



TERRAIN ESSENTIALS

A BOOK ABOUT MAKING WARGAMING TERRAIN

MEL BOSE

THE TERRAIN TUTOR

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BY

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INTRODUCTION

ARE YOU READY TO BUILD WORLDS?



Hello, I'm Mel Bose, this is my book, and I'd like to welcome you to a hobby that has filled my life with joy, given me a peaceful respite when life has been hard, but above all, enriched my life with my friends and with my children as we game together.

The miniature wargaming hobby is often a battle across a tabletop. It's that tabletop that sets the scene for the game, creating a world where the dice gods decide the fate of the figures below them, and the fates of the players who control them. This miniature world is called terrain and terrain-making is a hobby within a hobby, and if you are interested in making terrain and creating these worlds to play across, then you are a terrain maker, a Terrainiac, and part of a very special club.

Now, you may be a grey-haired, long-toothed Terrainiac who remembers the days before terrain making got cool, or you may be completely new to the hobby, I don't know. So, I've written this book to start from the ground up, building section by section to give you a fundamental grasp on all the essential knowledge and techniques to make terrain for any location, time or genre. That doesn't mean this is a basics book and of no use to more experienced Terrainiacs; I've distilled into these pages as much knowledge as possible from almost four decades of passionate hobbying, including many advanced techniques and things born of trial and error, but in a simple way for all to enjoy. My intention was that you'd read the whole book, without skipping over descriptions of techniques that you feel you already know about – so I've tried to make sure that every section has plenty of nuggets of knowledge and experience. I've also tried to ensure that explanations are given at the point at which I think they'll be most useful, so if you don't find them where you expect, please keep reading!

Making terrain for tabletop wargaming is different from other scenic-modelling hobbies such as railroad modelling and diorama-making. Terrain is a functional item that has to work with a set of game rules, and so that functionality has to be factored into the build. Functionality is a common thread throughout these pages, so that the pieces you build will enrich the games you play. This doesn't mean that this book isn't for those Terrainiacs who build for other purposes; the techniques described in this book apply across all the scenic modelling hobbies, and seeing how others tackle different terrain projects is a good way to broaden your knowledge base.

There are many modelling books full of beautiful terrain pieces that we would all love to build. This book isn't like that, it's not a coffee table book, filled with photographs of beautiful terrain you wished you knew how to build. Instead, it has great looking terrain that you *can* build. Some of the pieces are simple, some are more realistic, but the knowledge you need to build them is included alongside the photographs. Mistakes haven't been hidden, or Photoshopped out, instead they've been left in place to show you that even someone who's been building terrain for years can still make mistakes and often does, so it's ok for you to make them, too. Above all, the mistakes have

been left in place to show you that they don't stop a piece being great-looking, functional wargaming terrain.

Throughout this book are various recipes for the common mixtures we use in terrain-making. But these are guidelines, not rules - materials and brands differ, as do the environments they are used in - so use them as a starting point, take the underpinning knowledge in this book, and adjust them to fit your needs. The same can be said for the various techniques I describe. All the core techniques of terrain-making are included, but if a different method works for you, use it.

Above all, I hope this book will either add to the knowledge you already have, or give you a foundation for the knowledge to come, because this is a hobby where you never stop learning or wanting to learn, and a solid knowledge base always helps.

Whilst terrain can come in many different shapes, sizes, and colours, this book focuses on the most common terrain types: the greenfield terrain that's common to many historical and fantasy genres, and the grey terrain that's common in popular sci-fi genres. But the principles and techniques included here can easily be carried over to other genres and scales with a little bit of thought and planning.

Welcome to Terrain Essentials, a practical guide to building good looking terrain pieces that make for a great gaming experience. We've got a lot of ground to cover, so it's time to crack on!

What do you want to build?



*This book is dedicated to Corben and Willow.
My finest creations, the reasons I do what I do.*



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READ THE INSTRUCTIONS

Terrain building has always had an “arts and crafts” feel and, in safety terms, most of the work done in basic terrain builds – making castles and the like – is no more dangerous than when we did that kind of thing in school. Most paints and glues are completely safe when used sensibly. Of course, care needs to be taken when cutting things with sharp blades but overall, as hobbies go, terrain-making is very safe. Common injuries are minor - occasional cuts to fingers or thumbs and little hot glue burns (more common than cuts for me) - meaning this hobby rarely results in the need for medical attention.

That is, until the tools and materials step up from the common blade, brush, glue and paint, to power tools, aerosols, and all sorts of funky chemicals.

Stepping up your terrain building often means switching from hand tools to power tools – with jigsaws, sanders, and rotatory tools all speeding up the build process. Extra care must be taken when using power tools to avoid accident and injury. Invest not only in the tools but also the safety equipment that goes with them. Safety goggles can definitely save you from a life-changing injury (they have saved my right eye from a fragment from a shattered Dremmel head in the past). A decent mask will protect your lungs from sanding dust and aerosol sprays alike, and gloves are an essential when working with resins and similar chemicals. As a good tip, if it's a tool or material designed for the hobby it will come with instructions. These instructions will typically be brief but very important. Reading them BEFORE using the tool or material is always a good idea!

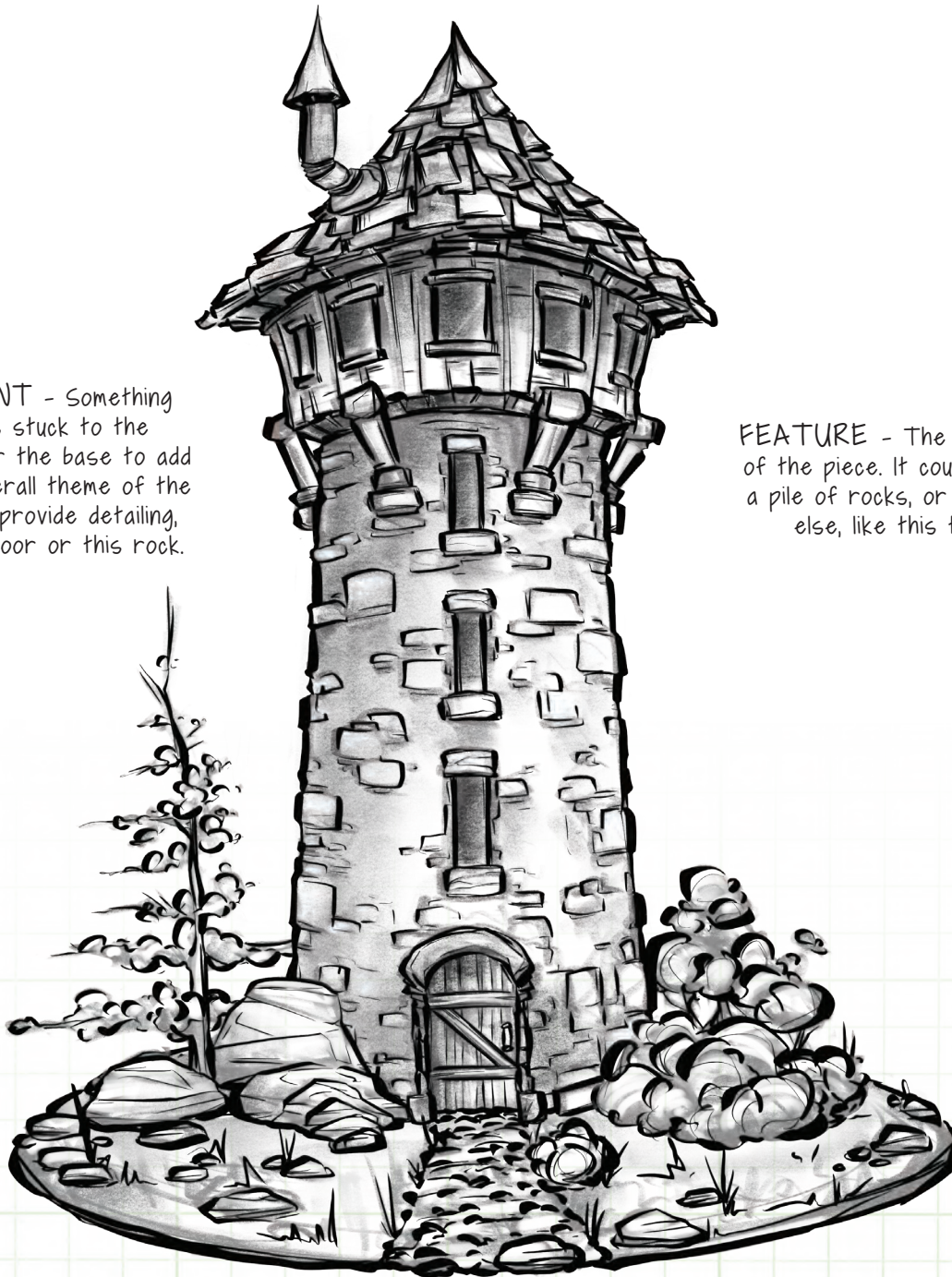
ESSENTIALS GLOSSARY

A GUIDE TO SOME BASIC TERMINOLOGY



When you're having fun with a hobby that can see you building not only everything on Earth, but also anything you can imagine, and then you try to put all that into a book, it's important to aim for some sort of consistency in the terminology you use. We've tried really hard to keep all of our core terms the same throughout each of these sections. Here's a look at those we use the most.

ELEMENT - Something that is stuck to the feature or the base to add to the overall theme of the build and provide detailing, like this door or this rock.



FEATURE - The focal point of the piece. It could be a hill, a pile of rocks, or something else, like this tower.

GROUNDWORK - The texture applied to the base that looks like a particular ground surface.

BASE - The piece of wood, MDF, or card that the feature is attached to.

GRASSWORK - The flock, scatter, and tussocks that are added to a base to help it blend in with the table.

BUILD - The process of creating a piece or set of pieces of terrain, from concept to completion.

SET - A collection of pieces of terrain that are designed to work together to represent a particular place or environment.

PIECES - Each individual feature of a set of terrain, typically given fairly obvious names like forest, hill, or pond.

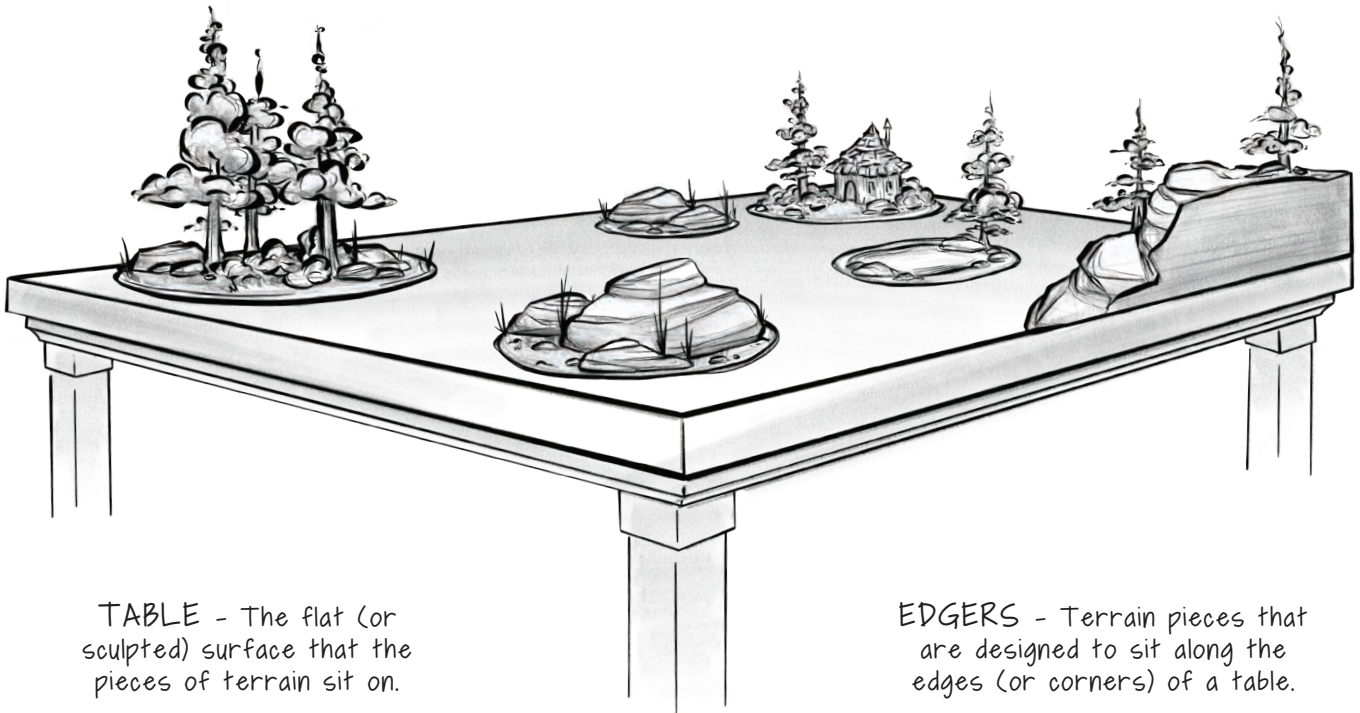


TABLE - The flat (or sculpted) surface that the pieces of terrain sit on.

EDGERS - Terrain pieces that are designed to sit along the edges (or corners) of a table.

BOARD - Still the most common form of table, a surface made from a single sheet of wood, cut to the appropriate size. Alternatively, the board might be cut down into smaller **TILES** or a **BATTLEMAT** may be used.

OTHER THINGS TO NOTE

Lengths: We are involved in a hobby where both metric and Imperial measurements are used side-by-side on a daily basis. In this book you'll find the use of millimetres (mm), inches (") and feet (') pretty much as you will find them used commonly in the hobby.

Weights: Pounds and ounces and grams and kilograms are also used almost interchangeably when describing the materials we use. As we deal primarily with ratios to create our recipes, we've tried to use whichever measure is most appropriate.

Ratios: We've taken a particular approach to the way we've presented ratios to maintain consistency. The ratio is presented in the same order in which the materials are listed. If the recipe is presented as "material A and material B in a 1:2 mix", it means that one part of material A is mixed with two parts of material B.

Example: "A 1:3 mix of PVA and water was then applied..." would mean one part PVA mixed with three parts water.

Particular Materials: There are a handful of regularly used materials that go by different names around the world. In this book, British terms are mostly used, although (on occasion) the US term may also be used.

Example: Filler is a paste-like substance used in construction to fill gaps between boards on interior walls. In the US, this is called spackle.

We hope that even if we don't use the term you are most familiar with, the context will provide sufficient clues for you to keep your build rolling along.

Green and Red Text: Throughout the book you'll find different paragraphs in either a green or red text. These are additional "top tips" (green) and important safety warnings (red). These are intended to be read in Mel's voice and help to take you a little deeper into the whys and wherefores of terrain making.

Icons: You will no doubt spot these three icons of Mel in various situations. These whimsical indicators are intended to point out (from left to right): The most important "top tip" on the page, an important safety warning, and one of "Mel's Rules"!



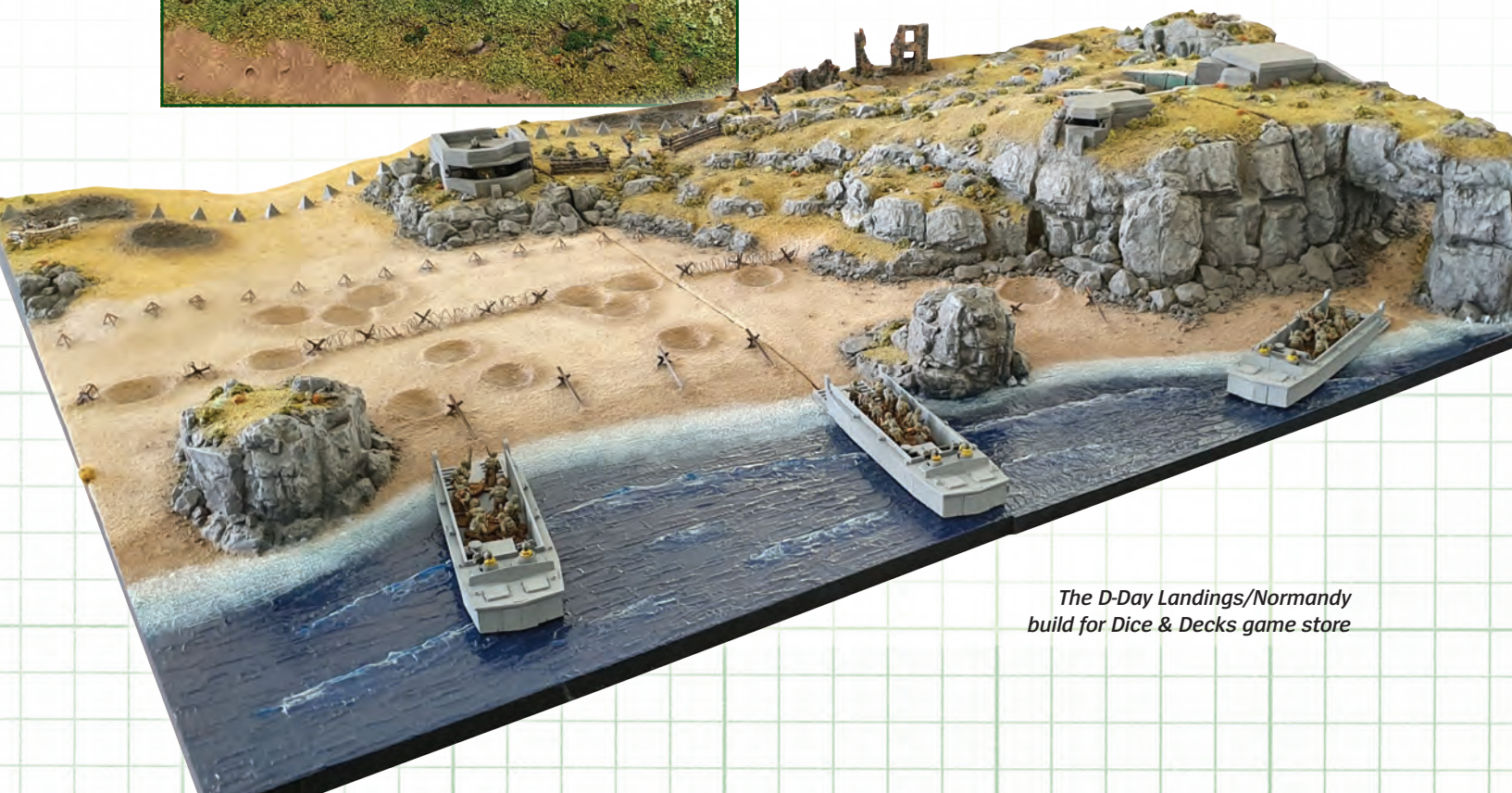
TIME AND ATTENTION THESE TECHNIQUES ARE YOUR FOUNDATION



Although I've worked on a lot of big builds over the years, we made the deliberate decision to work on smaller builds and sample sections for this book. The thinking behind this is that if you're comfortable building a 6" wide section of a cliff face, with a bit of practice, extra time, and a lot of attention, you can also build your own D-Day table (or any other table, really).

The techniques that I cover in this book are the foundations for your future projects and by using smaller builds we could fit more of them in these pages. This gives you a broader scope to create exactly what you want to create. With the solid foundation techniques we're confident that you'll find in this book, you'll be able to build worlds!

Now, let's get planning!



*The D-Day Landings/Normandy
build for Dice & Decks game store*

The Turf War Z build for Broken Spirit Wargames



The Frostgrave build for Osprey/4Ground

The Fabled Realms Map build for 4Ground



PRIOR PLANNING & PREPARATION PREVENTS POOR PERFORMANCE



Having an idea about what you want to build is only the start. Good planning is the key to building terrain that not only looks great but works well with the games you play.

In this section, we'll go through fleshing out your ideas and turning them into designs, as well as introducing a host of often-overlooked factors that are crucial for success.

SO, WHAT DO YOU WANT TO BUILD?

That's the wrong question really. Wargaming terrain is for playing games, and the desire to play with a certain set of rules, in a certain setting, period, or scale often dictates what needs to be built from the beginning.

The first question shouldn't be "What do you want to build?" but rather "What do you need it for?" It's easy to make the mistake of thinking that form and appearance are what matters most. Remember that the purpose of terrain isn't just to look great, it's also a functional element of the game. So it should strive to enhance gameplay as much as the visual spectacle. Losing sight of what it's being built for can result in pieces that don't work well with the intended ruleset or are difficult to interact with. The result is terrain that negatively impacts gameplay and the gaming experience.

During the planning phase, focus on what you are building the terrain for, then you can focus on making it look great in the build phase.

If you want to play Napoleonic naval games, for example, you're going to be building small scale coastal pieces and ocean boards, whereas if you want to play post-apocalyptic games you might be building a lot of desert-themed terrain and ruined buildings.

Gaming systems and rulesets often dictate the core features of what's to be built - the size of the table, the scale you build in, or even whether buildings and ruins will need ladders for movement between floors. They can also determine the visual style of your pieces; historical systems are often tied to specific geography and time periods. Similarly, the richly described world settings of some science-fiction and fantasy systems mean the look and feel of your terrain is pre-determined.

While rulesets, genres, periods, and scales are all factors that will influence what you build long before you plan it, you also have to consider where it's going to be used. Terrain is built for playing games, but the setting and purpose of those games varies greatly. Games played at home between friends have to fulfill different needs from tournament games, say, to make for an enjoyable game.

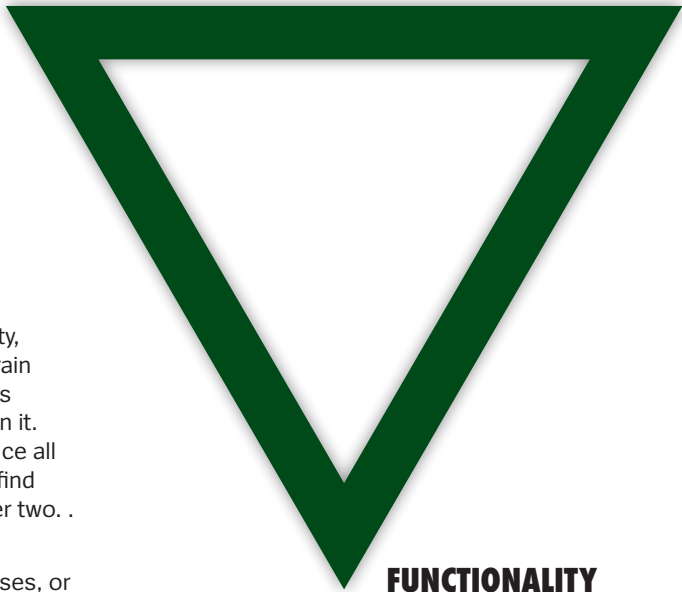
If you have a very clear idea of what and why you are building, there's no need to note it all down before you get started. However, if there are any doubts or grey areas, it's always a great idea to jot down your thoughts to help you focus your ideas and make the planning process smoother.

So, it's important the pieces you build work both to enhance the games being played on them, and for the community setting the game is being played in. And for that we have The Terrain Tutor's Terrain Design Triad!



DURABILITY

REALISM



FUNCTIONALITY

**THE TERRAIN TUTOR'S
TERRAIN DESIGN TRIAD**

Good terrain involves three key concepts: functionality, realism, and durability. These concepts cover the terrain as a gameplay enhancer, as a visual spectacle, and its purpose beyond the table and the dice being rolled on it. It can be incredibly difficult (nigh impossible) to balance all three concepts in a single terrain piece, so often we find ourselves sacrificing one in order to achieve the other two.

Wargaming terrain's functionality means things like balconies being made wide enough to hold model bases, or rooms being designed to accommodate a full squad. Your chosen ruleset might need features that allow movement through or over them, or it might require clear indications of building access points, or the boundaries of area terrain effects. A ruleset using true line of sight (TLOS) will have a considerable impact on the design constraints of your pieces, compared to a ruleset that uses a more abstract system. Ensuring buildings and ruins have plenty of windows or blast holes at the right height for the models using a TLOS system makes the difference between creating a key location to be defended and held in the game, and producing an "unusable" piece that models move around rather than interact with.

Don't think all your buildings have to have the maximum number of fire points. Changing the amount from build to build, or altering the side of the building they're on, can make a building easier to defend from one direction than another. This adds tactical considerations to make gameplay more interesting. Think about creating strong sides and weak sides.

It's not just gameplay that affects the design. The needs of the community setting also play a part, from the pieces needing to be easily, safely and compactly stored for club and tournament play, to demo boards that should be both simple to play on and visually spectacular to engage new players in the system.

All that functionality often comes at the price of realism. We might think that what makes a piece realistic are the scenic materials, colours and paint scheme used, but there is a host of other factors involved.

Buildings, stairs, landings, gantries – anywhere a model may be placed – may have to be adapted to accommodate bases. Even entire rooms may need to be designed around a set squad size; ceilings might have to be raised for the waving hands of squad leaders, ground may need to be levelled for top-heavy models, dense woods might need their trees spread out so players can reach in to move models. All these things (and many more) can change a replica into a (sometimes merely symbolic) representation, and thus realism is sacrificed for functionality.

The realism of a piece can also be impacted by the desire for reusability in different games, periods, and settings. Making terrain that has a wide number of uses generally means simplifying and standardising it. While this increases the types of games and setups that can be played, it comes at the cost of realism; nature is rarely standardised. The same applies to using a consistent build, paint, and flocking style across an expanding set of pieces; there will be more variation in the possible game setups but less variation visually. A dry stone wall on a grass base could belong in many settings around the world, across many different periods, but adding a 1970s British signpost ties it to a very narrow region and time. Little details may enhance the realism of a piece but only at the cost of reusability, particularly if those little details are man-made items.

The durability of a piece is determined by necessity, and depends on the use over its playable life and the estimated level of care a piece will receive from those using it. Neglecting the need for durability almost certainly means repairs will be needed sooner rather than later.

Durability depends on the design as much as the materials and techniques used. Tall, rickety towers may look great and enhance gameplay but, if parts are fragile or extend too far, it's better to remove them in the design stage than in the middle of a game with an inattentive wave of the hand. The same applies to trees and the like – delicate armatures lightly covered in clump foliage will shed and snap with heavy use, and realistic grass will be worn away as much by setup as by gameplay.

You don't always have to lose the detailed stuff; trees can be tucked against taller walls, or in the middle of more robust trees on a woodland base. You can have all those lovely fragile details but put them in places rarely touched by models and fingers. If you can't, brace them in the build stage and give them a good sealing at the end!



Mel's Rule No. 43 - If you had written it down, you'd know it now!

DOING IT FOR THE COMMUNITY!

Certain common gameplay settings benefit from particular balances of the Design Triad.

The most common setting is **home** play: games played between the terrain builder, their friends and family. Builds in this setting can sacrifice durability for increases in functionality and realism. The builder knows it's going to be well handled, not misused by the players, and has the tools, materials, and experience to fix it quickly. This decreases the need for durability, allowing for more focus on the other two concepts for good gaming experiences.

Of course, if you're playing with young players, durability becomes more important. The younger they are, the more emphasis you need to put on the durable point of the triad. If you're starting your kids young, you have to accept that the pieces may be used for anything from a toy dinosaur park, to propping up a tablet. So you might as well plan for it, it's better that way!

Club terrain tends to give up a little realism for a boost in durability, and functionality. Club members can generally be trusted to look after the terrain they use, but not as well as in a home setting, so durability becomes a more important factor than realism.

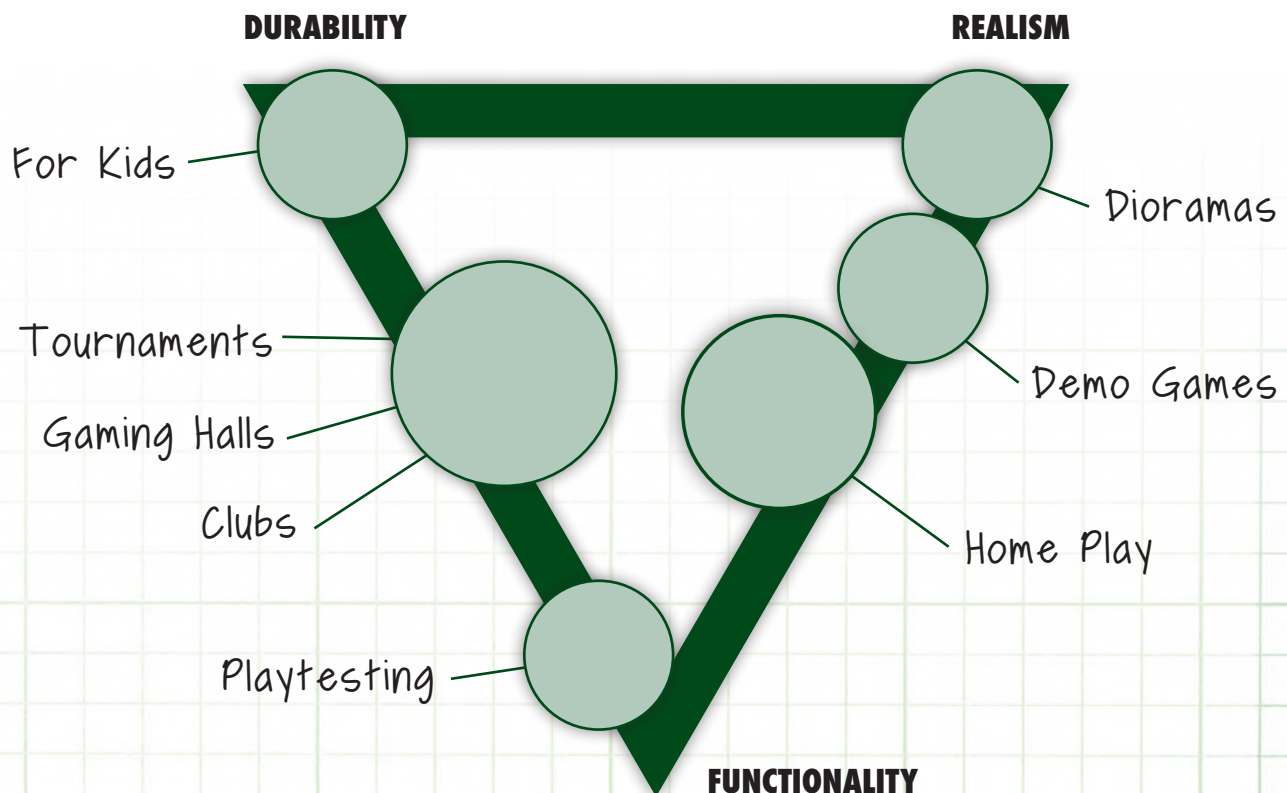
The key member of the triad, however, is functionality. Factors like cost, build time for mass production, standardisation across multiple rulesets, and ease of storage all come before realism. Cost and build time matter because of the club's need to fill lots of tables as quickly and cheaply as possible. And typically the burden falls on the sole terrain builder at the club (and whoever he can drag/coerce/blackmail into an evening's club building session).

Sets need to be standardised in terms of colours and styles because it speeds club night setup. Many clubs run on a "green set" and "grey set" principle - most of their gaming boards will either be green or grey, with a few extra sets for naval, snow, desert, and space games, etc. Standardisation also helps with reusability across different gaming systems, and genres. Specific setups, like a heavy woodland board, can be created by pooling all the woodland pieces from the club's multiple standardised sets.

Storage is another key factor for clubs, with pieces being designed to stack on top of each other, or base sizes limited at the planning stage by their future storage boxes.

Nearly all these functional needs result in a drop in realism, but no terrain sacrifices realism more than tournament terrain which has all the needs of club terrain but with two additional, very important, functional needs. Tournament gaming is about competitive play and so the terrain needs to perfectly align with the ruleset being used. No tournament organiser wants an unhappy player complaining that a ruling on, or a misunderstanding about, the terrain didn't go their way and cost them the game. The phrase "I don't care if it looks great, if it's going to cause an argument, get rid of it!" is common in tournament terrain-building sessions. This "rules before appearance" principle can lead to multiple sets being built to exactly the same design so they can all be laid out identically. This means no table offers an advantage over another table, balancing the effects of the terrain across all the tables.

Tournament terrain tends to sacrifice realism for a boost in durability, sometimes to the point where pieces become symbolic representations, rather than scenic items, so that they can take the mishandling they often suffer. It's also handy to have a simple build and paint scheme if you regularly have to touch up and repair multiple sets of terrain.





Gaming halls sit in the same region of the triad as club and tournament terrain. **Storefront demo boards**, however, require a completely different balance.

Durability is not so important here since they're used relatively infrequently and are often handled by a staff member who's responsible for their care. Greater emphasis can be put on realism and the visual spectacle to draw people towards the game being demoed. The gameplay area may well utilise only the ruleset's basic terrain rules, allowing games to flow smoothly, and ensuring the players are engaged in the mechanics and visual setting. The primary function of the demo board is to encourage people to buy the game.

There are also less common settings too, where you will need to work out the triad balance for yourself. As you do, don't think of the triad as a strait jacket, but rather something that guides you both during the planning stage – to ensure that the design meets its needs – and during the build process, so that the right materials and techniques are used to produce a piece that meets those needs. Thus the piece will enhance the game for those who play with it, which is usually the whole point.

FROM DREAMS AND IDEAS, TO LISTS AND REFERENCES!

Once you have established the needs (and the triad balance) of a build, now you can ask the question, "So, what do you want to build?" This question is often met with an awkward silence – we have an idea of the type of terrain we want to build but that's a long way from individual designs and detailed build lists.

The ideas and inspiration for a build can come from anywhere: a photo in a rulebook, a five second clip in an old sci-fi movie, a passage of text in a novel, a desire to replay

a battle from history, a walk with the family, a childhood memory, or even a dream. It really doesn't matter where your idea came from, it's the idea itself that matters. Now is the time to flesh it out, and that means research! There was a time when research meant looking through photos, magazines, books, and films, but now all that and more material than you could ever use is online, so make the internet your research friend!

With so much material at your fingertips, it's easy to become overwhelmed and distracted by details. To avoid this, split your idea into elements and make a list: the overall concept, building styles, colour schemes, and even tree species and appearance. Once you have your elements listed, tackle them one by one.

For interesting ideas, just add the word strange/weird/unusual/awesome to the start of any of your Internet search terms!

Don't try to find stuff that exactly fits what you are looking for, you don't have the time to be making those decisions on the fly. Be relaxed and carefree. Even if it only slightly interests you, grab it, stick it in a folder and move on. Otherwise you risk ending the research session with a light folder and plenty of frustration. Be gluttonous, devour everything that tickles your terrain-making taste buds. The point of the research phase is to gather information, not make decisions, so fill your folders as full as possible – concept art, photos, PC gameplay clips, links to video segments, blogs, and tutorials alike.

The research phase is also about creating a wishlist of what you could possibly build. From individual terrain pieces to roofing styles, from entire subset ideas, to little groundwork details, to crazy feature build concepts. If at any point you think "Oh, that'd be good" or "I need a couple of those",



Mel's Rule No. 21 – It may look good but if you can't put models on it, it's no bloody use! The Battle for Wobbly Model Ridge!

for any part of the build, big or small, get it on your wishlist. Take the same gluttonous approach to filling your wishlist like you do with your idea folders.

Once you have created your pools of research material for the various elements and your wishlist is full of ideas, it's decision time. Now, the objective is to narrow all you've gathered down to usable reference material and an organised build list.

Establishing your reference material is done by browsing through each of your idea folders and picking a single theme or style. It won't always be easy. There's no shortcut for deciding which type of trees you want or what colour to paint your sandbags. Just take your time and be honest with yourself. This is all about how you want it to look. If you can't decide, leave it, move on to a different element and narrow that down before going back. This process is best done in waves, each pass narrowing your research material further and further until all that's left is just what you need to make the terrain look the way you want it to.

Turning your wishlist into a build list comes down to deciding what are the best pieces for the games you want to play and then prioritising them accordingly. Imagine the setups you could create from your wishlist and imagine what the common battlefields would be. Once you know this, look for the most common features across them. Those features will become your core set. Green sets usually have hills, woods, and bushes, while grey sets often have ruins, rubble, and roads but your core set depends on your personal preferences and what you need from your terrain.

If you are planning a single set with no intention of expanding it in the future, then include one or two small,

feature centrepieces, to give your terrain collection a focused setting, so it's more than an abstract collection of the common features you would expect in that setting. Players like to have something to battle over.

After you've defined your core list, go back through your wishlist and break it up into expansion sets. A core green set could be expanded with a collection of pieces representing a farmstead, or a modular river, while a grey set could be expanded with an industrial facility or a set of bunkers and barricades. Ordering your future build list this way allows you to expand your set for specific settings which is much more rewarding than randomly adding unrelated pieces from your wishlist.

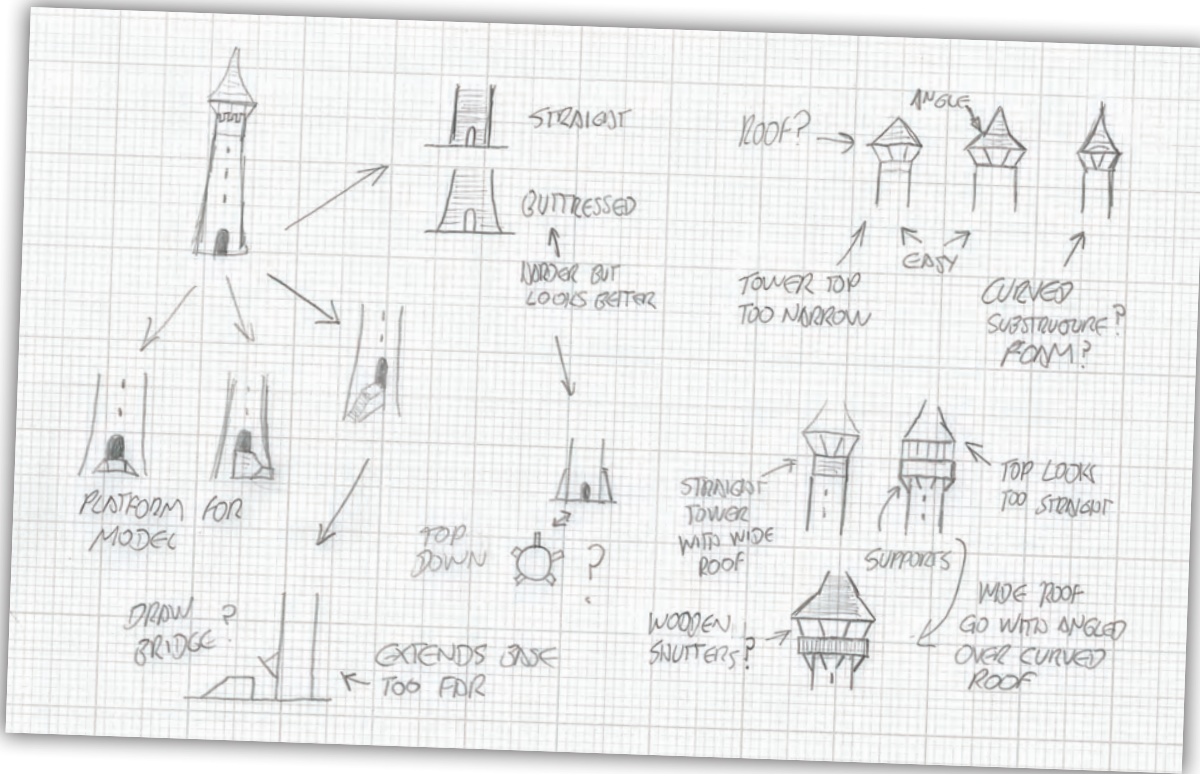
When you're doing your expansions, always throw a couple of the original core set pieces onto the build list. A new themed set may allow you to play in a different battlefield setting but expanding your core set means you can also play on larger or multiple tables!

When working out your future build lists, save building the centrepieces to reward yourself between building your themed sets. This may encourage you to complete the more mundane stages of the build process, and will allow you to apply the things you've learned while creating that set, to the centrepiece to crown it. You'll also be able to focus on it without the distraction or workload of multiple pieces that typically comes with set building.

Now you know what you want to build and what it's going to look like, it's time to put pencil to paper!

Dream for the Glorious, Wish for the Grand, Plan for the Practical, but Build what's Achievable!





TO PENCIL AND PAPER, AND CARDBOARD!

Of course, you could jump straight into building. Simple pieces can be started without any real designing or planning, but for more complicated pieces, like sets or boards, even a little paperwork can save you from disaster and prevent you from making pieces that, once built, don't work for the games you want to play.

The process of detailing your ideas is split into two main phases; sketching and planning. During the sketching phase, your ideas come together and are developed, forming a design which is then refined in the planning phase to produce a final build plan.

What type of sketches and plans you create depend on the build type. For features like hills, buildings and woods, elevation (side-on) plans confirm visual style elements, whilst floorplans (top down) can be used for overall size, base footprints, and to refine any functional needs such as model placement. Floorplans for roads and rivers are more useful than elevations as their planning is more focused on ensuring that their modularity works, whilst sets and boards use floorplans to focus on terrain density and other gameplay elements for enjoyable games.

A detailed final plan of a build isn't done in a single drawing, but rather as steps, starting from simple sketches, slowly being refined as details and aesthetics are confirmed, bit by bit, until it takes the shape of a final concept design that can be used to draw up scale plans.

Time spent planning is never wasted, but it is often seen as eating into/getting in the way of build time, or precious gaming time. When you think of how long you will spend planning a piece, don't compare it to the time it'll take to build it, compare it to the time it'll be played with over the years. Putting in a bit of extra time at the start always seems well worth it when it's put like that.

Sketches

Sketching is putting your thinking process on paper – taking the ideas from your mind, conceptualising them, and refining them until you have a design you are ready to plan out.

Sketches are about what feels right. It might be confirming that two style elements that you like actually work together – such as a roof tile style from a film and a chimney stack you saw in a PC game. It may be confirming that measurements of a church nave and tower look in proportion, or checking that the board space can fit a certain number of pieces, or a building can accommodate a certain number of troops. It's always better to find these things out on a piece of paper before the build, rather than on the tabletop after it.

Keep sketches small and loose, with as little detail as possible; drawing them should be quick. Draw them in pencil but don't erase and change bits, instead move on and do another sketch. Constantly erasing and redrawing can be frustrating, and you might erase elements you could combine into later sketches as ideas evolve and are refined. Don't worry about lines being straight and angles correct, or making sketches look nice, they don't need to be at this point. Instead focus on the ideas and developing the design.

When you're sketching, it's easy to say "Nah – don't like that" but that doesn't help you with the next sketch. Ask yourself why you don't like it, note it down and then use that as a focus for starting your next sketch.

Keep going with this process of sketching, checking, and refining until you have a sketch of a design you are happy with. The next stage is to turn this design into a scale plan for the actual build.



Mel's Rule No. 36 - Yes, your measurements are right but what's the point of all that fancy detail if you didn't double check your plans?

Plans

Scale plans are proportional illustrations of your designs. They are the reality checkers of the design process and once finalised, become your guide during the build process. Just as designs come from the refinement of sketches, final plans come from the refinement of designs, although now, refinement means little adjustments to make the design work, rather than the larger changes of the sketching phase.

Plans can be produced on a PC CAD program, but for paper plans, you will need gridded graph paper, a fine tipped pencil, an eraser, a ruler, and coloured pens to highlight important points. First, decide what scale ratio to draw your plans to. Ratio shows the paper size to the real life size. If one centimetre on paper represents one metre in real life, the scale ratio is written as 1:100. The scale to use is often decided by the size of your paper but also, how much you intend to rely on it during the build phase.

The planning phase is where many little problems arise, like the thickness of build materials making a corridor too narrow to fit a plastic doorway, or a woodland base only having room for five big trees instead of seven, or even a room only being able to accommodate a squad as long as it doesn't have a support weapon with a larger base. These issues are fixed with little adjustments to the design rather than complete redraws. Keep going like the sketching phase until you have a final, refined plan of your build.

For the purpose of design refinement, scale plans should be as large as possible - to a maximum of two thirds of the paper - so they are as clear as possible but have room for changes and notes. For use as a guide in the build phase, they should still be large and clear, but choose a scale that makes the mathematics of measurement-checking for cutting as easy as possible.

If maths isn't your strong point, forget the actual scale ratio, think in measurements. Look at the graph paper and count the boxes as measurement, like four boxes to an inch, then mark up the margins like a ruler. That way, all your measurement checking is a matter of counting boxes, rather than the maths that comes with the ratio method.

To start the plan, draw the outline of your major features, such as the front of a building or the shape of a pond, adjusting as necessary. For floorplans, start in the centre of your paper, allowing expansion of the design in all directions, whereas elevations should start at the bottom centre of the sheet to allow for expansion upwards and to both sides.

I always find it handy to put my best sketch in one of the empty corners of the page, along with any important notes for reference purposes, so I don't lose track of the original idea

Remember that build materials do have a thickness, two identical walls made from 5mm foamboard put together in a corner will result in one side being 5mm longer than the other, so factor that into your plans.

Next, position the key details – windows and doors in a ruined building, or in the case of a pond, a small fishing pier or an area of reeds. Templates, either commercial or home cut, speed this process up greatly. Scale cut outs are a great way of working out positioning or checking that models will fit in place.

Once you're happy with the positions of the details and after you've checked all the important measurements, the final step is to clearly note the measurements and anything else you will need to guide you through the build stage.

At this point you are ready to start building, but given the nature of wargaming, and the size of the pieces and the tables to be used, it's worth taking the opportunity to refine the final plan in playtesting.



TERRAIN DENSITY

For boards and sets, the amount of terrain to use depends on the game. A table's terrain density is shown as a percentage, or ratio of the space the terrain takes up, compared to the total table space. If all the terrain pieces in a set, when bunched up together, take up a quarter of the table, its terrain density would be 1:4 or 25% (like the tables above).

Different game types require different terrain densities for good gameplay. Rank and file games require the most

clear playable space, meaning a terrain density of 10-20%; squad-based games need 25-35%; skirmish games using just a few models need 40-50%. A terrain density over 50% will start to hamper gameplay, and a good board shouldn't be a struggle to play on.

Always plan your sets' terrain density higher than needed, it's a lot easier to leave a piece off the table than it is to build another piece. For boards, plan for a lower terrain density - adding is considerably easier than taking away when a board goes wrong!



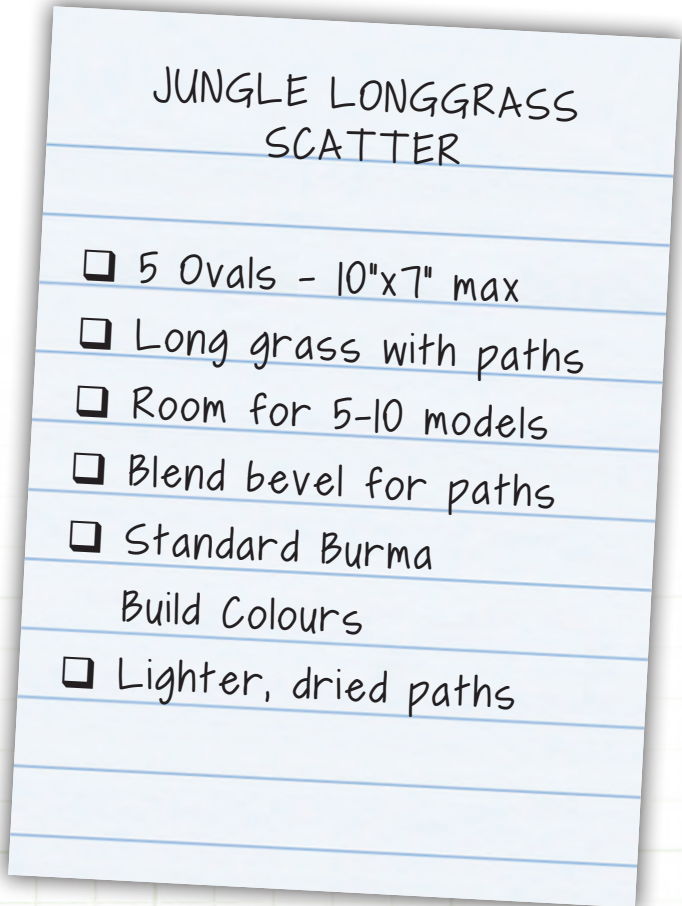
Playtesting

Since the floor plans of many terrain pieces can be drawn on a large piece of paper at true 1:1 scale, we can use real models to check gameplay elements, such as model placement. For set planning, this can be extended to paper cut outs laid on a gaming board to check terrain density, or even playing games with them to check your set plan works. For feature boards, wallpaper pieces taped together can easily give a full board surface for planning and testing.

Nor need you be limited to a purely 2D top-down approach. With corrugated cardboard, a blade, and a hot glue gun, you can easily mock up a true scale version of most sets, especially buildings, in a short time. This not only gives you the opportunity to playtest your design, but also provides something to play on while you build the proper set.

The ease and speed of making cardboard mock ups also means gamer friends can usually be encouraged to help with making them, often adding a few mock ups of their own design, and you can acquire any good ones for future builds.

The Terrain Tutor's Terrain Testing Team are models pulled from across multiple genres and systems, that are so awkwardly posed, they'll challenge any terrain. If your terrain can handle these troopers, it'll handle any squad you throw at it. If you have problem terrain to plan and build ... if no other model can help... and if you can find them in your collection ... maybe you can have ... a TTTT team!



YOU ARE ALMOST READY TO BUILD!

With your ideas turned into designs, checked, refined, and your final build plan drawn up, the design and planning process is done. Plans are a guide for the build process, but it's common for things to change on the fly as necessities and desires dictate, just remember to update your plans when they do!

With all your designing and planning done, it's time to check if you have the right tools and materials to make the build happen, and that means getting all your whatchacallits in order.

THE WHATCHACALLITS

ESSENTIAL TOOLS AND MATERIALS



Terrain making can involve a wide variety of materials and tools from many different hobbies and industries. From humble house paints to industrial resins, from construction materials to casting powders, Terrainiacs will no doubt amass considerable collections of tools, consumables, and supplies. Some of these will be more useful, or used more often than others, and this section is a guide to those essential items, as well as an overview of the items most commonly used in terrain making.

THE BARE ESSENTIALS

Your journey into terrain making can be relatively inexpensive, as most terrain pieces can be built with a small set of core items: **Tools, Consumables, Materials,** and **Scenics** – all of which you may already own or can purchase easily. If you are just starting out, I recommend you assemble this set as a single task, rather than just getting the bare minimum. If you find you lack the items for the next stage when you are making good progress, your build will come to a grinding halt and you risk sabotaging your motivation to continue, meaning the piece never gets finished. Acquiring what you need to build what you have planned is an important part of the pre-build process, so gather your resources first.

Everything on these pages costs less than your average wargaming boxset, but don't think of these things as a 'starter' set, but as a CORE set. These ARE my core tools and materials that I build my terrain with!

Tools

A retractable, snap-off blade will cover your essential cutting needs when it comes to working with the core materials. Its retractability gives you a short blade for precision work, and a long blade for foam work.

A metal ruler is also an essential when using a blade for straight-line work.

WARNING – Be careful when cutting. Keep fingers and body parts well away from the cut line. If a cut feels awkward or forced, stop, change your technique or tool. It's easy to fix a bad cut during a build, assuming you have the fingers to do so!

Children's craft brush sets are excellent for terrain. The range of brushes means you have the primary brush types, their sizes suit terrain well, whilst their 'designed for children' sturdiness means they can stand up to the more punishing terrain jobs.

Yes, 95% of my paint work is NOT done with posh artist or scenic modelling brushes, but with children's paint brushes. It's not about what the brush is called, or who it's marketed at, it's about whether it's good for the job, and kids' brushes are great for terrain!

Consumables: glue, paint and filler

PVA glue (also called wood, white, and craft glue) is widely available and is the primary glue of terrain making. Used from the beginning to the end of the build process, it's definitely an essential item.

When it comes to paint, interior, matt, ceiling and wall paints are the best option with regards to quality and cost. Sold as tester pots, a core set of browns and greys can cover most painting needs from ground work and rocks to ruins and rubble. Cheap craft acrylics are great, cost-effective paints





for detailing work, and a set of browns, a black, and a white are the essentials, terrain-wise.

Filler (also called spackle), an air drying paste used in decorating and construction to fix cracks in walls, is another terrain making essential. It is used in various ways, from blending foam pieces together, to creating undulating or textured ground. It can also be used to texture buildings or put a hard coat on foam hills prior to painting.

Materials

Expanded PVC foamboard (EPVC) is great for bases because it is workable with a blade, and standard polystyrene foamboard is cheap, easy to cut, and sturdy enough for buildings and ruins, amongst other things.

White expanded polystyrene (Styrofoam), is a core landscaping substructure material for hills. It's workable with a blade, can be glued with PVA, and takes acrylics and house paints well.

Cardboard, both the cereal box kind and the corrugated kind, are useful in the build process.

Coffee stirrers, lollipop (popsicle) sticks, cocktail sticks, and bamboo skewers are regulars in modelling wooden builds and, like cardboard, are easy to source.

Scenics

Sand, grit, and gravel make up the bulk of your ground-texturing materials. You can grab your own from local sources, and they are also sold in tubs by hobby stores, along with the scenic scatter, flocks, and clump materials used for grass work.

It's common for your first terrain pieces to be textured and grassed up using leftovers from model basing tubs, and if you've got them, use them, but railroad hobby stores generally offer the best value for money for restocking your scenic materials.

These core items are available through arts-and-craft, hobby, and DIY (hardware) stores, or can be acquired for free if you don't mind foraging. They are the essentials of your terrain making set, and once you have them, you have everything you need to get started.





TOOLS OF THE TRADE

Creating terrain is a 'hands on' hobby. It's about creating physical pieces in a process that draws on many craft and artistic practices, which means the average Terrainiac uses a very wide range of tools, some more important than others.

90% of your work will be done with a handful of tools – your regulars – and another 9% will be your occasionals, for tricky bits and specific jobs. The final 1% are just for that one difficult job that they make so easy.

The Slappers

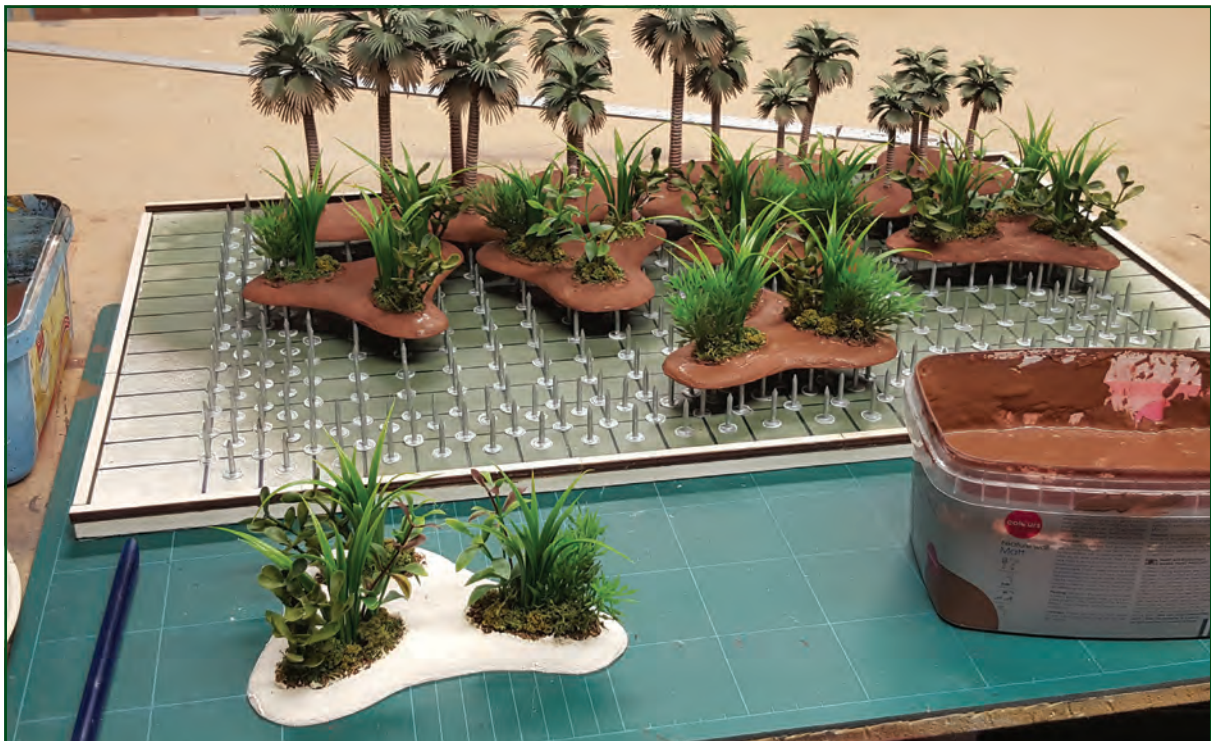
Whether putting down PVA for your first hill or sealing a finished piece with varnish, brushes are used throughout the build process, making them a core part of your regular toolset. When it comes to terrain, there's not a vast difference between the results you get with expensive brushes and those from cheaper ones, but having the right brush for the right job makes a huge difference.

Buy cheap rather than expensive brushes for your terrain work. Care for them but treat them as ultimately disposable. That way, when you come to a technique that may ruin a brush, you can say 'bye-bye, Mr. Brush' and crack on with getting the technique right completely guilt-free!



Reliables - The larger brushes from children's craft sets are great for all the general brush jobs. Made of synthetic fibres, their fine bristles make them great for laying down glues, paints and washes in smooth, even coats, while their firmness and durability means they are good for overbrushing and dry brushing, so they cover most of your terrain building needs.

These cheap brushes tend to shed bristles, so give them a good drybrush without paint or water as soon as they come out of the packet. A good minute will usually shake out all the loose bristles, leaving you worry-free when you use them.



DRYING RACKS

It's not just about the tools used to coat the pieces in wet stuff, there is also what your pieces are sitting on whilst they dry. Terrain making can be messy work and unless you have a dedicated work area you will need to protect the surface you are working on. A large sheet of thick corrugated cardboard is often all that is needed, but drying racks can offer so much more than simply keeping your work surface clean.

One of the challenges you'll face when painting up your pieces are things like handling a piece as you apply a heavy basecoat whilst avoiding sticking your thumb on any reactivated aggregates. More challenging is ensuring pieces soaked with a PVA sealing coat don't get stuck to whatever they're resting on. This can lead to propping up pieces on bits of foam or with paint pots, but a drying rack can solve all these problems.

Drying racks hold the pieces up from the surface, meaning that they don't need to be touched when priming, basecoating or sealing, but also they don't stick to the surface they're resting on when soaked in PVA. You can think of drying racks in the same way as you think of cake cooling racks, and silicone versions can work well for small projects. For the larger projects you're best off creating your own.

A simple sheet of EPVC or MDF, a handful of roof felt nails, and a little superglue is all that's needed to create a large drying rack. The key is making sure the nails are placed close enough together that even small pieces can be placed on the "bed of nails" without balancing problems. Adding a rim around the edge of your rack helps prevent excess PVA running off but is not essential. With your drying rack built, you'll be basecoating, priming and sealing away without any worry about making a mess on your work surface!

Tough-uns - White-bristled, hog hair brushes are for your tough work. Commonly used in oil painting, they are incredibly tough, and so perfect for all your stippling work. Their bristles tend to absorb moisture which makes them great for controlling excess water when working with filler. Black-and-grey, badger-hair paint brushes are slightly less firm but have the same absorbing qualities, making them great for large-area dry brushing.

Dandies - Acrylic nail art brushes have the softest and finest of bristles. Sable brushes are the softest, but the firm synthetics are better suited to terrain building. They hold liquids well and apply paints smoothly, while their fine tips and flat heads are great for detail work, from base-coating, to fine dry brushing.

Bigguns - The smaller house brushes, especially, older, worn, synthetic brushes, make very good large-area dry brushes for board work.

The key to getting good results doesn't just depend on the right choice of brush but also on the care of that brush. Rinsing between colour changes may remove most of the previous colour but it still might tint your new colour if it isn't completely rinsed out. Paint caught at the ferrule can cause the bristles to spread and may even come back to haunt you the next time the brush gets wet, even if it's months later. After a session, wash your brushes with soap, rinsing and repeating until no further pigment comes from them.

A little cross-tinting can be a great way of blending colours on the fly but if you want to avoid excessive washing, you should swap brushes. While you're working, put a clothes peg on the brush handle and suspend the brush body past the ferrule in your paint water to stop any paint drying while you work. This makes clean up at the end so much quicker!



The Appliers

As well as brushes, there are a few more specialist tools for applying your wet materials and working with the not-so-wet ones.

Dabbers - Kitchen sponges, kids' foam brushes, and sea sponges all make great paint stipplers. Simply rip and pluck at them until they are irregular and ragged. Foam works well for chipping effects, and sea sponges are great for large-area stippling, from concrete effects to ocean and water work.

Squirters - Typically used in the sealing phase, spray bottles are excellent at broad-coverage pre-wetting and sealing. Perfume misters are perfect for pre-watering tasks. Syringes, depending on their size, are great for more focused sealing, while turkey basters can be used for large-area sealing

From experience, cheap squirters always perform better than pro versions. Discount window cleaner bottles are the best because they're designed for fine, even misting and are easily replaced when they clog.

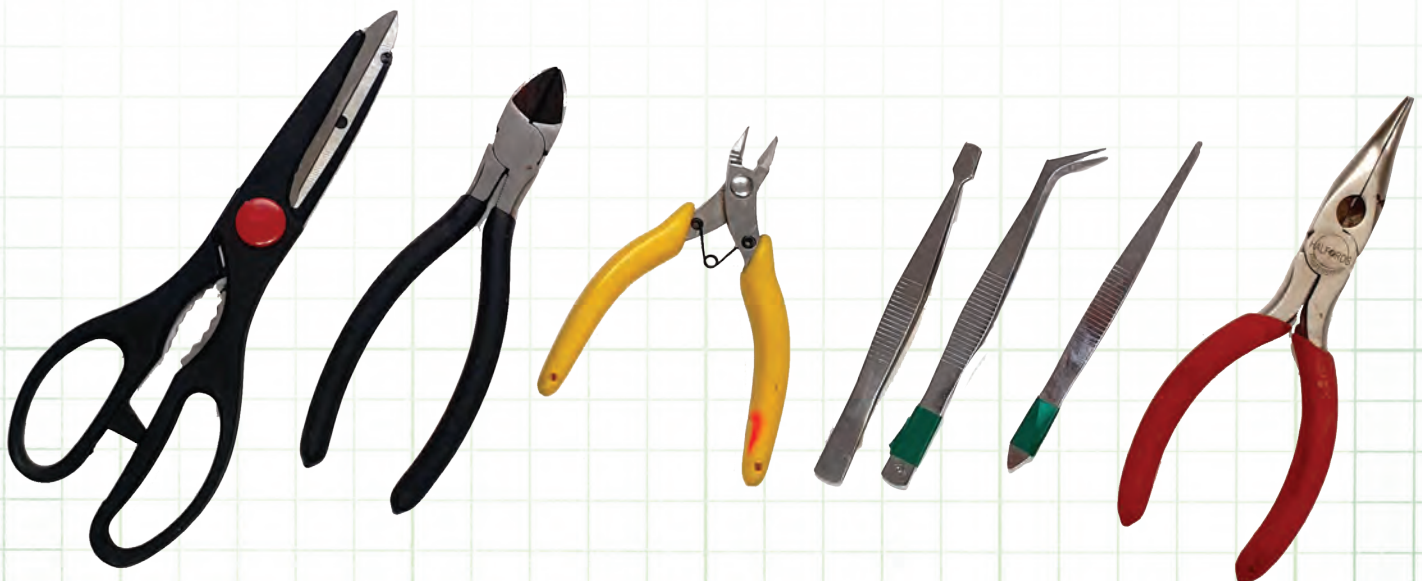
Smearers - Palette knives are for working with pastes, from base work with filler and rock work with clay, to shaping waves with acrylic, heavy gels. Plastic palette knives are more durable and firmer than budget metal ones which snap easily, making the choice either plastic or pro.

The Builders

Although applying wet stuff to dry stuff is a major part of the build process, you need something to apply it to, and for building that something, there's a whole host of different tools.

Clippers - Wire snips, clippers or cutters are good all-rounders and do the bulk of your wire- and wood-cutting work, although kitchen scissors are better for tough lollipop sticks. Heavy duty clippers are needed for heavy wire work.

Grippers - Tweezers come into play when laying down fine foliage such as tufts, while heavy duty pliers are good for gripping work and bending wire, especially tree armatures. A set of clamps can come in handy when working with difficult pieces, and rubber bands are essential for most pre-bought kits.





Cutters - A retractable, snap-off blade is my go-to tool for cutting. Scalpels (X-Acto knives) can be handy for more fine-detailed work, while a Stanley knife is good for working with more durable materials. The serrated edge of steak and carving knives makes them great for shaping foam.

Straights - Metal rulers are essential when cutting, with a 12-inch ruler covering most of your needs, and a metre ruler being needed for larger builds and boards. Metal set squares are handy for ensuring cuts are square, especially with foamboard walls for buildings and ruins.

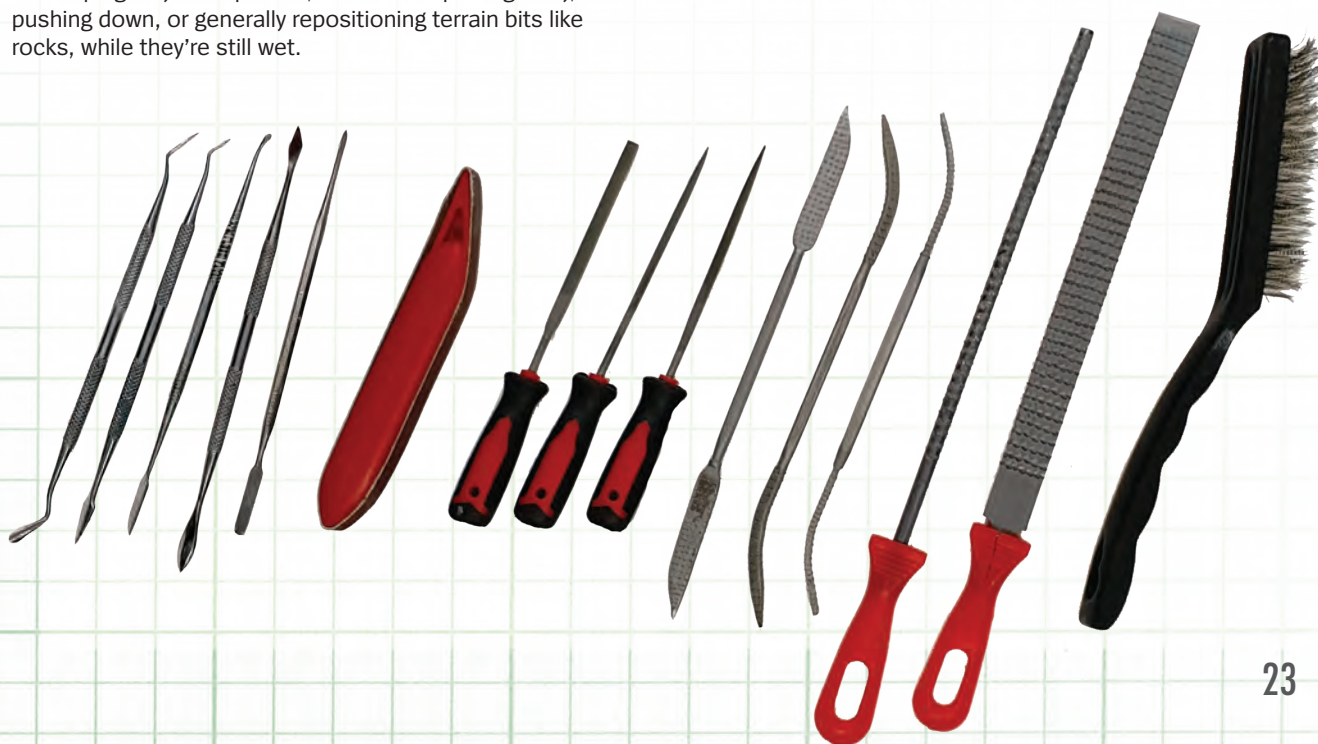
Saws - Fine-toothed diamond or jewelers' saws are good for working with balsa wood and hard plastic kits. The manoeuvrability of coping saws makes them great for rough-cutting shapes out of sheets of foam, whilst a junior hacksaw is good for dowels and board battens.

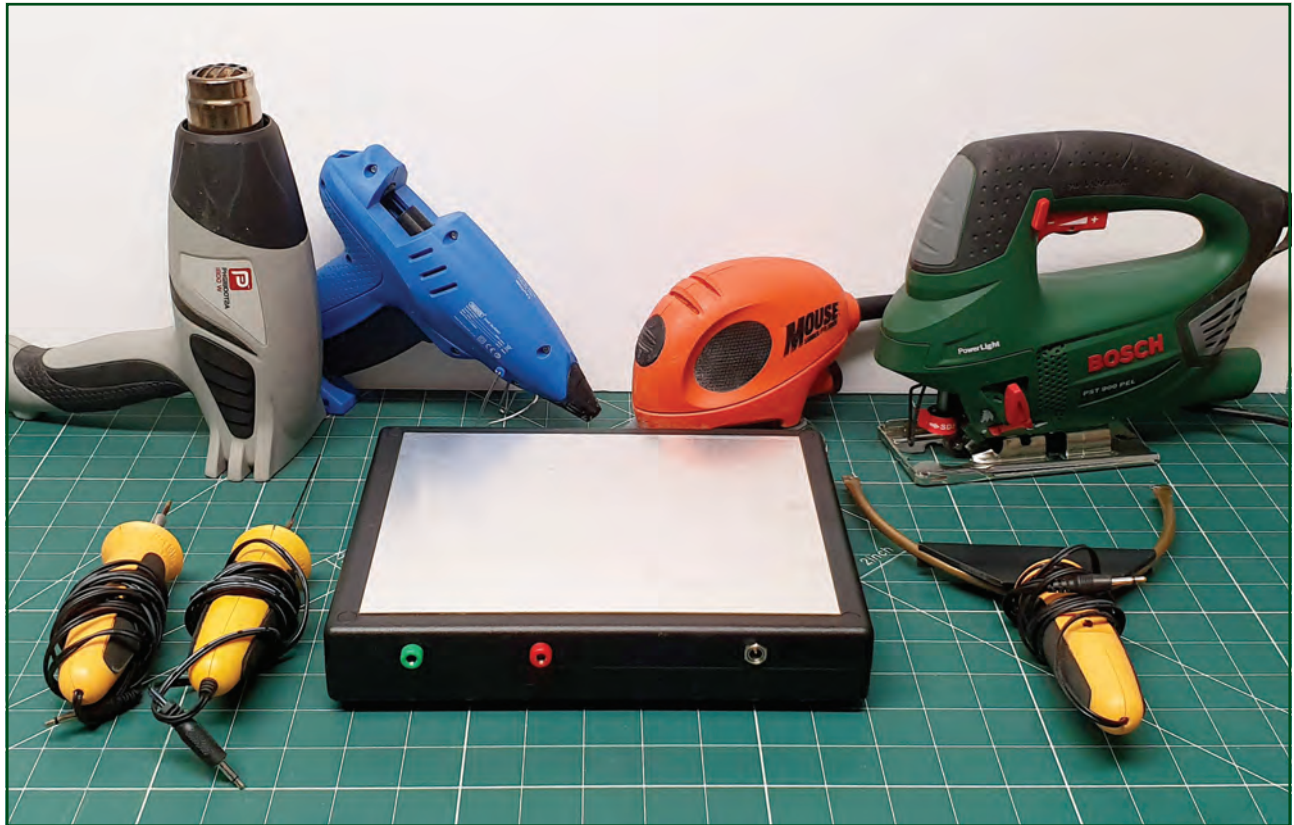
Drillers - A pin vice drill is a handy tool to create mounting holes for pre-built trees, or to make recessed holes for magnets on more versatile, modular builds

Prodders - A set of metal sculpting tools are great, not just for shaping clays and putties, but also for picking away, pushing down, or generally repositioning terrain bits like rocks, while they're still wet.

Grinders - Needle files are good for working with wood and plastic alike, cleaning up cuts or mold lines, and a replaceable hobby file is a great all-rounder thanks to its size and shape. A sanding block with accompanying sand paper, usually 80 to 120 grit, is well suited for terrain making. Rasps are in no way essential but can be handy for shaping details in foam. Barbeque cleaning brushes, both plastic and metal, work well for texturing wood and foam, as well as for clean-up tasks.

Cutting mats are brilliant working surfaces but you can work on just a sheet or two of corrugated cardboard. Be aware of how deep your cuts are going and of the surface under the cardboard (like the kitchen table that now resides in my studio because it can't reside in our kitchen anymore). From experience, careful cutting and cutting mats are cheaper than new kitchen tables.





The Specialists

The following, specialized tools are not essential, but occasionally, for those very specific jobs, they can save time, effort and give great results.

Power tools (specifically a jigsaw and sander) make base building much easier, whether working in MDF or EPVC foamboard. **Dremels** are good for detail work with heavy duty plastics, resins, hardened pastes, and clays or rock castings. **Heat guns** are handy for resin work and some ground-texturing effects as well. **Powered paint sprayers** aren't precision tools, but they do blast through boards when basecoating big sets.

An airbrush can really help with tasks like basecoating and shading buildings, staining flocks, and even sealing them afterwards. Its ability to put down thin layers of paint can drastically decrease build time, and using one to lay down sealing coats means a less messy and more precise seal than using a squirter.

Start with an entry-level, branded airbrush that you can get replacement needles for relatively easily. Don't use the cheap unbranded one that comes with compressor kits. They'll be so problematic that they'll put you off airbrushing. Also, invest time in researching how to do it. Trust me, both pay off!

Hotwire tools - ranging from simple wire cutters to 3D scroll tables are great for working with foam. **A flockbox** and **electrostatic flockers** are great for laying down static grass as well as creating tufts and flowers.

There is a host of more specialist scenic-specific tools, from texture rollers and presses for ground work, to punch stamps for leaves and tiles. The list of tools is as endless as the hobby, but you should focus on the tools you need to build the terrain you want to.

Shiny kit syndrome (Oh, that's shiny, I want it, I need it, what does it do?) is a plague to be avoided. Ask yourself, do you want to look at a tool you've never really used, or have the money for a tool you really need?

The Disposables

Some of your most essential tools are actually the disposable ones. Coffee stirrers and cocktail sticks can be as much tools as they are materials. Dressmaking pins are great when it comes to holding together buildings and ruins. Plastic cups, bottles, and tubs are all essential tools for mixing things up and saving them for the future. Disposable droppers save clean up time and cut down the risk of liquids tainting each other.

Terrain making is a messy hobby, so gloves are important for protecting your hands when dealing with messy tasks or skin-irritating materials. The same can be said for masks when doing dusty work like sanding. Rags, tissues and baby wipes are also essentials for your clean up kit. There will be spills.

THE WET STUFF

Creating terrain can involve a wide range of liquids, pastes, and putties, with shelves often sagging under the weight of many bottles of paints, glues, additives, varnishes and others.

Colour Juice!

Paints are an integral part of the hobby. Most Terrainiacs have both a wide selection of colours, and a great range of paint types. Paint is made from colour pigments mixed with a binder, and suspended in a medium which, when applied, allows the binder to dry, fixing the pigment to the surface it was applied to. Paints can vary greatly in their pigments, binders and mediums.

Acrylics

Acrylics use a plastic-based binder comprised of acrylic, vinyl, or PVA, suspended in a water-soluble medium, meaning they are quick drying paints that put down a durable, well-bound layer of pigment. It's these properties that make acrylics the workhorses of the hobby, but while there are many types of acrylic paint, there are a few that predominate.

Artist acrylics are thick paints containing very little water, allowing the artist to thin it down easily to their desired consistency. The main colours contain a single, fine, fixed, coloured pigment, meaning they stay the same colour as they are watered-down and also allow the artist to mix them consistently with other true colours to create new colours or shades. These pigments are inert minerals, which do not change colour when mixed with water, or over time, making them very reliable for painting.

Artist acrylics can also be a mix of fixed pigments producing a specific, composite colour used in the art world. An example of this is Van Dyke brown, a dark brown with an organic feel, perfect for painting river banks and swamps. This is because Van Dyke originally used his local soil and peat as the pigment for his brown paint. (Of course, fixed colour synthetics are now used!)

The thickness of artist acrylics, and sometimes their cost, makes them impractical for the bulk of terrain painting, but their fixed colour nature makes them perfect for highly diluted washes.

A cheap, acrylic, art starter set from a craft store will contain all the core artist acrylics you need to get you through your first few sets of terrain with ease.

Craft acrylics, including model paints, are composite colour paints with a higher water content than artist acrylics, allowing them to be applied straight from the bottle or with very little thinning, meaning they are quick to work with.

Unlike artist acrylics, which is a small range of set mixes, craft acrylics use composite colouring to create an almost unending range of colours. This is to allow hobbyists to work quickly without any in-depth knowledge of colour theory beyond using white and black to change the colour tone, simply picking the colours they like rather than having to mix them.

This wide range of colours comes from a much broader mix of pigments in each paint, meaning that surprising colour shifts and tints can appear when they are thinned heavily, as they are not formulated for this purpose. This makes mixing craft acrylics challenging, especially if mixing with composite colours. It's always best to use single-pigment artist acrylics to mix a new colour from a craft acrylic base, to avoid two unknown pigments producing strange results.

The array of colours and ease of application make craft acrylics perfect for detailing work, and for basecoating small, one-off pieces. However, for sets, feature pieces, boards, etc., you will need more paint than comes in the average craft acrylic bottle.

House paints - interior wall and ceiling matt paints (often referred to as latex paints in the US or emulsions in the UK) - are specially formulated, composite colours consisting of multiple diverse pigments, with a durable, heavy acrylic binder and very little water medium. They are not designed to be thinned down or mixed but applied to a wall to give a solid, durable coating.



Although they always require some thinning, the wide range of colours, the ability to get custom colours mixed, and their availability in low-cost tester quantities, make these house paints your paint of choice. Two 75ml tester tubes can easily basecoat an entire set of terrain, while it takes less than half-a-litre (approximately a pint) to basecoat a table.

House paint usually needs 1 part water for every 4 parts paint to make craft acrylic consistency. Pour your tester tubs into plastic, squeezable condiment bottles, add 25% more water, plus a marble or other agitator, and then place a piece of mesh curtain or similar between the bottle neck and screw lid with the nozzle. Tighten it up, give it a good shake and you're good to go every time with a couple of shakes and you'll never have to worry about a blocked nozzle!

Although we use all three of these types of acrylics, their function varies greatly, much like our tools. **House paints** do the bulk of the work, especially basecoating and ground work. It's best to have a collection of core greys and browns, along with their highlight colours, and any specific colours you need for terrain basecoating such as blues for water work. **Craft paints** are used on a needs-must basis and rarely need restocking. The colours you need are often dictated by the details needing painting at the time or the desire to get a certain effect. Since **artist acrylics** are used mainly for washes and for tinting other paints, small tubes can last years, even with regular use.

Another type of acrylic paint is **coloured aerosol spray primer**, where the medium is a pressurised propellant which, when released, carries the pigment and binder to the surface being painted. The quick evaporation of the propellant means layers of aerosol paint dry very quickly. The additional benefits are the ability to paint surfaces that struggle to take water-based acrylics, and also to paint very irregular surfaces such as fibrous material.

Coloured spray primers with matching acrylic brush-on paints are great for basecoating buildings. The spray gives a nice, even-coloured basecoat and any missed bits, such as underhangs, can be touched up with the matching acrylic paint.

Oils and Others

Oil paints differ from acrylics in that the medium, a thick oil, is also their binder. They don't dry through evaporation, but rather a slow oxidation, or slow burn process and harden as they do. In terrain making, oil paints are used in a few specific instances. They're regularly used for weathering effects on industrial pieces, especially oil stains, much like in scale modelling. Their oil-based nature also means they're great for painting natural materials that are water resistant like plants and feathers. Finally, the flexible nature of the oil binder means the paint doesn't crack when applied to plastic plants, unlike acrylics.

Enamel paints are common in scale modelling. Designed to produce a durable finish, they have a varnish-like binder. Although great for scale models, they have no real use in terrain making, and their cost generally makes their use prohibitive for any large-scale project.

The Variables

Paints don't have to be thick; inks, dyes and stains are all paints but with a much finer pigment and binder. This means that, when thinned, they produce finer, more translucent effects, as compared to thinned acrylic paints. Although binders can vary, **acrylic inks** are used for making washes or tinting acrylic and resin water effects. **Dyes**, especially polyester dyes, are used for colouring teddy bear fur material to create gaming mats. **Stains** are great for weathering buildings, rocks and any hard feature, including ground work.

At the other end of the scale, you can have much thicker mediums like **acrylic gels**. Applied like a paste, they leave a textured effect when dry, and are typically used to create water effects, from ripples to ocean waves. There is also a wide range of texture pastes and specialist artist mediums, such as crackle mediums which can be used to create cracked and dried earth textures.

Pastels have no medium but consist only of pigment and binder, which can be either oil- or water-based. Applied by rubbing, their strong pigment is great for breaking up a large,





flat, coloured surface such as a cliff or rooftop, creating a stronger contrast than washes can achieve on flat surfaces.

Finally, there are dry pigments (with neither medium nor binder), weathering powders, and chalks. **Pigments** and **weathering powders** are minerals, mined from the earth, or synthetics that are colour-fixed. Being powder, they can be applied very lightly and manipulated to create the desired weathering effect before being fixed with a spray varnish, so as not to disturb them with brush strokes. Coloured **chalk** is often used as an inexpensive form of weathering powder and while white chalk is a colour-fixed mineral, dyed chalk is not and can react unusually with other colours.

Mixing it up

It's not just the paint that matters, what you mix it with can also have an impact. The first and most important of these additives is water, used in abundance throughout the build process, from thinning glues and paints to sealing terrain and cleaning brushes.

Tap water is perfectly fine for terrain making, although don't rely on the tap. Have a small bottle on your worktop to speed up thinning paints and making quick washes.

After water, **flow aid** is the most commonly used additive. When added to paint, flow aid reduces its surface tension, allowing it to flow more smoothly. In terrain making, this means not just smooth basecoats but also washes that flow naturally into recesses to create shadows, and sealing coats that soak deeper into foliage pieces to make them

tougher. Commonly used flow aids include commercially available artist's flow improvers, isopropyl alcohol, dish detergent, and even certain floor polishes.

Matt medium is an essential for creating professional-looking washes. Comprising of an acrylic binder and a matting agent suspended in a medium, it's basically pigmentless paint. In terrain making, when mixed with inks, it creates washes that adhere to smooth surfaces, creating a better matt shading effect than watered-down acrylic paints can achieve.

All the rest

There are lots of other paints and additives, ranging from acrylic gouaches to drying retarder that can be used for terrain making, but they are typically only for very specialist work.

There's an almost unlimited range of paints, inks, pastes, pigments, and additives to add to your collection but your workhorses will always be your basecoating house paints, artist acrylics for your washes, model paints for your details, and your flow aid, whatever it may be.

When buying, stick to the colours and mediums you need rather getting complete ranges. Yeah, they look nice on the shelf but you're just going to watch half of them dry out unused. Spend your pennies on the paint you need but haven't got yet!





THE STICKY STUFF

Making things and sticking them to other things is the core of terrain building, and so glues are used from the very start of the build process to the very end, with different types being used in different circumstances.

King of the Glues!

Polyvinyl Acetate, PVA, wood, white, or craft glue – whatever you call it, it's the workhorse of the terrain making glues. PVA is a vinyl-based glue, suspended in a water medium, appearing white when wet and drying to a flat, flexible, slightly transparent vinyl. Most PVA glues are just PVA, but some industrial glues can have a yellow tint due to additives. The strength of PVA glue varies on the purpose it's sold for. Craft glues are watered-down the most, giving the weakest bond when compared to industrial, raw PVA, which is almost gel-like (and the strongest bonding PVA available). Being water soluble, PVA works best at tasks where it can soak into the materials being bonded, whilst it struggles bonding to plastics and metals.

The downside of it being water soluble is that when water is applied to dried PVA, it reactivates, softens, and often stops bonding until it's dry again, so extra care should be taken when sealing with PVA.

Applied straight from the bottle, PVA is used for a multiplicity of tasks from gluing foam hills and bases, to constructing buildings out of foamboard. Slightly thinned with cold water, it's used to bond layers of fine particle materials such as sand, grit, flock and snow scatter. Watered-down even further and mixed with a flow aid, it's used as a sealing coat.

It can be mixed with acrylics to create basecoats that seal the surfaces they're applied to as well as painting them.

It's this versatility that makes PVA the go-to glue for terrain making, either in its standard form or in more specialised mixes.

Mod Podge is a type of PVA glue where the medium is a gel rather than water, often mixed with either a matting or gloss additive to give matte and gloss variants, along with others. The heavy-bodied nature of Mod Podge means it can be used to create subtle water effects such as surf, ripples and small rolling waves. It's gel nature makes it great for bonding materials that have irregular joining surfaces, as the gel fills in the gaps to hold things like clump foliage and other fibrous materials in place as they bond.

A lot of scale modellers like to use watered-down Matte Mod Podge for sealing, as it gives a matt finish compared to the slightly glossy finish from thinned PVA. The same effect can be achieved by adding a little matte medium to your watered-down PVA for a fraction of the price.

Tacky glue is another PVA variant. It's often thicker than craft PVA, sometimes contains latex additives, and is far stickier. It's this thickness, ability to grip quicker and dry faster, that makes tacky glue great for building terrain, whether placing rock clusters or laying cast bricks to make a building.

To make your own tacky glue, pour PVA into a foil serving tray and leave it to dry; stick it somewhere warm and occasionally stir it to stop a skin forming. When it's thick, pour it back in the bottle and you're ready to go!

Hot Stuff

After PVA, **hot glues** or low melt temperature plastic glues are the go-to glues. Bought in solid sticks of either 6mm or 11mm diameter, varying in length from a couple of inches to a couple of feet, it is applied via a hot glue gun, where the sticks are heated internally before trigger pressure forces the hot liquid plastic out of the gun's nozzle on to the material, to which it bonds as it cools.

The hot glue guns themselves can vary more than the glue sticks, with variable temperature, precision application, and cordless rechargeables, available in both 6mm and 11mm forms. Glue sticks vary in quality, with the softer, opaque sticks melting at a lower temperature and providing a weaker bond compared to the harder translucent higher temperature melt sticks.

High temperature glues WILL stick to and blister skin. Use a probe such as a lollipop stick to push things firmly down when trying to get a bond rather than your finger, and keep a cup of water to hand for when you forget to use your probe!

Although hot glue doesn't have the penetration of PVA, its surface grip strength is strong enough to make it the glue of choice for plastics, metals and resins. The fact that it is gel-like when hot but solidifies through cooling rather than evaporating like PVA, means that it doesn't lose volume as it bonds. Given the speed with which it cools and bonds, hot glue is better for gripping and bonding irregular and fibrous materials than Mod Podge, which takes longer to bond and reduces in volume as it does. The strength and speed of bonding of hot glues mean they're also great for speeding up the build phase, fixing pieces in seconds compared to the hours it can take PVA to bond, and this means that builds are not held up by glue-drying times.

PVA or Hot Glue? Why not both? PVA and hot glues aren't mutually exclusive, you can use them at the same time. I'll regularly prepare pieces to be glued together with PVA but just before putting them together, I'll put a few spots of hot glue between the PVA. These few spots fix the piece in place quickly, allowing the PVA to dry without being disturbed by slippage and allowing me to crack on with the build without waiting for the PVA to dry!

Super Stuff

Cyanoacrylate acid (CA), more commonly known as super glue or crazy glue is a fast-acting, resin polymer glue that's activated by exposure to the moisture in the air, and further accelerated by water. Hot, dry air doesn't accelerate the curing process but moisture in your breath from blowing on it will. Curing accelerators are available, that speed up the curing process by applying a mist of water, although professional versions can also contain an alkali, which drastically speeds up the polymerisation process; it's always best to check the ingredients before purchasing. The process can also be sped up by applying baking soda to wet CA glue. The particles allow quick bonding and create a much stronger bond across gaps which, when hardened, can be sanded into shape, making it a useful filler for ill-fitting model joints.

Having a shelf life of around a year unopened and a month once opened, CA is the more costly of the commonly used terrain glues, and is usually only applied in very specific terrain building needs. Available in both liquid and gel form, the gel is most commonly used for building, primarily for the control it gives when applying. CA glues also have the stickiness and fast-acting benefits of hot glue, especially on non-porous surfaces, but without the volume, meaning there should be fewer gaps between well-fitting surfaces when using CA.

Avoid cheap CAs. Their fumes when curing can be quite strong and can discolour any acrylics near the glue spot! Buy a good brand in a small tube volume; there's no point stocking up or buying big tubes, it'll just go off!

WARNING – Whilst PVA with hot glue can be your friend, super glue with hot glue is NOT your friend. When hot glue mixes with wet super glue, it will vaporise. These vapours then float up and attach themselves to any wet surface they come into contact with, such as your eyeballs, or the inner surfaces of the nose, throat and lungs. It CAN blind you and at the very least, it hurts like hell!



The Rubbers

Latex-based glues come in many forms, many of which have specific uses in terrain making. The bonding agent is usually a latex-based rubber suspended in a water medium which, as it evaporates, allows the latex to bond together forming the cured glue. Copydex is a form of latex glue that can be used to create static grass patches on grease proof paper. Once cured, these can be peeled off, cut to shape and, because the latex is flexible, PVA can then be used to glue them to uneven ground surfaces.

The waterproof quality of latex glues means they are unaffected by moisture, unlike PVA which can be reactivated. Latex glues can stay tacky, even a few years after they have initially cured. This can be a great aid when sticking foliage on walls for moss, or adding clump foliage to tree armatures, as they can be sealed with thinned PVA without fear of bits falling off due to glues reactivating. They are also available as aerosol sprays, with the repositionable, mist-type spray being great for laying down large areas of flock, or adding foliage to fibrous materials to make bushes and tree crowns.

Don't think you always have to use the right glue for the job. Sometimes a bit of lateral thinking comes up with a win, like using double-sided sticky tape applied to a whole roof so shingles can be placed straight on it. If it sticks it, it's as good as a glue!

The Others

While the primary four (PVA, hot glue, CA glue, and latex glues) will meet most terrain building needs, it's worth having a few other glues for the occasional jobs they work so well for. Plastic glue sticks both hard and soft plastics through a chemical weld process, giving a very strong bond and is great for scratchbuilding with plasticard, styrene bits and plastic model kits.

There are various contact adhesives too, from UHU to builder's grip adhesive, and even silicone sealant can be used as an adhesive. These contact adhesives create great bonds but can be tricky to work with, especially for delicate work and some are so strong, a single application can warp bases significantly.

There is also a range of two-part epoxy glues sold in syringes, that harden as they are mixed. These are basically gel resins that won't shrink as they cure, and can be used for adding dense foliage to vertical structures like overgrown walls, or used to create water and splash effects.

For every material you'd like to join to another, there's a good chance there's a glue for it, but PVA and hot glue will be your workhorses, rarely far from your desk, whilst the rest will sit on your shelf for those occasional jobs.

However, glues and paints aren't the only liquids we use in terrain making.

Clear Coats

While pretty much all terrain can be sealed with thinned PVA, it is best suited to surfaces it can soak into, such as grass and foliage work. On other surfaces, varnishes provide a better layer of protection. Available as liquids to be brushed or airbrushed on, or in aerosol cans, most terrain varnishes are either acrylic, cellulose, or polyurethane-based resins, but there are other variants.



Varnishes have three main finishes, a flat **matt**, a **satin** (slight shimmer) and a reflective **gloss**, all determined by the amount of matting agent added to the base gloss varnish during manufacture. Although lacking the penetration of thinned PVA, matt varnishes (especially aerosol spray versions) are great for protecting hard surfaces such as roadwork, rockwork, and buildings. Satin varnish sprayed onto snowy pieces can be used to give the impression of frost, whilst gloss brushed onto groundwork can give the impression of wet mud.

For matt sprays, I use car varnish rather than model sprays. It gives a tougher, better quality finish because it is designed for life-size cars, not model cars, and when that goes wrong, it's a lot more costly for the manufacturer than knackered up a model and getting an angry email. This means it's a lot more reliable than hobby variants!

There are also industrial resins that are used as varnishes but are pourable to greater depths than can be achieved with traditional varnishes. Some of these varnishes can be poured to a depth of over an inch in a single pour with no loss of clarity. They can be manipulated during curing with a heat gun and probe to create lacing effects and ripples on their surface, and the zero shrinkage of the epoxy-chemical curing process puts them well ahead of volume-reducing, acrylic, water effects products for water and wave work.

WARNING – Acrylics, vinyls and resins do not react well to being frozen, which means that neither does just about everything wet that has been mentioned so far. Protect your supplies from a frost or freeze, or face having to buy them ALL again! At a bare minimum, store your dry materials down low where it's colder and your wet ones up high on a shelf. Never leave them sitting on the floor!



Pastes and Putties

Although not as wet as most of our paints and glues, there are pastes of plaster and water mixtures, with different types offering different terrain making qualities. Nearly all these pastes can be purchased premixed in tubes and tubs, or in powder form in boxes and bags to be mixed as needed.

Filler (also known as spackle or polyfiller) is a plaster paste used for filling cracks and gaps in walls and woodwork. In terrain making, it's a go-to paste for everything from blending foam joints and landscaping, to texturing ground and buildings alike. **Ceiling stucco** (like Artex) doesn't have the same bulk as filler, but is better at producing a tough finish while still holding detail incredibly well.

Stippled filler works great for groundwork since its peaks smooth out as it dries, whereas stippled stucco works great for wave work because the peaks stay sharp as they dry. Tile grout, with the least water content, is the densest of the pastes and although it can be difficult to lay down, it can be used to produce realistic groundwork with very little effort, often holding impressed details such as wheel ruts and tank tracks incredibly well.

In addition to the basic building pastes, there are various casting powders and building renders that can be used to much the same effect, whilst benefitting from properties such as fast cure times and industrial strength finishes. Although superior products, the need to buy these materials in bulk, usually 25kg (approximately 50lb) bags, means they're more suited to high-volume terrain makers than hobbyists making a single board or set.

Even thicker than pastes are the putties, which come in air drying and epoxy forms. For the bulk of terrain making putty and sculpting work, I use an air drying clay like **DAS modelling clay**, or a low shrinkage, air drying clay, with

the latter being better value when bought in bulk. Used in everything from basic landscaping and blending in features onto bases, to sculpting sandbag emplacements and thatched roofs, it is easily softened and smoothed with water, whilst producing a tough finish that holds sculpted detail; it's a go-to putty in terrain making. The downside to its air drying quality is that it shrinks slightly as it dries, which can cause warping, or if applied thinly, cracking, although that can be prevented by draping a damp cloth over the clay to ensure it dries evenly.

No matter how you seal your packet of DAS, it always dries out, even in an airtight tub. So tuck a wet kitchen sponge in the end of the packet before you seal it up and it'll stay soft, wet, and ready to go for much longer!

Epoxy putties such as Kneadatite (greenstuff) and Milliput are two-part putties that harden when mixed. Like epoxy resins, the curing process of these putties means they don't reduce in volume, unlike DAS and other air drying clays.

Whilst Kneadatite or Green Stuff is more suited to figure modelling and sculpting, it can be used in terrain making for fine build corrections such as gap- and pin-hole filling, as well as for very fine detailing work on high level builds. Milliput is more common in terrain building partly because its cheaper, but also because it adheres to other materials better than Kneadatite. Milliput's work time and zero shrinkage means it's perfect for gap filling and detailing, blending feature pieces into bases and creating sandbags and other details.

If it needs blending or filling, use filler, if it needs to be good, use DAS, if it needs to be perfect, use Milliput!

With all the wet stuff on your terrain-making shelves covered and ready to slap on, it's time to look at the wide array of build materials you're going to be slapping it on to or on with – that's all the dry stuff!





THE DRY STUFF

There's a small set of basic materials that will form the core of almost all of your builds. There's also a host of different things – from recycled household products to specific scenic materials and even things foraged from the great outdoors – that you will only use for specific builds or themes.

Basic build materials

New materials that can be used for terrain making come along all the time, but the following core materials have been the staple of terrain making for decades and will form an essential part of any Terrainiac's material set.

All about the base

All scatter pieces are built upon a base and, like everything in life, it's best to have a good foundation to build on. What makes materials good for basing depends on several factors. These include the material's sturdiness, its thickness, its weight and how easy it is to work with simple tools.

Picking the right base material can be crucial to your build, with many Terrainiacs finding a material they like and sticking with it through all their builds. Whilst the list of what you can use for basing is practically endless, from CDs and cereal boxes to old signs and industrially-cut metal sheets, there are a few common materials that are the go-to for the majority of the community.

EPVC foamboard is a lightweight signage material that is available in 3mm and 5mm thicknesses. It's easy to cut with blades and shape with sandpaper. Although it's a lightweight material, it's quite sturdy and therefore suitable for most build types, including long thin roads and rivers. The only problem is that it's not too easy to find in stores, particularly in the US. Check with a local sign printer, or look online.

EPVC foamboard can be pricey but great quantities can be acquired for free as sign printers often have lots of offcuts they normally have to pay to dispose of, so give your local sign printer a call and they might be happy to give you as much as you want!

Plyboard makes an excellent basing material, with its alternating, perpendicular layers providing a much higher level of sturdiness, but the need for power tools to work it means that it's often skipped over in favour of **fibreboards** such as hardboard and MDF, which are much easier to work with hand tools. It is typically inexpensive and available in various thickness from 3mm to 15mm. Plyboard is heavier and harder to work with than EPVC foamboard, but provides a much higher level of sturdiness, with 12/15mm sheets being suitable for base boards.

When EPVC and fibreboard aren't available, materials such as corrugated cardboard, cardboard-backed polystyrene foamboard (mounting board), and cork sheets or polystyrene ceiling tiles can make good fallbacks. They are all easy to work, cheap and commonly available, but offer very little sturdiness. Thin cardboard and plasticard (sheet styrene) can be useful for basing small pieces because their thinness gives a very low-profile base. However, they offer very little in the way of sturdiness.

Flimsy base materials can be strengthened. Two sheets of corrugated cardboard layered perpendicular to each other drastically increases the sturdiness of a base, whilst there are various pastes, such as filler, that can be applied to strengthen bases no matter what they're made of.

Terrain making is a hobby of finding materials and items and then making things out of them. This is true of bases as well, so if there's a material that's easy for you to acquire and work with to create sturdy bases with a low profile, use it!

Texturing it up

Another common feature across nearly all terrain is the ground itself and, as with base materials, it's common for Terrainiacs to pick their favourite and have a stock of it to use on all their builds.

Pastes such as fillers and stuccos (see **Pastes and Putties** – above) can be applied and stippled to create an earth texture, but it's common to use various **aggregates** of different grades to create ground textures. These aggregates vary from kiln-dried sharp sand, coarse sand, grit, and gravel made up of crushed or mined stone, rather than rounded pebbles from the sea and river beds.

Aggregates can be bought from hardware stores quite cheaply in large bags but are available in small quantities from pet shops in the form of rodent-bathing dust or aquarium and vivarium basing gravel.

It's often cheaper to buy a large bag of mixed aggregates or ballast from the hardware store and a few different sized sieves to filter out the smaller bits, than buying lots of different bags from different places.

Ground cork can be used to represent rocks and stones when doing groundwork and is available from many modelling stores, along with various small bags of aggregates, although this can be the most expensive method of purchasing texturing materials. Of course, various aggregates can be collected for free from outdoors as well.

Although some Terrainiacs use a general premix of aggregates that they just lay down randomly to create ground work, it's more common to have tubs of various grades of aggregates, starting with rodent-bathing dust, all the way up to 20mm limestone, crushed gravel. Having them in separate grades allows you to control where they're laid down on the pieces to create more realistic groundwork.

THE FOAMY STUFF

Although we've covered groundwork (texturing), we must also consider the material on which this texturing is applied – the 'under ground', if you will. Whether we're making hill pieces, a table-edging cliff face, or a rolling landscape across a board, the go-to material is **polystyrene/Styrofoam**. Often used in the packaging of household items,

when it may be molded into various shapes, the more useful form is as sheets of polystyrene insulation foam, available in different sizes and thicknesses.

Polystyrene insulation comes in two main forms, expanded (**EPS**) and extruded (**XPS**). The expanded form is made of small polystyrene beads melted together into sheets, while extruded polystyrene is formed by injecting liquid polystyrene and various gases into a sheet mold.

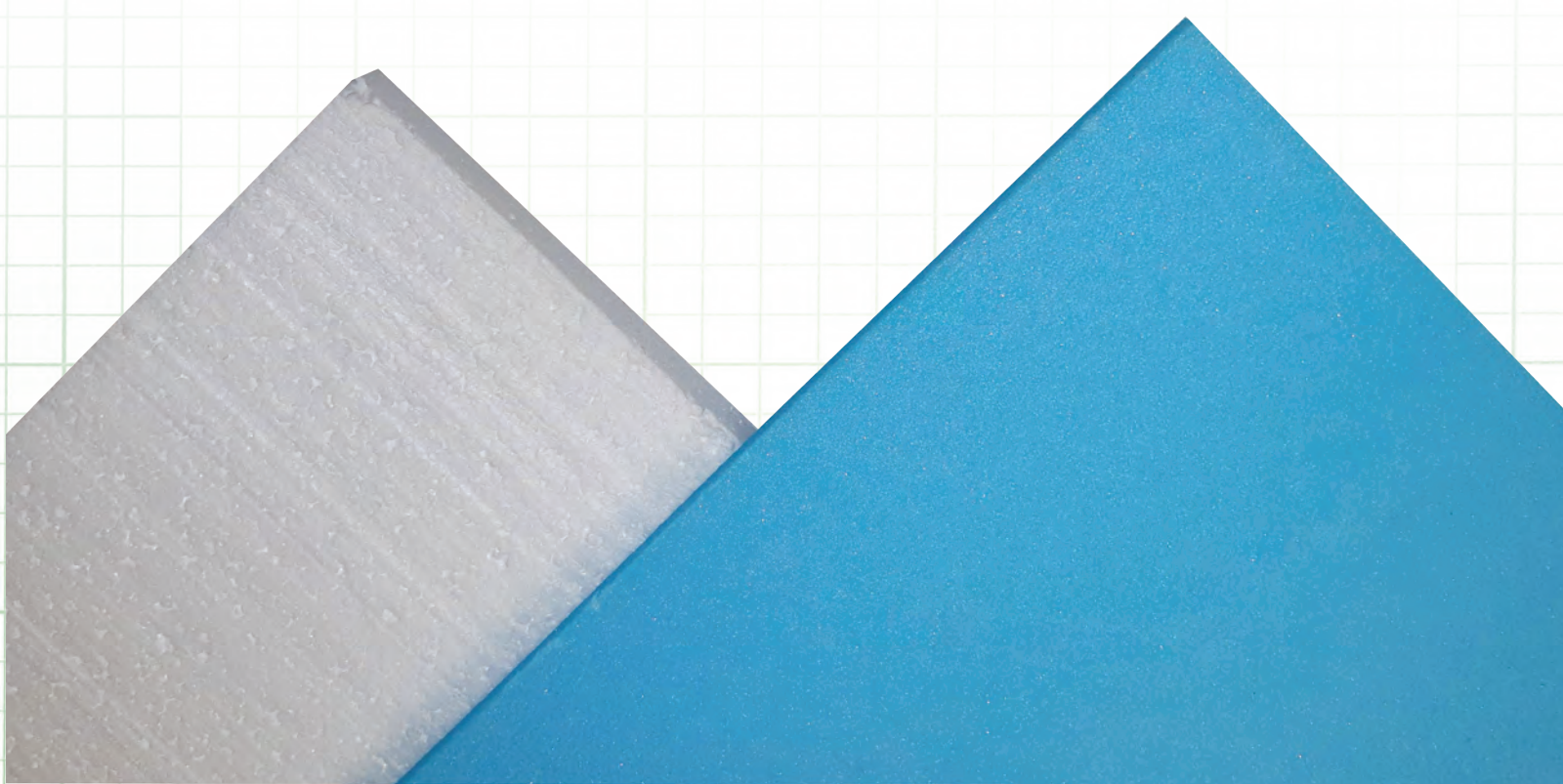
The commercial use for expanded polystyrene sheets is as insulation; it is often used in wall cavities and roof spaces. The sheets are lightweight, commonly available from hardware stores and easily worked with blades, abrasives and hot tools, although the beaded nature of the sheets can make them extremely messy to work with.

EPS beads have a slight static charge, meaning they stick to everything, even the under surface of your work bench! When working EPS with abrasives, keep the vacuum cleaner nozzle close by and clean as you go. It's a lot easier that way than after you've realised you've walked it through the entire house on your last toilet break!

EPS is less dense than XPS, and the beads are easy to spot, meaning its main use in terrain building is as a substructure to be completely covered with some sort of filler, stucco, or gloop mix in order both to make it more sturdy and also to hide the beads for a more natural-looking finish.

Extruded polystyrene sheets (XPS) are considerably denser than EPS sheets, offering a higher level of insulation. Its commercial use is in construction and other situations where high levels of insulation are needed. Nevertheless, XPS densities can vary greatly, and manufacturers often colour-code different densities. This coding can vary from manufacturer to manufacturer, but each sheet's R-value (its level of insulation) is the best guide to density; the higher the R-value, the denser the sheet.

The extruded nature of XPS, along with its higher density makes it great for shaping with blades and abrasives, allowing more control in building features than if working with EPS. Being extruded, it doesn't have to be texture-coated like EPS and can take paint directly. It can be worked with hot tools, but its higher density means this is a slower process than with EPS.





Above all, the ability of XPS to be cut, shaped, engraved, and pressed with precision, makes it perfect for features from cliff faces to statues. When combined with its availability in sheets varying in thickness from 5mm to 140mm, it becomes a go-to material for all types of terrain pieces – lay down landscapes and create cliffs with the thicker sheets, or build old stone walls and futuristic, apocalyptic ruins with the thinner.

Getting your hands on XPS in hot countries can be challenging, but it is used as an insulator in refrigeration, whether it's food trucks, industrial units, or medical packaging. Find anywhere that makes or scraps any of those, and you will find XPS!

There are other types of insulation foam that are not made from polystyrene but can still be used for terrain making, particularly when EPS and XPS are hard to come by. **Kingspan** or **Celotex** is a phenolic plastic foam, often found in sheets backed with aluminium foil. Phenolic foams are far better insulators than polystyrene, but for terrain making they are softer than XPS, meaning they don't hold engraved or impressed details very well and often need a filler coat to firm them up, much like EPS.

Another type of phenolic foam that can be used is **floral foam** or 'florists' oasis'. Designed to be softer and more brittle than the other foams, it's easily shaped but does need a good filler/stucco coat or a spray of watered-down PVA to firm it up and seal it for painting. Balsa foam is another type of phenolic foam. It is less brittle than floral foam and holds engraved and impressed detail really well.

The last of the common types of building foam is **polyurethane foam**, more commonly called expanding spray foam, which offers the best insulation rating for cavity walls. Available in aerosol cans for sealing gaps where pipes go through walls, it comprises two chemicals that mix as they are sprayed and expand from 20 to 60 times the original volume (depending on the applicator setting). It can be sprayed in clumps to expand in blocks for shaping into features such as hills, mounds, mesas, etc.



WARNING – *The dust produced by sanding foam can be an irritant to your throat and lungs, so wear a dust mask when using abrasives on foam. When it comes to heat, the fumes from working polystyrene can be hazardous and are well known for making people feel light-headed, so always use*

your hot tools in a well-ventilated area. The fumes from using hot tools to melt phenolic or polyurethane foam are highly toxic and can KILL YOU, so just don't do it. If it isn't polystyrene, stick to blades and abrasives!

BUILDING BOARDS

Although cardboard-backed polystyrene foamboard (or mounting board) can be used for making bases, its real value in terrain making is in constructing buildings and ruins. Comprising a sheet of polystyrene foam backed on each side by cardboard, it is incredibly sturdy. Available in various thicknesses, foamboard is easy to work with blades and takes PVA and paint without problems.

Polystyrene foamboard comes in two main types, white and black. The white consists of white foam, backed by smooth, glossy, white card much like the outer printed side of a cereal packet, whereas the black consists of black foam, backed by matt-textured card much like the inside of a cereal packet.

You can use both types for buildings and ruins, but I prefer the black as I don't have to worry about white bits showing if I miss a little corner when basecoating, or if it gets slightly chipped during gameplay.

All-rounder Cork

Ground cork can be used as a basing material and **cork tiles** can be used for making bases, but cork has several other uses in terrain building. Cork tiles can be used much like foamboard to create small buildings and ruins. Tiles broken up and laid on top of each other can be used to represent stratified rock. Commercially purchased cork bark can be used to create realistic rocks and cliff faces. Being lightweight and easy to work with, it is generally the go-to material for rock work.

Brilliant Balsa

Balsa is a soft wood commonly used for modelling building details such as doors and window frames, or even entire timber-framed medieval houses, or wooden, shingle roofs. Available in strips and sheets of various sizes and thicknesses, its softness makes it easy to cut, and it can be abraded with wire brushes to create a realistic wood texture. Its ability to hold new forms after being soaked with water and bent into various shapes, makes it the go-to material for most tasks involving the creation of wooden elements or features.

SCRATCHBUILDING

The term 'scratchbuilding' is applied in two main contexts. In model making it means constructing the model out of raw materials, typically plasticard (sheet styrene) and other components. In terrain making, scratchbuilding refers to building terrain pieces from collections of seemingly-random household items.

Precision Model Making

To scratchbuild models there is a wide range of plastic materials. Plasticard sheets of various thickness, from 0.5mm up to 3mm, come in both smooth or textured forms, with designs ranging from flooring and brick walls to various types of roofs. As well as sheets, there are plastic rods, tubes and strips in lots of different sizes, along with a wide range of scale girders and other industrial components, from valves and ladders to storage tanks and machinery. These can be hobby accessory kits or precision, architectural modelling pieces, with prices varying greatly between the two.

Although traditional scratchbuilding does have a place in terrain-making, the cost implications often mean that plastic pieces are used to dress up a piece with little details, rather than being the primary build material.

Building Big on a Budget

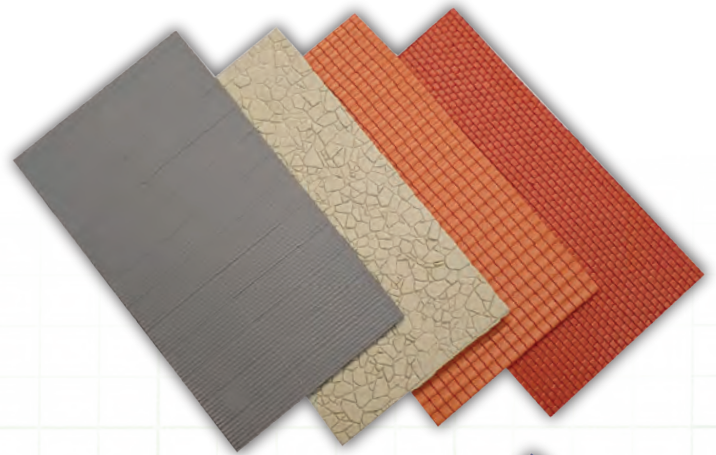
To scratchbuild terrain, inexpensive household items are repurposed to create anything from entire buildings to small features. There is no definitive list of items to use, but there are certain qualities to look out for when scavenging bits for your builds. These qualities are (primarily), the durability of the object and its ability to take paint. Items that don't have these qualities aren't excluded from scratchbuilding, they just require a little more work to strengthen and/or prepare them for painting.

Larger pieces include polystyrene packaging, plastic bottles and containers, and of course, cardboard packaging and tubes. Polystyrene packaging from household items is regularly repurposed as bunkers and futuristic building complexes. White, expanded polystyrene packaging can sometimes be less durable than insulating EPS, so will need to be well-coated for terrain use.

Plastic containers and bottles are the go-to for buildings, towers, and silos. The sturdier the plastic, the better for terrain making. Thin plastics can buckle when handled,

causing paint to crack and flake off. If there is any doubt about a piece's ability to stand up to game play, you can reinforce it by adding polystyrene chunks (or packing beads), wrapped in tissue and soaked in watered-down PVA, to the inside of the piece. Household plastics often have smooth surfaces, generally for hygiene purposes and these surfaces may struggle to take paint. Spray primers, especially textured ones, can prepare a piece for painting and texture it in a single coat.

Cardboard packaging is a common source of thin sheets of durable cardboard for all manner of details, from roofs, shutters, doors and signs, as well as panelling and fascias. The glossy, printed side takes paint better than the textured unprinted side, which also has a tendency to warp when painted, because it has greater absorbency than the sealed, glossy side. Cardboard tubes and rolls are primarily used for industrial piping and chimneys, with much larger carpet rolls occasionally used for castle towers and large silos. Cardboard tubes have a textured surface which can become gritty when painted with brush-on acrylics, and this (along with a diagonal recessed line from the manufacturing process) can mean tubes and rolls are easily identifiable after the build is completed. The recessed line can be hidden by a quick skim over of filler, whilst a light sanding of the surface with a fine grit abrasive paper will deal with the grittiness. This grittiness comes from the moisture in the paint soaking into the cardboard and causing it to expand. A sanded first coat prevents this from happening with the second coat. Spray primers are also a good way to minimise this problem, but tubes will still occasionally need a sanding after a first application, especially heavy ones. Textured spray paint, however, works great for giving tubes and rolls a uniform, textured surface whilst disguising their humble origin in the finished piece.





All the Little Things

The less commonly used items are harder to categorise because there's an almost infinite list of things that can be used. Still, there are a few regularly used items which deserve a mention:

Cocktail sticks, match sticks, toothpicks, bamboo skewers, coffee stirrers, ice lolly (popsicle) sticks, and discarded fireworks sticks are all great for various woodwork, from windowsills, to support beams of medieval buildings.

Cotton wool, polyfibre, and wire wool can all be used for smoke effects, while loofahs, coconut plant liners, vulcanised horse hair upholstery mats, hemp rodent matting, kitchen and concrete scourers can all be used as substructures for bushes, hedges, and tree crowns. Hemp matting, terry towelling, scourers, bamboo grass mats, teddy bear fur, and fleece blankets can all be used to create thatching for roofs.

Wire twists, copper electric wire, florist wire stems, and garden wire can be used to create armatures for trees and bushes. Fuse wire and soldering wire work well for modelling rope, and guitar wire works great for pipes, hosing, and concrete rebar. Tougher paperclips can be cut to represent metal bars and building details.

Doormats, plumbers' hemp, sisal string, garden twine, and brush head bristles, can be used for making long grass clumps and tufts.

Plastic bottle tops can be used as urban planters and sci-fi storage containers, while plumbing pipes and fittings work well as industrial pipes, and electrical boxes and guttering can make great bunkers. Plastic embroidery gridding (granny grating), can be used for drainage and ventilation covers, as well as for gantry floors and other metal meshwork. Plastic bottle brushes and gutter guard strips make simple and durable trees. Plastic, hair-curling rollers can be used to make gabions (barricades), and clear plastic packaging can be turned into windows.

Aquarium plants can be used in jungle pieces, whilst toys can be recycled in numerous ways. When it comes to plastic bits, the list of what you can reuse in terrain making is near endless.

Sand paper and embossed wallpaper can be used to create textured surfaces for roads and walls. Newspaper can be balled up as a substructure for plaster-bandage hills, along with materials like upholstery foam, chicken wire and even balloons!

Aluminium mesh can be used for chain-link fencing, and wicker baskets can be broken down to model wicker fencing. Baby wipes and paper towels can be used as tarpaulins, whilst cheese cloth and window-curtain netting are regularly used to make camouflage nets. Tin cans are a great stand in for storage silos, while tin foil and corrugated cardboard can be used for rooftops. Red bricks can be smashed into realistic rubble and pot pourri pieces can be reused as large alien plants.

Collecting and building up your big scratchbuild core pieces and your bits box for detailing work just requires a mindset of 'What could I use that for?' in everyday life. It won't take many visits to the hardware store, charity shop, or car boot (garage) sales to amass quite a collection of useful bits for projects not even considered yet.

It's quite usual for Terrainiacs to take the "grab as much as possible" approach when acquiring materials, especially if they are cheap or free. This is fine if you have the storage for it, but if you don't, this approach can cause you problems. The best solution is to set up a dedicated storage area, out of the way for your large pieces, with an organiser close by your work area for your small bits. This will help you stay in control of the space your big materials take up, forcing you to discard a less useful piece in favor of more useful ones. Having bits organised saves you hunting things down each time you need a specific bit and keeps them looking like modelling supplies rather than random junk to non-modeller members of your household!

BITS & KITS

As previously mentioned, there are plenty of accessory pieces that can be purchased and added to builds to make them more detailed. For a long time, these were limited to specific, plastic, scale model kits, and similar kits from model railroad manufacturers, as well as architectural, scale modelling supplies. Other than a few small sets from gaming companies, these were the only bits supplies available to Terrainiacs until about a decade ago.

We are now living in a golden age for Terrainiacs! Not only has there been an incredible growth in the number of companies supplying wargames terrain making materials and kits, there are also new technologies that have been adapted towards terrain making. This has allowed the development of various accessories and dressing pieces, entire build kits and even complete, single-piece builds. These are produced in various different materials, from cardboard and MDF, to hard plastic and printed EPVC foamboard, as well as entire pieces that are either 3D printed or cast in resin.

Cardboard kits, comprising die cut sheets of thick cardboard with printed details on them that can be slotted together with plastic connectors, or glued together, are some of the oldest types of terrain accessories. Although an older technology for our industry, it is still in active use with companies producing a wide array of wonderfully high quality accessories and modular buildings for lots of different settings.

The internet has a wealth of free paper designs that can be printed, cut out, and glued together for next to no cost at all, assuming you have the right materials and printer to print them.

Laser cutters capable of precision cutting and etching MDF have been widely adopted and have revolutionised terrain making for wargames, providing everything from accessories to whole buildings, and even terrain making tools such as foam cutting guides.

These kits of MDF sheets of various thickness (as well as thick card), laser cut into pieces, can be used to construct everything from a dining room chair to entire castles. Most kits are supplied unpainted, with companies producing accessories, build kits and even full modular board tiles for all manner of settings, scales and periods.

Alternatively, MDF kits can be purchased pre-painted, reducing the work it takes to go from kit to tabletop. There are multi-layered kits of different coloured sheets, that create buildings such as medieval inns with highly detailed, 3D, timbered exteriors, as well as detailed interiors.

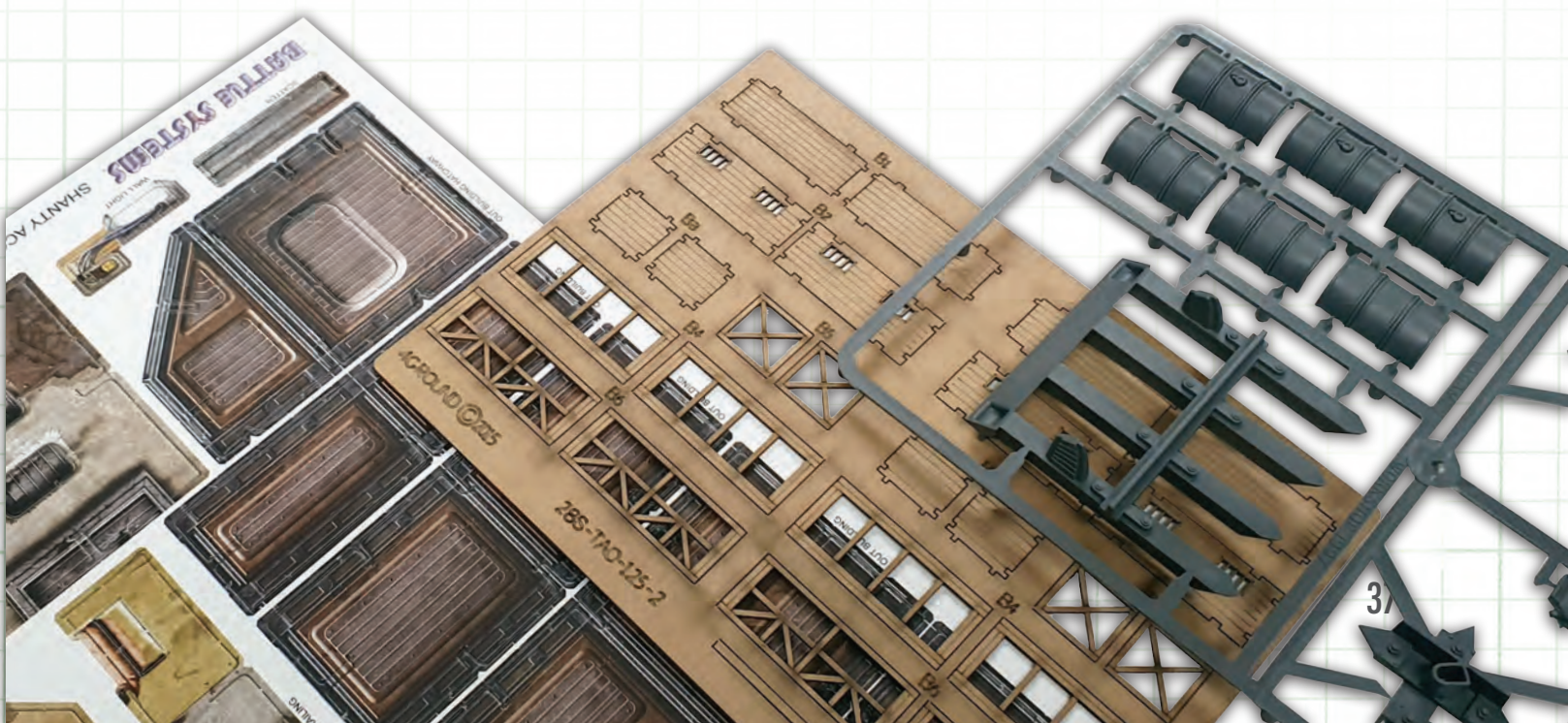
One of the latest cutting technologies applied to producing terrain kits is the computer numerical control (CNC) cutting of EPVC foamboard. Commercially used in sign printing, EPVC foamboard is now used in terrain making with various companies producing pre-printed kits, much like the cardboard kits. When put together, these kits become lightweight, durable, highly-detailed pieces with very little effort.

Moving on to even sturdier stuff, plastic kits have been around for almost as long as the cardboard ones, although the quality and quantity of hard plastic, highly-detailed, modular buildings and accessory kits has only really exploded over the last decade.

Terrain accessories, as well as small-to-medium-sized buildings, often come in single solid pieces, usually cast in polyurethane resin. The process of making terrain like this is as old as modern wargaming. Resins used to create these models vary, depending on the size and detail of the piece.

The latest technology to be adopted widely for terrain making is 3D printing. Although this technology is still relatively new, terrain makers have been very early adopters of consumer-level and low-end industrial printers. There are several types of 3D printers, with extruded plastic printers being the most commonly used (and cheapest). Designs can be created with CAD software on most PCs, or downloaded (for free or purchased) from various websites. There are also websites that can print and ship chosen or created designs for a fee, meaning 3D printing can be explored by hobbyists without the need to buy an actual printer.

The downside (other than the cost of a 3D printer and the limited print space) is that 3D printing, especially with entry level machines, is an incredibly slow process. Pieces like a 28mm scale, two-storey house may take over 24 hours to print. Like most technologies, however, it will improve over time. This means that entry-level machine costs will go down, along with print times, and the level of print quality will go up. This technology will only be adopted more in terrain-making as time goes on.



NATURAL MATERIALS

When trying to model nature, the best source of cheap, realistic modelling material is nature itself. There are a lot of commonalities between various plant species: how they grow, their physical structure, whether they are big or small. Because of this, we're able to use the smaller to represent the larger in our terrain making.



WARNING – In the UK, certain plants and other species including many shrubby lichens are protected species under law, with heavy penalties for collecting them, even on your own property. It is also illegal to uproot any wild plant, and on NNRs (National

Nature Reserves) and SSSIs (Sites of Specific Scientific Interest), it is illegal to collect any living plant material. Other countries may vary but it's always best to check your local laws before foraging.

Nature can be a source of a multitude of free modelling materials, but there is a price to be paid in planning, foraging and preparation time. Foraging materials from nature can be done pretty much any time of year and just requires a keen eye for useful bits, but the best approach, long term, is to identify the best locations for the materials you want, establish the best time of year to collect them, and then add collection reminders to an annual calendar. After that, it's a simple matter of going out and harvesting specific supplies in bulk, before preparing them for use as a single batch. This drastically cuts down preparation time when compared to ad hoc collecting.

The fact that I became interested in gardening for a month a few years ago and the fact that I have two Goldenrod (Solidago) bushes right outside my door – that every February give me enough 5mm wide and 2' long, almost perfectly straight stems to build a wooden town three times over – are completely coincidental and are in no way related. They were just nice looking plants in the garden centre, just like the silver birch sapling I bought and planted.

The majority of natural materials that can be collected for modelling fall into four broad groups. The first comprises various inorganic aggregates (**earth stuff**), the second group – herbs, teas, and seeds – is **dried stuff**, the third group (**green stuff**) is grasses, leaves, buds, and mosses, and the fourth group (**wood stuff**) is made up of twigs, roots, and barks. Each of these groups is used differently and has its own challenges when it comes to preparation.

Earth Stuff

The most cost effective method of collecting different grades of aggregates is to simply go outside and collect them from the ground. Dust, sand, grit, gravel, along with slate and stone can all be collected for free, although for the smaller aggregates, some types of earth are more suitable than others. Earth, dirt, soil, whatever you call it comes in three broad types, earth, sand, and clay, with the first two being great for groundwork. Earth with a high clay content doesn't react well to paints and PVAs, because it tends to clump up when wet. To tell if earth has a high clay content, simply add a little water and see if you can roll it into a mud ball. If you can, it's not suitable for terrain making. If it stays as a sloppy mess in your hand, it'll be fine with paints and PVAs.

If you're collecting your own, then expect to also pick up various living organisms, including bacteria. Any collected materials should be made inert. In the case of earth, baking it at 200°C (390°F) for 30 minutes will guarantee any living material is killed off. Microwaves won't kill off all the bacteria in earth, as they aren't a toxic form of radiation and they rarely get the earth hot enough for long enough, so stick with baking it over nuking it!

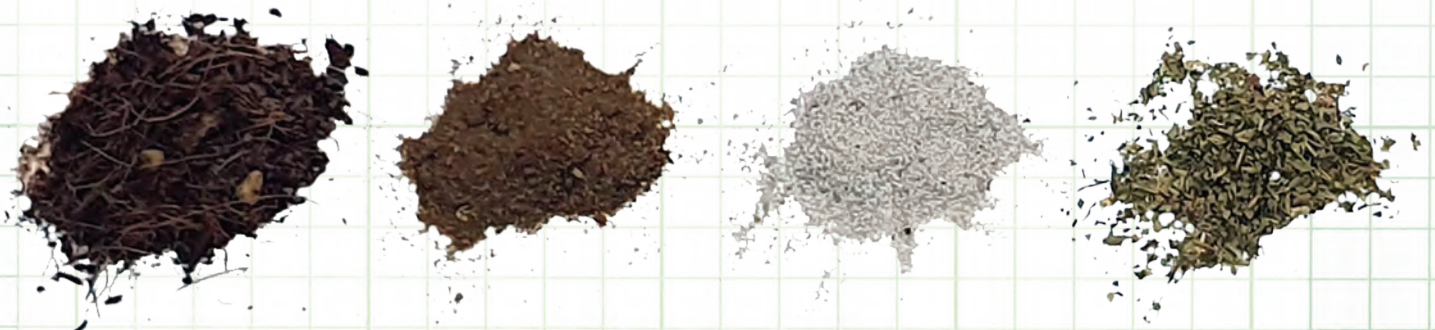
Dried Stuff

Dried herbs and spices consist of various plant parts including dried leaves, stems, seeds and even bark, either whole or ground into small bits. They can be foraged and dried out, but it is often easier simply to buy them, with 1kg bulk bags being far more cost effective than buying them in the usual supermarket quantities.

Ready to go out of the packet, they are perfect for creating various ground effects and textures, especially for woodland and heavily foliated pieces. Fixed in place with watered-down PVA, they can be painted along with the rest of the groundwork after being placed, or stained beforehand with acrylic inks and artist paints.

Mint, thyme, parsley, and basil all work great as ground cover, each varying in size, shape and colour, allowing them to be placed down individually with very realistic results. For most situations, however, a single bag of mixed dried herbs is all that is needed to create great looking ground cover.

Tea leaves, dried out after use, also make great natural-looking ground cover, as do used coffee grounds. In fact, most plants and deciduous tree leaves can be collected, dried out and crushed to make ground mixes for no cost



whatsoever, whereas dried Silver Birch seed pods make perfect miniature broad leaves with no crushing required.

To preserve leaves and herbs, ensure they are fresh and free of disease and infestation, then simply wash them and leave them in a warm place to dry out completely before packaging them or grinding them into ground mixes.

Green Stuff

Not all of nature's modelling materials need to be dried out and crushed up. Grasses, leaves, buds, lichens and mosses can all be plucked, preserved and placed on pieces to represent their larger relatives.

The tips of wild grasses can be collected in autumn, and stripped of their seeds and bunched together, they make great long grass tufts. Alternatively, they can be chopped up and laid down to represent threshed hay and straw thrown on the ground. Flower buds can be picked whole and used to represent larger plants and certain vegetables. Seed pods can be opened, painted and stuck to bushy substructures to model flowering shrubs.

Foraging isn't limited to small stuff either; larger pieces, such as the heads of artemisia 'Seafoam' (Curlicue Sage) make beautiful, delicate trees when dried, either by themselves or as a substructure for realistic bushes and tree foliage.

Certain mosses and lichens can also be collected and used in modelling. Lichens are often confused with mosses as the two terms are commonly used interchangeably but, in biological terms, mosses are plants, whereas lichens are a mix of fungi and algae that work together symbiotically.

Mosses are small, furry-stemmed plants, found in dense groups in damp and shady areas. Most of the moss species can be used in modelling in some way. They can be easily collected, split into individual stems before being preserved, strained, dyed, painted or applied to pieces with their original colour. They are regularly used to create vines, creepers and, although tricky, make beautiful weeping willow branches.

There are many species of lichens, but fruticose lichen, also known as 'shrubby lichen', is the one most used in modelling. While most lichen are flat, shrubby lichen has a bushy appearance. Confusingly, the most commonly used types are called 'Lichen Moss' or 'Reindeer Moss'.

Commercially purchased plant modelling materials come ready to use out of the packet, whereas foraged materials

need to be prepared. When preparing small plants, like lichens and mosses, remember that as they dry out, they change colour and become brittle, often crumbling to dust after even a short period. To counter this, after the initial wash to remove dirt and insects, you can take one of two different approaches, depending on what needs to be preserved.

The first involves glycerol (Glycerine). This is an organic sugar alcohol with uses ranging from skin care to a component in explosives. It has a greasy nature and is very resistant to evaporation, meaning it can be used to replace the moisture in plants, stopping them from drying out and becoming brittle. Prepare a solution of warm water and glycerol in a 2:1 ratio, plus inks such as greens and browns if you want to help colour the pieces. Once cooled down to room temperature, completely submerge your plant pieces in the solution for 24 hours before removing them and leaving them on tissue to dry out. This will leave the pieces preserved, colour fixed, and flexible for decades if stored properly.

This preservation will reduce the sturdiness of the piece, however. Preserved pieces often handle like wet tissue. In normal plant preservation, the pieces are often pressed flat, so it isn't an issue, but for terrain making it can be problematic. For this reason, glycerol bathing is used for pieces that are large and sturdy enough to support themselves after the preserving process, such as Reindeer Moss. It's also a suitable process if the piece is going to be supported with wire or plastic fibre, or stuck to a stable structure, such as moss stems applied to a wall to create vines.

Small pieces that need to support themselves should be preserved by the second approach - PVA bathing. This involves soaking the pieces in a 3:1 solution of water and PVA, before leaving them to dry, and then repeating the process a few more times until the pieces toughen up but before they lose their detail. Once completely sealed, they can be painted or used with their natural colours, albeit faded slightly by the PVA.

When it comes to painting, PVA-sealed plants can be painted with acrylics, but glycerol-bathed plant parts can be water resistant. This means acrylics will struggle to bind with them and is one of the few situations where oil paints become the better choice. Applied thinly, the oil will penetrate the pieces where water couldn't, fixing the pigment to the piece. Since the oil paint is more flexible, it also prevents the flaking that can happen with acrylics.





WOOD STUFF

Various parts of larger, woodier plants can also be used in modelling. These items range from the roots of a tree or bush, all the way to the crowns, twigs, and even the protective bark covering.

Cork bark has already been mentioned, although it is difficult to forage unless you live near the Mediterranean, but there are many other bark types that work well for modelling rocks and cliff faces. Bark chips and the like can be bought commercially as they are used as surfaces for garden paths and so on. Larger pieces can be foraged, but bark from long-fallen trees should be avoided as it will be rotten and infested with insects. The best time to gather fresh bark is just after a storm, since it is easy to collect a large amount of fresh bark from recently fallen trees. Alternatively, tree surgeons and landscapers are a good source of different barks if you have no woodland locally. After cork, ash and oak trees have some of the best bark, texture-wise, for terrain making. Both of these trees have thick, heavily textured bark, unlike Birch and Beech trees, while Scots pines have a scaly bark that can be easily broken into large chip pieces; any species with a thick, heavily textured bark will work for terrain making. Commercially purchased chips and bark pieces are normally treated, so you can use them straight from the bag.

WARNING – NEVER EVER take bark from a living tree. The bark protects the tree from bacterial infection and insect infestation but more importantly, it's how a tree carries water from its roots to its branches and leaves. If you were to remove even a two-inch strip of bark from a tree's circumference, it will not recover, and will die. Only take bark from dead and fallen trees!



Moving from a tree's covering to its branches, twigs can also be foraged from both trees and shrubs. Whilst there are many differences between trees and shrubs, one of the key differences is that a tree grows a long trunk, branch, twig or stem before splitting, whereas a shrub splits much earlier with shorter branches, meaning it has many more branches than a tree of a similar size. Whilst twigs and shrub stems have a very different structure, both can be used for modelling terrain.

Trees come in many different sizes, both in real life and on the tabletop. Tree twigs used as tree armatures should generally be as thick as a slim finger, no more than 15mm across. Twigs and branches wider than this rarely have enough forks and branches to represent a tree of that



trunk width. When sourcing twigs, look for ones that have multiple forks grouped close together, giving the appearance of multiple large supporting branches or boughs (large branches). These can be used as tree armatures but only with either solid foliage crowns such as clump and flocked upholstery foams, or a very densely flocked substructure, which will completely hide the fact that the tree has no small branches beyond its main trunk.

When foraging for twigs, look for fresh fallen branches or dry branches off the ground, these being the ones that either bend, or snap with a crisp sound. If they snap with a dull sound, they are rotten and should be avoided.

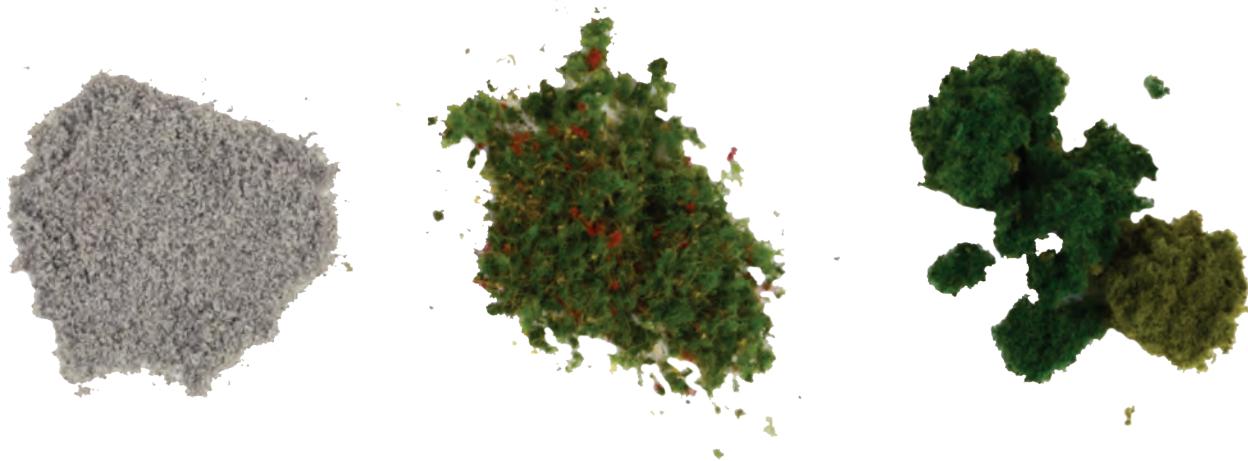
Shrub twigs, although thinner than tree twigs, have a much greater number of branches, so they can be used to create very realistic trees. You can use more delicate foliage crowns because there is less need to hide the lack of branches. The twigs from smaller shrubs and bushes work best, as they usually have more branches compared to twigs of the same size from larger plants. It's rare to find fresh, dead shrubs since they are perennials rather than seasonals, so twigs need to be harvested from living shrubs. As long as this isn't done excessively, and the cuts are cleanly done with gardening shears, the plant won't be harmed.

Small individual twigs from trees and shrubs can also be collected, preserved and then used to represent the still standing remains of old, dead trees, or as recently fallen trees and branches as ground scatter. When representing dead trees and broken branches, twigs can be stripped of bark to mimic nature, especially if being placed on water-focused terrain pieces as washed-up debris.

Even smaller than twigs, the root structures of shrubs, bushes, and other large plants can be used to represent vines and creepers on trees and buildings with very little work, once prepared.

Wood that you've collected needs to be prepared before you use it as modelling material. Foraged pieces can have all manner of bacteria, fungi, and the occasional insect or two in them, so they need to be cleaned up. First, scrub the pieces of bark under running water to remove any surface organisms and in the case of roots, earth they were buried in. Then place the pieces in a warm place to dry out completely. Once dry, soak them in a solution of 90% water, 5% PVA and 5% disinfectant and leave them to dry out completely again. This will ensure that the pieces are clean of organisms as well as sealing them and strengthening smaller pieces like twigs and roots.





SCENICS

While most of the tools and materials used to build terrain are repurposed for terrain making, there has long been a selection of scenic modelling materials available from railroad model manufacturers. In the early days, these products were often repackaged and sold in smaller quantities as miniature basing supplies.

Much like the explosion in other areas of the hobby over the past decade, the quantity of scenic modelling supplies has also greatly expanded, with a number of companies now dedicated to providing large ranges of scenic supplies. Although many of the diorama supplies such as texture pastes, paints and weathering pigments might be too expensive for large-scale terrain making, there are several supply types that are both cost effective and great for wargames terrain.

Bits, Grits and Ballasts

There is a wide range of aggregates. These are usually packaged in various grades (sizes), although some wargaming suppliers do supply premixed basing sets. These are invariably sands, grits, and/or small stones but can include cork and ground walnut shells, and some railroad supplies are pre-painted to represent rail track ballast or coal supplies. Of all the methods of acquiring aggregates for texturing bases, specific scenic suppliers are the best way to get a wide range of aggregates, but they are also the most expensive.

Flocking it up

Flock is the generic term used for three different product types, all used to add grass texture to a terrain piece, or 'flock it'. Flock can refer to traditional flock, scatter, or static grass, with all three being used in the flocking process depending on the desired effect.

Traditional flocks, now often called fine scatter, consist of dyed sawdust in many different shades and mixes, replicating the look of grasslands across the different seasons. Although some are still manufactured in the traditional way, manufacturers have also started to use synthetic materials, including ground foam.

Scatters are a newer addition to the flock family consisting of synthetic materials, commonly ground up foam, and they are available in various shades much like traditional flocks, but also different grades and mixtures meaning they can be used to represent rougher grassland.

Static grass consists of short (1-4mm) dyed, nylon fibres, originally produced by the automotive trade to make velvet

surfaces on the interiors of cars. These fibres, supplied as scenic modelling supplies in various colour mixes (much like traditional flocks) can be used to create longer and more realistic grass effects than flocks or scatters. They can be either sprinkled on, to create a rough grass effect, or applied with an electrostatic flocker to make the fibres stand upright, replicating real grass.

Along with grassland materials, covering all the seasons, there are also supplies dedicated to replicating snow. Most of these are different types of white flock, made from various materials like plastic granules, to 1mm white nylon fibres, that can be laid on top, or instead, of the usual grass flocks.

Rolls of pre-flocked or pre-static-grassed sheets can also be purchased. Primarily used in railroad modelling, these can be cut up and glued to pieces and boards as an alternative to flocking manually.

Clumps and Bushes

Moving up in size, there are various scenic products that can be used to represent bushes and tree foliage. Clump foliage, traditionally upholstery foam blended with paint and glue, is now also made from a range of materials and is available in a wide range of colours. Broken up, it can be used to represent rough grassland, bushes, hedges, even tree foliage.

Reindeer Moss (Shrubby Lichen) can also be purchased as a scenic supply. Always pre-cleaned, stained, and preserved, it can be used straight out of the bag for busy tasks much like clump foliage. It can also be used as a substructure for larger bushes or tree crowns. Vulcanised horse hair (now coconut fibre) sheets can also be purchased to use as a foliage substructure material.

Trees

Along with small scenic items, model trees can be purchased to be applied straight to terrain pieces and boards, along with plastic armatures that can be repositioned and crowned with either clump foliage or a crown substructure to be flocked with one of the wide range of leaf foliage available.

Little Bits

Although flocks, clump, lichen and trees have been a stable of scenic supplies for decades, additional products for scenic model making are now becoming more widely available. Most of these are small, delicate pieces that you can add as dressing beyond the usual flocks, scatters, etc. These include self-adhesive, static grass tufts (tussocks)

or flowers, and foliage strips for use as vines or crop lines in vegetable patches. There are also long grass fibres, both natural and synthetic, that are sold in various shades to model tall grasses of all seasons.

Tufts can be expensive to buy. Long term, if you're going to be using lots, buy a terrain maker's flockbox, greaseproof paper, stay-tacky glue, and a couple of bags of static grass, and start making your own!

For more detailed work, there are ranges of laser cut and brass etched plants and flowers, that can be bent into shape, painted up and placed on pieces. There are also a wide range of ground covers and specialist tree foliage scatters for very realistic work.

Wet Work

There is also a range of scenic materials dedicated to replicating water. These are usually materials from other industries, sometimes pre-mixed with inks and pigments, repackaged for scenic modelling either to create realistic water or water effects.

Realistic water products are designed to produce a layer of modelled water when poured into a pond or river piece. They are usually supplied clear, and applied clear, but they can be tinted with inks, paints and pigments. Most realistic water products are acrylic based, usually just a thick acrylic binder mixed with water so that when it dries, it leaves a clear plastic layer. As these are air drying, they can suffer from cracking around the edges due to the volume reducing as it dries, so they are best for small pieces or replicating puddles.

Acrylics are water soluble, meaning any cracks can be soaked with brushed on water and filled with a thin application of more acrylic 'water', then smoothed out with a wet brush as it dries, leaving a perfect finish.

There are also epoxy resins that are used to replicate water, although they require more preparation time. They cure through a chemical process so don't reduce in volume and, once cured, produce a far more durable and clearer layer of modelled water without any shrinkage issues compared to acrylic-based materials.

WARNING – Epoxy resins cure through a chemical process and should be tinted with inks and pigments designed specifically for those resins. Most hobby resins can be tinted with acrylic inks and artist paints but if used too much, it can stop the resin curing completely, leaving you with sticky model water. Excessive tinting, especially with watery products, can result in an exothermic reaction, where the resin gets very hot. This can result in the resin starting to smoke, melting its plastic container and even causing fires. When tinting resin, never add more than 5% of the total volume of the resin being tinted, no matter what you are using to tint it!



Water effects are acrylic-based pastes that, when applied on top of a realistic water layer, can be used to create all manner of effects from ripples and splashes to ocean waves and waterfalls. They are usually a mixture of heavy, acrylic gel, pre-mixed with inks or pigments to create a translucent or opaque textured effect, replicating various waves and foamy effects.

Acrylic water effects can be applied in bulk, but they air dry. The thicker the application, the longer it will take to dry and go clear, sometimes up to a week. Applied too heavily, the outside can dry, stopping the inside from drying and going clear, so multiple thin applications to build up the effect work better than a single bulky one, especially as some of them lose more than half their volume as they dry.



ALWAYS GROWING!

These are only the commonly used scenic materials in terrain making, but the ranges available from scenic suppliers also include many modelling materials from the earlier sections as well. The actual range of materials available in the scenic modelling industry is huge, and only continues to grow; their use in terrain making is only limited by the budget of the build.

THE PRACTICALS

COMMON METHODS AND TECHNIQUES



Terrain sets come in all shapes and sizes, with themes and settings from different places, times, or even the world of the imagination. With all sets, however, the themes and settings are just "skins" applied to the same pieces, made with the same materials, and using the same techniques.

There is a core set of practical skills – just as there are core sets of tools and materials - that are used over and over again throughout the build process, regardless of what is being built.

FROM CUTTING MAT TO TABLETOP - THE TYPICAL WORKFLOW

Once your pieces are sufficiently planned, and all the necessary materials and tools have been acquired, it's time to start the build process. Making wargaming terrain isn't a one-sitting hobby. Terrain pieces, sets, and boards are usually built over multiple sessions and can take anything from a couple of evenings to months of work, depending on the project. Terrain is built in stages and each stage needs to be completed before you can move on to the next. Whilst terrain pieces vary greatly, the process is similar for all of them. The number of build stages that can be completed in a single session is often determined by the amount of work that needs to be done in the time available, or by the need to allow the pieces to dry.

The build process can be broken down into eight core stages. It's important to understand what each involves, so that your hobby sessions can be productive. There's nothing much worse than starting a session with a task that takes only a little time but then leaves the pieces untouchable until they are dry.

1. Base Making – This is the first stage, as bases provide the foundation for the rest of the build. The time needed will depend on factors such as the number of bases needed, the material they'll be made from, the tools available, and even the desired bevel of the base edges. Thin, EPVC foamboard bases can be crafted quite quickly at the hobby desk, whilst thicker, tougher materials might require special tools and workstations. In such cases, it is best to treat mass base making as a single session.

2. Basic Build – After the bases, focus moves to completing the basic shapes of the terrain pieces. From cutting out walls, floors, and roofs, to shaping foam into rough hills or creating tree armatures – the list is varied. These elements are combined on the base to form the substructure of the piece. The amount of work involved in each piece is determined by the number of different materials and techniques used. It is best to split the basic build stage by materials and techniques, focusing on completing all the work on one material type or technique before moving onto the next, saving time on both setup and clean up. This approach also makes it easier to plan the basic build workflow over multiple sessions for large projects. Usually, completed basic builds need to be left to dry before moving onto the detailing and texturing stage. However, for pieces made from dry materials that have been constructed and mounted to the base with fast acting glues, it's possible to move straight to the next stage.

There are times when you'll want to add detail to various elements before you put them together on a base. If that's going to be easier, do as much as you can before assembly and finish off the detailing once it's mounted.

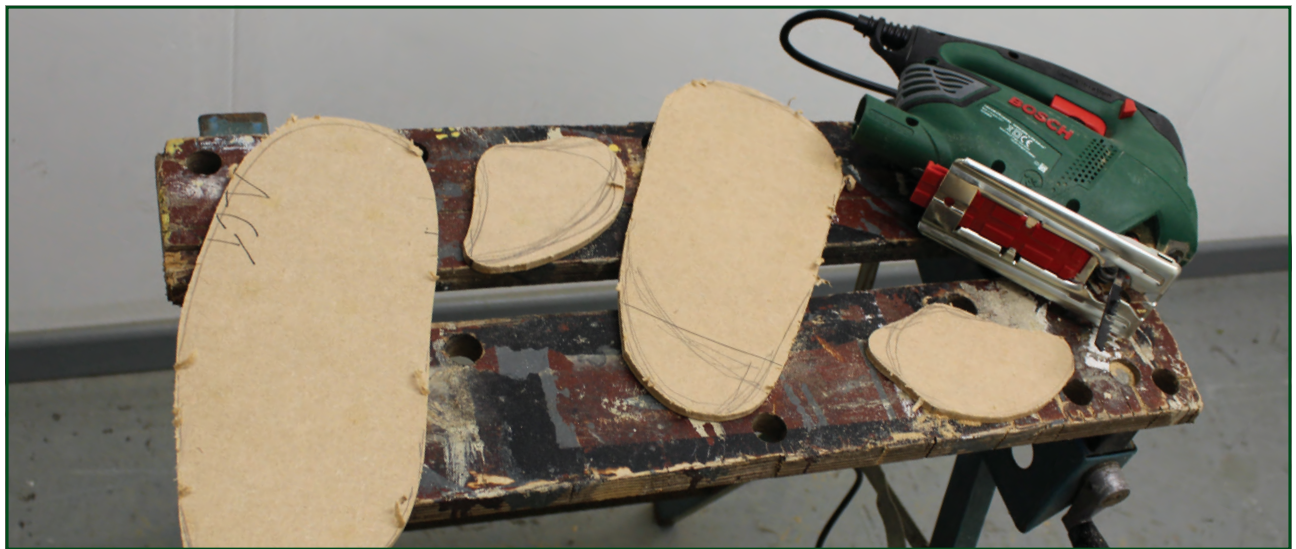
3. Detailing and Texturing – Now we take the basic shapes and substructures and dress them up with additional details, and we can add smaller elements to give the piece character and provide textured surfaces. Detailing can involve embossing or engraving foam to replicate brickwork on walls, or rockfaces on hills. It can be about adding balsa strips to a fantasy townhouse, tiling a roof with cardboard, or adding plastic pieces such as pipes and vents to industrial builds. It can also require putty work, for sculpting tree bark, for example, or to add sandbags. The time needed for this stage often depends on the desired level of realism. Most pieces can look good with minimal detailing. Usually, the greater the realism desired, the more detail is required, and this can drastically increase the workload.

Texturing often comes after detailing but can be considered part of the same process. Texturing might be about adding a rough surface to walls and rockfaces, or adding groundwork with aggregates and textured gloop. When working with multiple pieces, it's best to batch texture them all at the same time; it can be a messy process, and this will cut down the number of times you have to clean up.

When you need to create a lot of small detail elements to add to a piece (like window frames), it's best to mass produce them in advance, making more than you need. This will stop you worrying about being a few short, or breaking one along the way, and let you focus purely on their application.

4. Sealing – When the detailed and textured pieces are dry, it's time to seal them for painting. This involves coating them in a thinned PVA solution, or varnish, which not only seals absorbent materials, but also provides a surface that takes paint easily. Sealing helps to bond the detailing to the basic builds, reducing the risk of bits being dislodged as they are painted. Buildings and above ground structures are best sealed once fully dry (after detailing), but groundwork can be sealed as it's laid down. The sealing stage can also be combined with the texturing stage to speed up the process, especially if you are sealing non-groundwork elements with varnish.

Once the pieces are sealed and solid, it's time to paint them up.



5. Basecoating – The paint process begins with the application of the main colours, such as greys for rocks and walls, browns for woodwork and groundwork. Basecoating is a stage in itself because it involves applying a much larger quantity of paint to the pieces, compared to the terrain painting techniques that follow. Basecoats have a lengthy drying time, so they are often best left overnight before beginning the detail painting. This is especially important if any of the detailing techniques involve wet work, which can reactivate almost-dried basecoats, and result in unintended colour mixes.

6. Detail Painting – This stage can involve a wide range of painting techniques to add depth to the piece, such as highlighting a texture, adding subtle variation or shading, and weathering a piece, all of which increase realism. The time needed will depend on the desired level of realism, the number of pieces you are working on, and the techniques employed. Overbrushing, drybrushing, and stippling need next-to-no drying time before being ready for the next step. Washes for shading and weathering have longer dry times and are best applied to fully dried and highlighted pieces, to ensure they don't reactivate paint that is almost dried.

7. Greenwork – If there's no grasswork or foliage to be added, the pieces can be left to dry before they have their final protective sealing (stage 8), otherwise, it's time to add the greenery.

The addition of grass and foliage is really an extension of the detailing stage, but it needs to be done after the details have been painted. This stage can involve applying multiple layers of flocks, scatters, and scenic materials, as well as adding foliage materials to bushes and trees. There are a number of different techniques for creating a realistic finish, as well as a wide range of special effects materials for specific situations, so this can mean that this stage may be the longest of the entire build process. Moreover, speed of application is the major factor for many of the techniques and materials to be used at this stage. While the level of realism depends on the amount of work put in to the pieces and the variety of the materials laid down, it's really quite easy to achieve a good looking piece with a few simple steps and a core set of materials.

8. Final Sealing – Once all the detail painting and grasswork is done, the final stage is to apply a protective coat to the piece, preparing it for handling and gameplay. This could be either a single application of thinned PVA or a varnish, which can be applied quite quickly, or you may prefer multiple applications of various sealants which will be more time-consuming but give a more realistic or durable finish. This stage will usually be the quickest of all the build stages, and often the set up can take longer than the actual application. However, if you need to apply multiple layers, especially varnishes, it can require multiple sessions with overnight drying time between each application.



Go with the flow

In most cases, after sealing, the build process is complete and the pieces are ready for the tabletop. There are, however, some processes - such as adding resins to water pieces - which can be done after the sealing process. So, treat this build workflow as a guide, not a strict set of rules. It will help you to keep your builds progressing in an organised manner, and avoid situations where pieces in a set are at different stages, leading to a lot of lost time. This is most likely to happen when you need to swap between workspaces, as different stages need not only different techniques and materials, they might also need different work areas.

Work Areas

Given all the tools and materials you might use, together with the table space you need for building, you might think you need a large, dedicated hobby space. But while a terrain studio is a glorious thing, all you really need is a humble kitchen/dining room table.

For the basic setup, you need room for an A2 (approximately 17"x24") cutting mat, or a few sheets of thick, corrugated cardboard, along with space for the tools and materials being used at the time. If you're building a whole set of terrain, it's useful to have table space within arm's reach for the pieces not currently being worked on, so you're not constantly getting up and down to swap pieces. Often, this is all that's needed for most of the build process and so can be done anywhere the space can be found.

At some point, however, it's going to get messy.

Base making, for example, may well create lots of dust, or small bits of card, or polystyrene. Unless you can do it cleanly on the cutting mat, it's best done outside or somewhere the excessive dust will be easy to clean, especially if you are using power tools. The same applies to spray sealing, since the overspray from quickly sealing an entire set can be surprisingly extensive. You should also consider ventilation when using aerosol paints and varnishes, or cutting foam with hot tools; the former is always best done outside on a nice, non-humid day.

WARNING – Remember, just because you (think you) can “handle the fumes”, it doesn't mean they won't affect kids, people with respiratory problems, or even pets. Only use sprays and varnishes in a well-ventilated area.



Accidents, spills, and splashes can and do happen frequently, so prepare for these when setting up your workspace. Indoors, a few sheets of newspaper under and around the cutting mat may be all that is needed to prevent disaster. If you're in a carpeted area, a plastic playmat beneath the work area can save you a lot of time and money in carpet cleaning. Even the simplest of build tasks can make a bit of a mess with offcuts, debris and dust, some of which can get in the way or contaminate a build later on. Cleaning regularly throughout the session is better than leaving it until the end.





A damp rag is an essential at pretty much every stage, but never underestimate the benefit of keeping the Hoover (vacuum) nozzle close by when cutting, sanding, or working with aggregates and scenic scatters.

For the messier spraying tasks, those that are often done outside, a few large sheets of corrugated cardboard are all that's needed to make sure the patio or garage floor doesn't get stained or coloured. This is a hands-on hobby, so some mess is inevitable. If you take the time to make sure the job is done in the right place, with the right protection, and if you clean up as you go, your builds will progress smoothly and problem free.

Mixing things up

The workflow laid out above will help you to build great terrain that's durable for gameplay, but might appear dishearteningly long and drawn out. Remember, however, that once you've got an understanding of the core stages, techniques, and materials, it's possible to combine stages into one session, reducing drying times and speeding up your workflow, particularly when building sets. With the right choice of techniques and materials you can drastically reduce the time needed to complete a piece or set and, in some cases, entire pieces or sets can be completed in a single day.

It's best to become confident doing each individual stage before you try to combine them. Understanding the process makes it a lot easier to troubleshoot any issues that arise when you do speed up your workflow.

A simple way to speed up your workflow is to organise your tools and materials by build stages, storing them together in their own containers. For example, you might keep your base-making tools with your base materials, or use a small set of plastic drawers, with each drawer dedicated to a different build stage. This eliminates the need to hunt for items when setting up.

There are a host of techniques you can use to combine the laying down and sealing of multiple layers of fine materials such as aggregates and scenic scatters, often allowing them all to be done in a single sitting. Drying times can be reduced by painting techniques that control the amount of paint and water applied to a piece, as well as by tools like hairdryers. You can also reduce build times just by taking a little care, such as applying washes on a dry area whilst waiting for the detail painting on an adjacent area to dry.

There is also a wide range of materials that can reduce the drying times between stages. There are adhesives, like hot glue and super glues, that bond quickly and allow detailing to be done in the same session as the basic build. There are quick-evaporating thinners that drastically speed up water-based sealing processes. Aerosols and airbrushes can be used to basecoat pieces, allowing pieces to be detailed very soon after basecoating.

It is always handy to have a couple of odd, one-off pieces, some at different build stages than your main project and some at the same stage. Let them sit on a shelf until all the work you can do in a session is done and you've got time to fill, or when you need something to work on because you need to do messy work on your main set but the weather isn't letting you.

Whilst the range of materials and techniques that can be used to speed up builds is growing by the day, don't forget that this is a hobby, not a race. Building fast is fine if there's a real need for speed, but it's easier to improve your skills if you're not in a rush.

What next?

With your workflow planned out, your workspace and hobby sessions organised, you now know what to do, in what order, where best to do it and how to stay safe as you do. Next up are the common techniques you are going to use.



KEEP GOING, HAPPY AND HEALTHY



WARNING – *The following is NOT medical advice, just a guide to help you stay healthy and safe as you hobby. If you are in pain or suffer disability, always seek appropriate advice from a qualified medical professional.*

Aside from the odd cut finger and the need to mask up or work in a well-ventilated area, this hobby isn't hazardous to your health. Terrain making is actually quite sedate, which is one of the reasons why it's seen as relaxing. Nevertheless, sitting in one place and position for a prolonged period can put pressures on your muscles and spine, especially if the warning signs of discomfort are ignored just because you want to get something finished.

Proper Hobby Posture - Whilst sitting at, or standing over, a desk, bench or table, the lower back muscles are constantly under load, constantly contracting, building up waste, increasing in discomfort. If ignored, this can lead to protective spasming and escalate into full blown back problems. Above all, do not ignore discomfort and allow it to develop into pain, take regular breaks, get up, move around, let muscles pump for a bit, before going back to your hobby.

Bending over puts a lot of strain on the back muscles and improving your working position can drastically

improve the load on your back. Ideally, when sitting, rather than being hunched over it, your work should be at the same level as your breastbone. While this is practical for figure painting, it can be impractical for terrain making, but raising your work surface by just a few inches can significantly reduce the load on your back. If you can't raise your work surface, look into lowering your chair.

Bending from a standing position whilst working at a table or bench, stresses the lower back. The best height for a table, to reduce these stresses, is level with the knuckles of a clenched fist when standing straight with your arms hanging down by your side. Kitchen and dining tables are usually a few inches too low but can be raised with some bricks or bits of wood.

It's not only bending over that the back doesn't like, it also doesn't like standing up straight. Instead, your back prefers to tilt a bit, side to side. The reason for this is that when tilted, the muscles on one side of the spine work and the muscles on the other side rest. When standing straight, both sides have to work and neither get a rest, meaning more metabolic waste, discomfort and pain. I recommend using a simple 2" step to rest one foot on and tilt the spine. Swapping sides occasionally will help make standing at the bench considerably more comfortable.

Above all, be guided by discomfort, take breaks and make sure you've got a good, working posture and (fingers crossed) you'll be hobbying happily and healthily.

STICKING IT TOGETHER

If there is one activity that really sums up terrain making, it's the assembly of a bunch of different things and sticking them together to create something new.

Gluing things together is an integral part of terrain making. A wide range of materials, all needing a variety of glues and techniques to stick them together is part of the creative process. Understanding the best glue for the situation, and the correct way to apply it is a key factor when building, whether you're at the beginning of the basic build stage, or nearing the end and adding greenery and foliage .

For most gluing jobs, simple PVA is all that's needed. How it's applied, however, depends on what is being glued to what. Generally speaking, you'll either be gluing a small number of large elements together – such as adding foam hills to a base and constructing a building out of individual walls – or you'll be gluing a large number of smaller elements to a piece – like texturing with aggregates or flocking a piece.

Big Bits

In the first case, the heavy-duty tasks, unthinned PVA straight from the bottle is the way to go. Apply it in small amounts, either as thin, broken lines to stick walls together, for example, or as a number of small dots for sticking large surfaces together, for example when layering foam sheets on top of each other to form a hill. It is important to control the amount of PVA being put down. PVA is an air-drying glue, so heavy applications can mean longer drying times or, in some cases, the outside edges and surface of the glue dry first and block the air from reaching the rest of the glue, meaning that the bulk of it never dries. The result is a weaker bond than if less glue was used in the first place.

If you get a glue blob that's a bit heavy and looks like it's not set inside, pop it with a pin and then press it down, forcing the wet PVA out and wiping it away. A bit like popping a spot. It's quicker and easier to wipe away or smooth out large blobs while they're still wet.



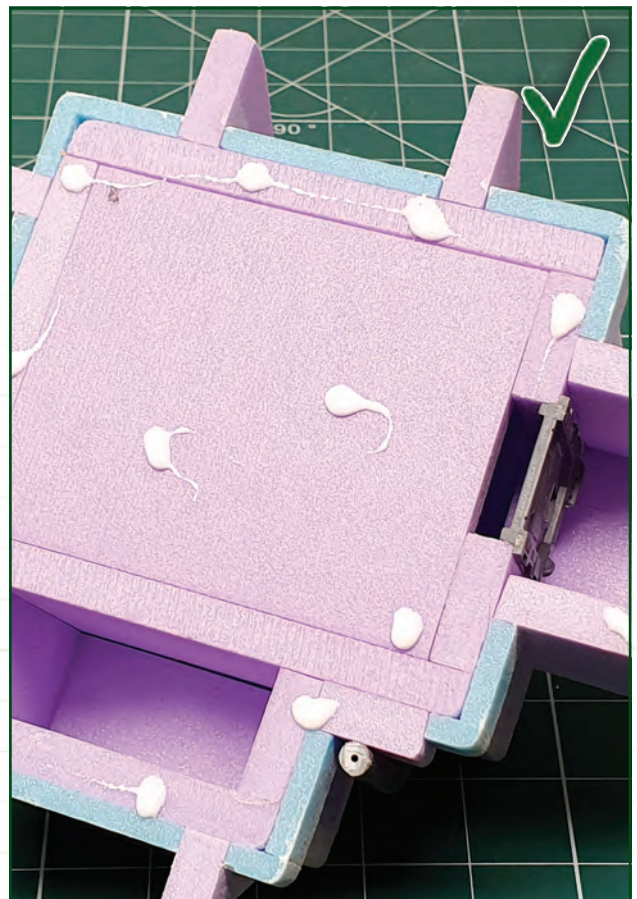
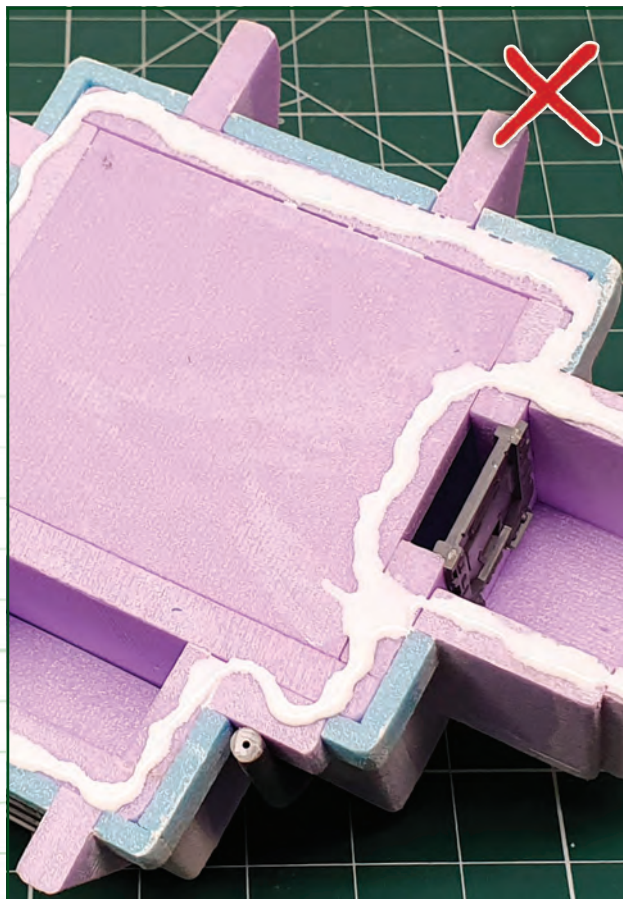
When gluing large sheets together, place 5mm diameter blobs of PVA in a 1" grid pattern across one of the surfaces. When pressed together, the blobs will flatten and expand but not enough to stop their centres drying, or to stop air getting further between the sheets, blocking other dots from drying at all.

A common misconception is that a ring of glue all the way around the edge of a piece when gluing layers of foam, will ensure the edges stick well. This approach, however, can lead to you sealing all the gaps, making the layers airtight and reducing your chances of a solid bond. So, go against what you might already do, and stick with broken lines and small dots.

Remember that most bonds will be reinforced as the piece is detailed, painted and sealed, so usually, elements only need to be bonded enough to proceed to the next stage, as the final piece will be solid enough for gameplay by the time it's finished.

Small Bits

When it comes to laying down aggregates and scenic scatters, unthinned PVA – even when brushed on as a smooth layer – will actually result in a weaker bond than thinned PVA, and will lead to bits dropping off once the glue is dry. With unthinned glue, aggregates and scatters are so



light that only the very bottom layer will bond. No matter how much material is sprinkled on the piece, only the bottom layer will be stuck down and everything above will be loose, once the PVA has dried. When thinned PVA is used, not only will the aggregates sink into the glue layer, but the thinned PVA itself will also be pulled up through the layer of aggregates by capillary action, a process where fluids are pulled into small gaps by surface tension. This 'soaking-through' effect can create an even stronger bond through techniques such as pre-wetting and wet-working, but these are sealing techniques, rather than gluing. With aggregates and scatters, the line between gluing and sealing becomes a little blurred.

PVA can be thinned down with water at a 1:1 ratio for laying down most small aggregates. For patches of larger aggregates, boulders, for example, unthinned PVA can be added into the thinned layer, which will bond the larger pieces better than the thinned layer on its own. For scenic scatters which are often laid over painted groundwork, an even thinner PVA solution, at a ratio of 2:1 water to PVA works better. Scatter flocks require very little glue, so the extra-thinned PVA will easily bond them. Pre-mix your thinned PVA and apply it with a large, fine-bristled, flat-tipped brush in even layers, ensuring that any pooling, typically in dips and recesses, is removed before sprinkling on the aggregates or scatters.



Sometimes a surface can be so large that by the time you've put your glue down, it has already started to dry before you can get your bits sprinkled. In such cases, do a bit at a time, laying your glue down over part of the area, then sprinkling your bits but avoiding

the very edge of the glue layer. This way you can add more glue to the edge, expand the area and sprinkle some more. It's quite easy to work across an entire board step by step using this method without ever getting bits in your brush or any sign of dried glue lines.

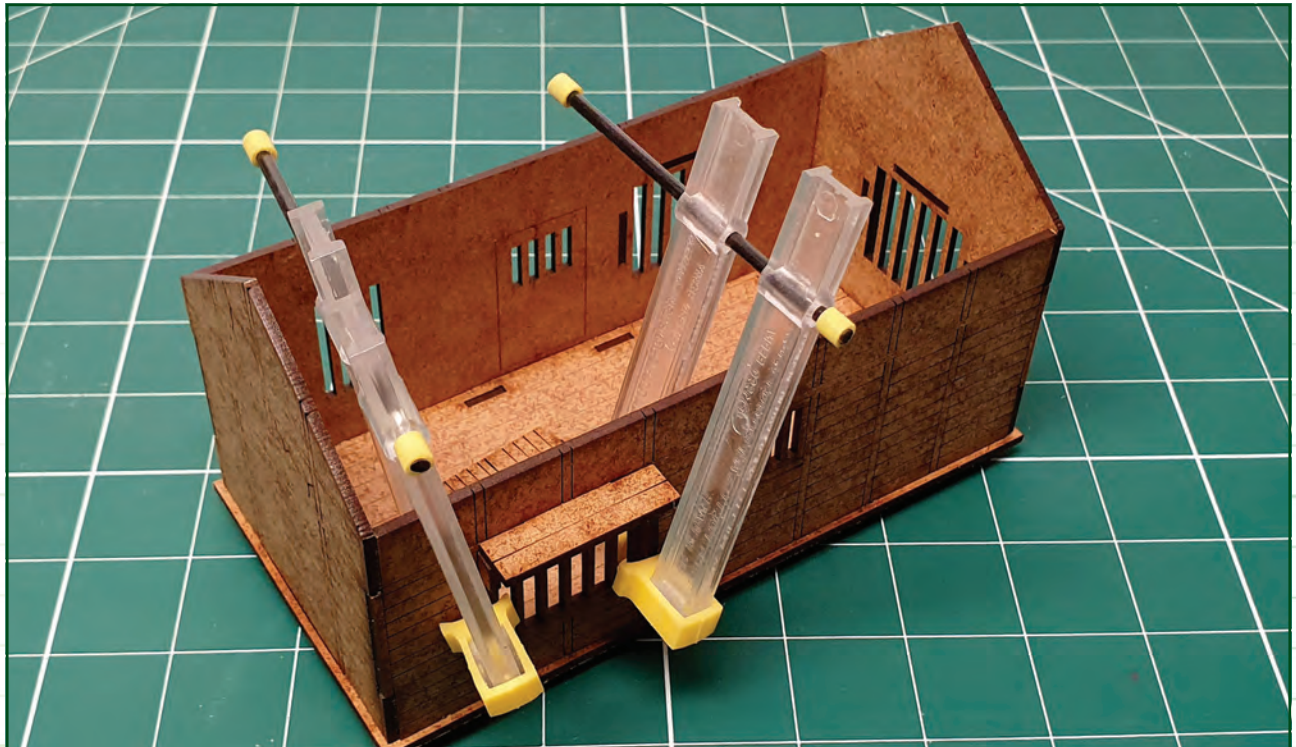
The Fast, The Fiddly, and The Non-absorbent

Whilst PVA is the king of glues for terrain making, there are times when other glues may be needed. The most common reason to switch from PVA is that one of the elements being bonded is made from a non-porous material such as metal, resin, or plastic. PVA struggles to bond these materials as it cannot penetrate the surface to grip it, whereas hot glue, super glue, and latex glues - contact adhesives - will bond much better.

The second reason for switching from PVA is bonding time. Hot glues and super glues have much shorter bonding times and can produce a stronger bond than the same amount of PVA. If you have a lot of things to build, or a short time to build your pieces in, consider a change in glues. Hot glue and super glue can also make detailing tasks much easier as they can bond small bits quickly, making tasks like tiling walls or creating fences a lot less fiddly.

For the even smaller bits, such as aggregates and scatters, a repositionable latex spray adhesive can be used instead of thinned PVA. Once sprayed across a surface, this instantly bonds anything that is put onto it, meaning drying time is eliminated completely. The downside is that it is only a contact adhesive, so there is no 'soaking-through' effect, and only the bottom layer of materials touching the glue will be bonded. It is possible to apply multiple layers of spray and aggregates or scatters but be sure to remove any loose excess before applying more spray. Just as the spray doesn't soak upwards, it won't soak downwards either. This can lead to disaster at the painting stages as layers of aggregate separate.

Although spray adhesives can be used for texturing and grasswork, they really excel when adding foliage to mesh-like substructures such as wire wool, polyfibre or coconut fibre to create bushes and tree crowns. Not only is this the best way to apply adhesives to such irregularly shaped materials but also, once added, the foliage can be sealed with thinned PVA with no fear of the latex glue reactivating and the foliage falling off.





The Extra Step

Sometimes, glue on its own is just not enough. You might need ways to hold elements of your build in place whilst glues dry, or if the area of the join is so small there is not enough glue to make a secure bond. Whilst swapping glues or combining them can help in these situations, there are other methods of holding things together while they bond, or to reinforce joins permanently.

'Pins' can be used to fix elements together while the glue dries, and when we say 'pins' these can be any long, thin rigid item that can be pushed through foam, foamcore, or balsa wood. Dressmaker pins are great as they can be easily removed once the glue dries before moving onto the next stage of the build. For stronger reinforcement or on large foam sheets, cocktail sticks or bamboo skewers can be used. Regardless of the type of pin you choose, they are best placed in pairs and at a right angle to each other, locking the elements together. When reinforcing with permanent pinning, flat-head sewing pins can be easily pushed in just below the surface of the material and then hidden with texturing later.

Push it in, pull it out, put a squirt of PVA in the hole, push it back in, clip off any that's still sticking out. Prod it in a little further and finally whack a bit of filler in the hole to hide your handy work.

When materials can't be pinned, typically because they are not soft enough, masking tape can be used instead. Elastic bands can also be used to hold elements in place, especially when working with MDF or resin kits. Clothes pegs can be useful, as can hobby C-clamps and specialised magnetic hobby clamps (both made specifically for hobby building).

Cheap and easy clamps can be made with a few bits of LEGO®, some small flat magnets and a bit of super glue. Unlike commercial clamps, homemade LEGO® clamps are highly customisable.

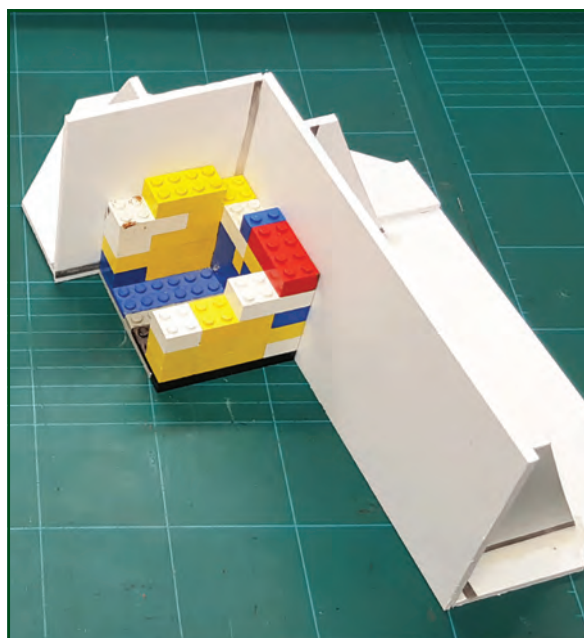
When it comes to terrain making, it doesn't take much to stick things together. The process is very forgiving and any join can be reinforced. The secret, however, is using the right glue in the right way in the first place.

But as well as glue, you're going to be applying paint to your pieces, and there's a whole load of ways to do that, too.

GOOD GUIDES

As well as applying the right glue in the right way, and holding everything together while it dries, you must make sure things are in the right place, too. This is particularly important when constructing buildings. Joins that are improperly aligned, or at the wrong angle can cause all sorts of problems later in the build. The easiest way to prevent this, is to draw the positions of the walls or other elements directly onto the base and use this as a guide when adding them. This will help to keep all the horizontal angles correct, but it will not help to ensure pieces aren't slanted vertically. Tools are needed. Forms, jigs, set-squares, T-squares, or blocks are large guide tools that can be pushed up against certain elements, ensuring walls are vertical, and corners are at right angles. They will also work as guides in all sorts of situations, depending of the form being used.

It's quite easy to make your own forms out of LEGO®. They're very customisable and PVA can be wiped/ washed/peeled off the plastic quite easily.





GLOOPS

Whilst there is a wide array of specialist modelling products for creating textured groundwork, hardcoating soft foam, and even sculpting landscapes, it can be more cost effective to make your own by mixing various common hobby materials together. These homebrewed products are called 'gloops' and are broadly grouped into three categories: textured paints, sealing gloops, and bulking gloops.

Textured Paints

Textured paints, as simple as it may sound, are normal paints (typically house paints) that have been mixed with a material to create a coloured, textured surface. Recipes vary depending on the application of the paint, along with the texture materials used.

To create a textured paint for the walls of buildings, use a fine grade aggregate, such as sharp sand, added to your paint at a ratio of 1 part sand to 5 parts of paint. If the aggregates struggle to adhere to the surface, the mixture can be supplemented with a little PVA to help the aggregates bond.

To create a textured paint for ground, the gloop recipe needs adjusting slightly. The addition of filler (spackle) will bulk out the mix and create small undulations on the ground. Try a mix of paint, filler, and small-grade mixed aggregates in a ratio of 2 parts paint to 1 part filler and 1 part sand. This will create a coloured paste that can be laid down over a

surface with a brush or spatula, and can be smoothed and shaped with damp tools. Once set, this will provide a very durable, textured, painted play surface. Although recipes can be adjusted to take into account the consistency of the various paints and fillers, always ensure your gloop is at least half paint. Anything less than this will result in a stiff paste that's too difficult to lay down consistently.

You don't really need to mix PVA with ground gloop as gravity works in your favor and bits rarely fall off the ground. That being said, a little PVA won't harm the mix and will give a very durable finish.

Sealing Gloops

Sealing gloops are mainly used for hardcoating and texturing foam – especially the softer EPS. When applied, they provide a tough, textured surface that takes paint much better than the bare foam.

The main ingredient is the hardcoat element which can be either a ceiling stucco, slightly-thinned filler, thinned grout, or an industrial casting powder. This is then mixed with fine aggregates at a ratio of 2:1, although an equal mix of each can be used to create a very tough and textured coating. However, a 1:1 mix is best applied by hand, due to its thick consistency.

If you're struggling to mix it up in the tub, you're gonna struggle to apply it. Thin it down by throwing a little water, PVA, or house paint into the mix but be careful, sealing gloops should never be so thin that they drip off a brush.





Bulking Gloops

Bulking gloops are used to build landscapes, creating undulating ground, as well as blending elements into their bases, usually carved foam hills or sheets of layered foam. Comprising of a mixture of a bulking element and a setting element, usually in a 1:1 mix, these gloops can be shaped as they are applied, or they can be chipped away once set.

The bulking element can be shredded tissue or paper, sawdust, or loose polystyrene balls. Other materials can be used as long as they can be broken down into very small pieces that will create volume, whilst being lightweight. Materials such as aggregates are unsuitable for bulking gloops as the weight of the gloop will become excessive if used over paper, sawdust or polystyrene.

Ceiling stuccos work very well for the setting element, since they require no thinning and, when mixed with the bulking element, set in hard, lightweight lumps. Alternatively, you can use a thinned filler or mixed up casting powder. Paint, however, doesn't have the hard setting quality of the stuccos, fillers and casting powders and so should be avoided.

Once mixed, the gloop is simply applied with a spatula or bare hands before being shaped in place with a wet, stiff-bristled brush, or wet fingers. Once set, it provides very

realistic blending and ground undulations that can take texturing and paint easily.

A small amount of small grade aggregates can be added to the mix along with a little PVA to help fix them in place. This will mean, once set, it's already textured and ready for painting, although this gives less control over the look of the texturing, than if you add the texture afterwards.

If you're planning on chipping away the bulking gloop after it's set, use filler or plaster of Paris as the setting element; ceiling stuccos and industrial casting powders will set too hard to be chipped away without risking damaging the piece.

The different ways in which the vast array of possible materials interact when mixed can vary greatly. The environment will also affect consistency, setting time and so on. Bear in mind that pigments and artist acrylics can be added to the mixes to provide colour to the gloops.

Toss out the recipes

Don't treat the directions above as strict recipes, but use them as a guide, and experiment with adjusting the quantities and materials according to the function of the gloop, whether it be texturing, sealing, bulking, or a mixture of all three.



SLAPPING IT ON!

There's a host of techniques for applying paint to pieces, and each is suited to a particular task or to create a particular effect.

There is a wide variety of paint types, of varying thickness, pigment density and quantity of medium, and it's important to pick the right paint for the task at hand. For terrain work, artist and craft acrylics are very thick and pigment heavy, so need thinning with water the most. Model paints can be used pretty much straight out of the bottle but often benefit from a little thinning. House paints are also very thick and require thinning almost as much as artist acrylics.

High pigment artist acrylics should be applied with care. Unless properly thinned, they can leave a glossy surface, so it's best to leave them for washes, tinting and occasional detail work, while avoiding large area applications.

The right consistency of paint used for terrain work should be thin enough to drip off a loaded brush, but thick enough to stay on an unloaded brush. This allows the paint to be applied straight onto the piece. However, some techniques require different consistencies, and these are explored next.

Constantly thinning paints can be a pain, especially your regulars like grey and brown house paints. I use squeeze ketchup bottles, filled with all my core colours pre-thinned to the desired consistency, meaning I can just squirt out a couple of drops of my desired colour straight onto my palette and get painting.

Basecoating – This may involve undercoating the entire piece in a single solid colour (often black), or it may be block-colouring the entirety of separate elements on the piece, such as the ground brown and the rocks grey. The best approach is to load a large, flat, fine-bristled brush

so the bottom third of the bristles are completely covered with paint. Then, dip the loaded brush into water before application, so that the applied paint is a little thinner than the basic consistency described above. When putting down a base coat, start each brush load on a large flat area slightly away from areas that have already been painted, and spread the paint over the area to meet the already painted areas. Applying it to areas already painted can double the density and slow down drying times, much like when a loaded brush is applied to a craggy surface, leaving blobs of paint between rocks that then take much longer to dry. Lay the paint down thinly in even coats, making sure to spread out and break up any large collections of paint in crags, recesses or underhangs. A single, solid basecoat is usually enough before proceeding to the next stage, but some colours can require two thin coats.

When it comes to loading a brush, only dip the end third of the bristles into the paint. Never go deeper than this, nor hold your brush with the bristles pointing upwards, otherwise the paint will get into the ferrule. This is a pain to clean, if it dries, will ruin your brush tip and there's a chance it'll reactivate in the future and tint the colour being applied at the time. So, only dip the tip!



Layering – This is very similar to basecoating but generally done with a smaller, flat, fine-bristled brush from which the excess paint is removed - unlike when loading a brush for basecoating. The paint, often a close shade to the basecoat, is thinned and laid down in thin layers over the basecoat, usually to break up large areas into different shades of similar colours, such as the base of a river or pond piece.





Blending – This is the technique of mixing a layered colour with its basecoat, to remove any stark contrasting edges. It can be done whilst layering down a colour by feathering its edges, and then going over those edges again with a damp, fine-bristled brush, to blend the layer and basecoat together. If the layer has dried, a 1:1 mix of the base colour and layer colour can be thinly applied to the transition line and then softened with a damp, fine-bristled brush as when working with a wet layer.

Detailing – This is the technique of picking out small details - such as the handles on doors, or adding chip marks to metal plates. This is best achieved with a small, fine-bristled, round-tipped brush that is used with the excess paint removed after loading. When detailing small items, start from the centre of the item and work the paint towards the edges to ensure it doesn't spread beyond the detail. When adding surface detail such as metal chips or the grain on wooden pieces, always lay the paint down on a test piece, first, to check its consistency, before applying it to the actual piece, and repeat this every time paint is added to the brush.

Mistakes are inevitable, paint will go somewhere you don't want it to. Always keep a damp, flat, fine-bristled

brush handy, so any mistakes can be quickly wiped away. With the bulk of the mistake removed, any remaining paint can be wetted slightly, left to soften and then lifted away with a damp brush or bit of tissue. This is best done almost immediately, as the longer it has to dry, the long it'll take to soften and lift away.

Drybrushing – This is a highlighting technique, where a small amount of a lighter shade of paint is applied to the raised surfaces and hard edges of a piece to create the illusion of depth. It is best done with a stiff-bristled, flat-tipped brush that is completely dry and then lightly dipped in unthinned paint so that just the very tips of the bristles have paint on them. Then brush the tips back and forth across corrugated cardboard, allowing the cardboard to soak up the excess paint until only a trace is laid down with each brush stroke. Then gently stroke the brush over the raised surface to be highlighted, brushing perpendicular to ridges and edges, so as to catch them rather than run along them. Increase the pressure of the strokes until the desired effect is achieved. This process is repeated until the drybrushing is complete, but the brush is never cleaned between applications to ensure it remains a dry process. This technique does put a lot of wear and tear on a brush's bristles, so it's a good idea to have a dedicated set of brushes for drybrushing.





Pre-thinned paints can take quite a bit of work to get drybrush ready, so it's often quicker to use the paint on the inside of the lid of the pot it originally came from, since that tends to be the thickest and easiest to work with. Also, when using a fresh brush, the first application is always a bit wetter than you need, so don't apply the first brush load, simply brush it off on the cardboard, then reload the bristle tips, brush it off, and then drybrush the piece. The small amount of remaining paint from the first run helps absorb the excess moisture of the paint in the second giving you much better results.

Overbrushing – This technique is a mixture of layering, drybrushing, and blending. It is often used to apply a subtle highlight to large flat areas with a soft texture, such as muddy roads or large, flat rockfaces. It is best applied with a large, damp, soft, fine-bristled brush with a flat tip, slightly dipped into paint before removing the excess on the palette - much like drybrushing. The paint is then applied with gentle strokes across the raised areas. The effect can be softened by feathering the edges as the brush runs out of paint or by blending it in with a clean damp brush immediately after application.

Stippling – This technique is used to apply a broken, random highlight to mainly flat surfaces. Small amounts of unthinned paint are applied with a firm-bristled, round, stub-tipped brush or with a ripped-up piece of sponge using a gentle dabbing motion. A brush can be used for very small chip effects on all sorts of surfaces, while a ripped up sponge, especially sea sponge, is better for breaking up large flat areas such as concrete walls, or ocean floors prior to a resin pour. The paint is best applied by dipping just the very tips of your bristles or sponge into the paint, and dabbing off any excess, before applying it gently to the surface in a random manner, building up the effect with multiple applications.

Build up in layers

How much paint to use and how to apply it is something that comes with experience. Just bear in mind that it's a lot easier to add more paint than it is to take off or remove too much paint. If you're not sure how much to use, go for a little and use light applications, building up the desired effect in controlled layers, until you get a feel for your brush and your paints. If it does go wrong, it can always be cleaned up or repainted.



COMMON PAINTING PROBLEMS AND THEIR SOLUTIONS

As I'm basecoating, bits that were stuck down are coming loose – This is because you're painting areas that are not properly dried. The moisture in the paint soaks into any PVA or soft filler and reactivates it, so when you apply more paint, bits start to move. Don't paint wet areas. Allow the first layer and any reactivated materials to dry fully before applying a second layer.



The tops of my rocks and grit are showing through my basecoat – That's due to a combination of gravity and a thin basecoat; the paint is simply running off the tops. If you will be layering, overbrushing, or drybrushing this surface, don't worry, the bare parts will get covered at a later stage. If you need a solid colour, however, wait until the basecoating is all done, let the paint dry, and then give a quick overbrush, rather than flooding the area with another layer of paint.



When I layer paint down, even though I've removed the excess, it runs everywhere – There's excess water in your bristles before you dipped into your paint, so when you applied the layer, the water was forced out, thinning the paint and causing it to run. Always wipe any excess water out of your bristles with a rag or tissue after every quick brush wash between applications.

I get the odd small streak of paint when I'm drybrushing – There's a little blob of paint hiding in your bristles, and it's being forced out as you stroke. Always do a firm final stroke on the cardboard to check for these hidden blobs before you hit the piece.



I get short lines, the width of my brush, on flat areas I'm drybrushing – You're not lifting your brush off the piece as you change the direction of your strokes, so the bristles are being forced into the piece, leaving a stronger impression as they bend to change direction. Remember, brush on, brush off, change direction, repeat.

When I drybrush edges and corners, I get a stronger effect than on the flatter bits – As you're stroking across a hard edge, you're scraping all the paint and any moisture in the bristles onto the edge. The harder the edge being drybrushed, the softer your strokes should be, keeping the bristles stroking across the edge rather than dragging over it.



My stippling is coming out like flat colour, rather than broken up – Your paint is too thin, or you're pressing too hard during the stippling. Less paint and lighter applications are the key to getting this technique right.

THIN STUFF

Whilst it's recommended always to thin your paints to the right consistency for application, you can thin paints even more to create what is called a wash. This watery paint will carry the fine paint pigment into recesses on the surface they're applied to, creating a natural shading effect as they settle and dry. Washes can be made and applied in a number of ways. These include simple shotgun washes, professional washes, and wet working, along with variations such as stains and glazes, each with its own benefits and final effects.

Shotgun Washes

These are the simplest washes to create, typically consisting of paint and water at a ratio of between 1:10 and 1:20, depending on the strength of the paint or the desired strength of the wash. These washes are often made by adding water to the last dregs of a paint pot, typically dark browns and blacks, often with a flow aid, too. When the wash is applied broadly to a textured surface, the pigments in the wash flow into the surface's recesses to create the impression of depth and shade. The broad application gives the 'shotgun' wash its name. Take care when applying your washes as they can leave 'tidelines' at the edge of the application area. This can be avoided by feathering these edges with clean water. Of course, you can also avoid these tidelines by applying your wash across the entire surface. When applied broadly, washes can pool excessively in dips and recesses, leaving dark glossy patches once dry. Remove excess wash that has pooled with a clean brush or piece of tissue.

Also known as "dreg" washes, shotgun washes are great for bulk work, and it's best to pre-mix them in large volumes so the shading can be standardised across an entire terrain set, and for future sets. This doesn't mean you can't also mix them on your palette for smaller applications as you go, but having a standard set of desaturated brown and black terrain washes will save a lot of time in the long run.



Professional Washes

'Professional' washes are homemade washes that mimic those sold by hobby companies. By using similar ingredients and recipes, it is possible to mix large quantities for a fraction of the price of commercial washes. In these professional washes, the paint is replaced with acrylic inks which provide a smoother effect because the pigments in the inks are typically finer and less opaque than the pigments in paints. Inks are used either individually or as a mixture of different colours to create a specific hue, for example, brown and black mixed in a 2:1 ratio will produce a copy of a commonly-used, commercial hobby wash.

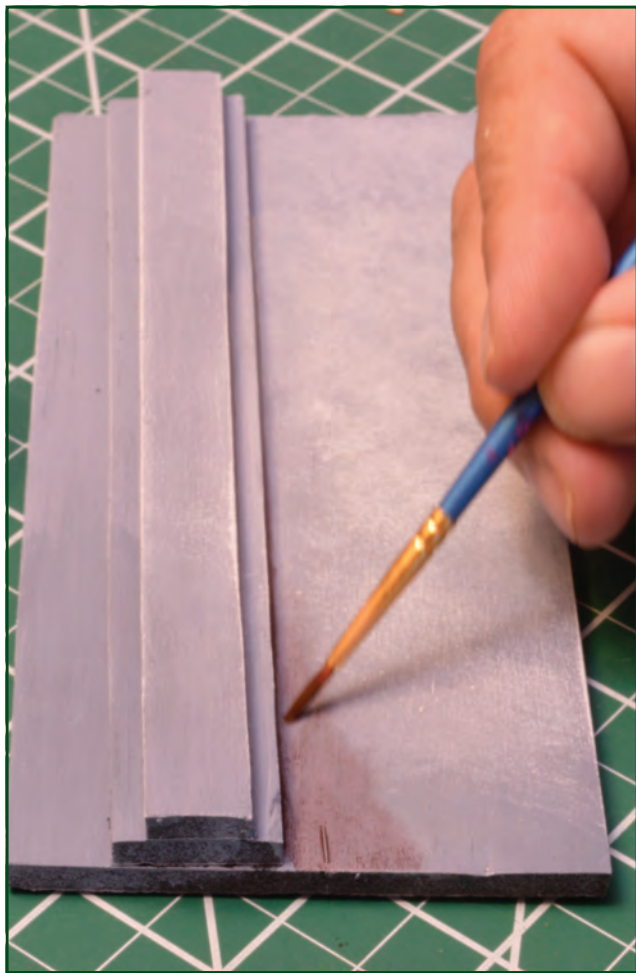
Pro-washes usually contain a matt medium which helps the finer ink pigments to bond to the terrain surface whilst also matting down the glossy shine that inks often produce. Flow aid is another typical ingredient of professional washes, and just like in the shotgun washes, it helps the wash reach all the recesses.

The base wash recipe begins with a mix of water (distilled is best), flow aid, and matt medium in a 9:1:10 ratio. This mixture will allow the wash to flow over the surface, bonding any pigments and matting down any glossy effects. Add inks to this wash base mixture in a ratio of between 10:1 and 20:1 ratio (base wash mix to ink).

Whilst these ink-based washes produce excellent results, they can be costly when applied in bulk, so are best saved for pieces or elements that need a higher standard of finish than the rest of the set.

When mixing your washes, always write each wash recipe on its bottle label, then write it in an email and send it to yourself. There's nothing worse than mixing up a new batch halfway through a project (or adding to a project in the future) and getting a different effect because the recipe was slightly off.





Wet Working

The final effect of washes is determined by the mixture, the amount of wash applied, the shape of the model, and gravity. Wet working is a technique that takes a little bit longer to apply, but gives you more control over the final results. Instead of the pigments and water being applied together, a coat of water is laid down first and small amounts of paint are added and manipulated into place with a fine-bristle, round-tip brush, essentially mixing the wash on the piece, removing the need for a flow aid.

Washes may have to be applied to a large area and, if applied to just part of a surface, they can leave ‘tidelines’ as discussed above. Wet washing allows portions of a surface to be shaded or weathered without the fear of tidelines by ensuring the pigment is never brushed near the edge of the water. Wet working can also be applied in stages over a large piece by simply adding more water and pigment as you work across the surface, allowing more control than applying a broad wash to a large area like a roof top, for example. Wet working can also be used in very small areas where control is paramount. This technique is called spot or pin washing and is applied in the same way as on larger areas, simply with less water and pigment.

The key to wet working is not to soak or flood the surface but just have a thin coat of water, adding little bits of paint and working it in before adding more. Be careful when adding more water as it can run into your corners and flush out your wash before it has set. However, if you make a mistake, it can be flushed out and the excess water and pigment taken off with a brush or tissue.

Stains & Glazes

A wash without flow aid is called a stain, and consists of highly thinned paint at the same ratio as normal washes. Washes flow off peaks and into recesses, and so do stains, but since they have no flow aid, some pigment sticks to the peaks as well. This results in an overall darkening or desaturation of the entire surface, as well as shading it. Absorbent materials such as grasswork and foliage will absorb washes, but also fix the pigment to their surface. This negates the effect of the flow aid and means that the wash acts more like a stain.

Glazes are paints or inks thinned down to near translucent, so when applied, they give a very subtle colour tint to the entirety of the surface they are applied to, without pooling in recesses to create the strong contrasts produced by stains and washes. Typically, glazes are used in small areas as a fine detail technique, the most common being to model heat effects on metal work, or to add lustre to precious metals and gemstones.

You will rarely use glazes, but stains are great for groundwork. Applied with a perfume atomiser or airbrush, light, irregular patches can break up large areas by adding subtle variation. Alternatively, heavy applications can be used to dirty the ground down or blend the edges of grasswork to groundwork. Stains made with inks will tint the ground colour, which is great for variation work, whereas stains made with paints change the colour and are more suited to muddying up grasswork.

Choosing the right wash

There are many ways to make and apply washes, but for the majority of jobs, simple shotgun washing is all that's required for good results. Both ink- and paint-based stains are the most commonly used types of wash, so focus on these first, before trying pro-washes and wet working for that added, extra level of realism.



SEALING IT UP

Sealing is the process of applying an overall coat of a thin, clear glue, lacquer, or varnish. It helps to fix small elements in place, whilst providing a protective coating. Often, when we talk about sealing, we mean the protective coating given to a piece at the end of a build, but it can also be used at various stages during the build.

Sealing can be used to secure aggregates that have been laid down as ground textures, or to seal builds, or kits in preparation for painting. It can also be used to temporarily fix layers of scatter and foliage, holding each layer of material in place before adding the next. The item and the material being sealed, as well as the stage of the build, will determine the type of sealing to be used: a type of PVA-mix, or a varnish.

PVA

Thinned PVA glue is the main sealer for terrain pieces. How to apply it depends on what's being sealed and when. The nature of the job will also determine the proportions of the mix, and the additives to be used.

A basic PVA sealing mix is a 1:5 ratio of PVA to water, to which a flow aid can be added, to help the solution soak into whatever is being sealed. The PVA can be thinned further, either to allow multiple applications, to control the amount of PVA applied, or if you're using a stronger, industrial PVA.

Blasting - the most common way to apply a sealing solution is the 'shotgun' technique, where the solution is sprayed broadly across the entire piece with a spray bottle. This quick and easy method can seal lots of pieces in a single go. Its downside is that everything on the piece gets covered, and it can be very messy. This won't be an issue when sealing a piece prior to painting, but it can be a problem in the final, protective sealing stage. Thinned PVA is great at sealing materials like grasswork and foliage that it can soak into, but on flatter, non-absorbent surfaces it can darken the paint and result in a slightly glossy finish, especially if applied too heavily.

Sealing a set by blasting can be messy work, so it's best done outside. Large sheets of corrugated cardboard are great for soaking up the excess, run-off solution, but take care that your pieces don't get stuck. Prop them up slightly on risers, like small bits of corrugated cardboard, or small paint pots, or simply move them around as they dry.

Mod Podging – Flatter, non-absorbent surfaces such as rocks, roads, stonework and so on, can be sealed with matt Mod Podge. Whether slightly thinned with water or applied directly from the bottle with a fine-bristled, flat-tipped brush, Mod Podge gives a durable, matt coating that won't darken your paintwork. It can also be thinned down to a liquid and used to seal absorbent surfaces such as scenic scatters, although it will probably require some added flow aid to allow it to soak through those materials.

Wet working – This is a technique where the piece, area or surface is soaked in water – usually mixed with a flow aid - before the PVA is applied. The pre-wetting works to "carry" a less dilute PVA (mixed at a 1:2 ratio of PVA to water) further into the materials, and will result in a stronger bond than the blasting method. This technique is best suited for ground surfaces and absorbent foliage. Both the pre-wetting water and the thinned PVA can be sprayed on, dripped on from a turkey baster, or applied with precision using a syringe. Blasting is a good way to apply both stages to a broad area, but it's more commonly used just for the pre-wetting stage, while the PVA solution is applied more precisely with a dropper of some sort. Syringes are great for precision application and are really helpful for injecting a little extra PVA solution into pre-wet, clump foliage – whether areas or individual pieces. This approach will drastically toughen the foliage and increasing its bond to whatever surface it's stuck to.

Additives – Flow aid is an essential when sealing with thinned PVA. It reduces the surface tension of the water, so that it flows into and around materials rather than sitting on top of them. There are numerous alternatives that can be used, from artistic flow aids, to a host of detergents and cleaning products.

Acrylic matt medium can also be added to the thinned PVA solution, preventing a glossy finish and reducing the darkening effect.

Use flow aid in a 1:10 or 1:20 ratio of flow aid to thinned PVA. Even less matt medium is required to achieve good results (perhaps a 1:30 ratio).

If you're using a cleaning product be sure to test it, before applying to a finished piece. Test new brands and even new bottles of brands you've used before. Manufacturers often change recipes, so what may have worked before might not work next time round.

One additive that can be used in larger quantities is 99-100% strength isopropyl alcohol (IPA). When used at the same ratio as other flow aids, IPA performs in a similar manner, but when added in larger quantities, it helps the PVA solution penetrate the materials far better than other flow aids, and results in a very durable sealing coat that strongly bonds the scatter. IPA also evaporates very quickly, and can often reduce an overnight dry time to a couple of hours. The more IPA used in the solution, the better the results, as long as it is never more than half the mix. My suggested starting mix is a 1:1:2 ratio of IPA to PVA to water. It can also be used for the pre-wetting technique, typically at a ratio of 1:2 IPA to water.

IPA can sometimes cause a frosting effect, especially around clump foliage, which may soak up too much solution. This is typically due to too much PVA. The effect can be removed by soaking the area with water, allowing the PVA to reactivate and soften, and then soaking up the excess PVA with a tissue, before leaving it to dry.



Hairspray

Hairspray, specifically the '80s-style, flat (matt), extra-volume, extra-hold type has long been used as a sealer in the hobby. It can be used lightly between layers of scenic scatters, holding each layer in place while the next is applied, before all the layers are sealed with thinned PVA. It also works well to seal the fine foliage on bushes and trees which thinned PVA can struggle with. Applied in multiple heavy coats, it can be used as a final sealer, working especially well on any fine flocks and scatters, from grasswork, to tree foliage. It can also be used to stick snow scatter to a building by spraying while dropping the scatter onto the piece from above.

Varnish

While thinned PVA is the best way to seal absorbent materials such as foliage and ground scatter, for harder surfaces such as buildings and walls, it is better to use a varnish. Varnishes are a contact sealer. They do not penetrate materials, but create a tough, durable, protective coating while avoiding the darkening effect that can occur with PVA sealers. Varnishes are available in gloss, satin or matt finishes and can be applied from a spray can, airbrush, or simply brushed on with a fine-bristled brush.

A single coat of matt varnish is enough to seal and protect a piece for casual gameplay, but for more heavy-duty use, a coat of gloss varnish followed by a coat of matt varnish (to remove the unnatural glossy sheen) will give a far more durable protective coating. Satin varnish is good for sealing snow scenes, giving a more realistic, glistening effect to the snow and ice compared to matt varnish or thinned PVA.

It's important to follow the manufacturer's instructions when applying varnish, as it is a much more complicated product than PVA or paint. Drying and reapplication times can vary greatly from product to product. Varnishing should be done in a well-ventilated area that is warm and dry. Spray varnishing in air that has moisture in it, whether from cold damp or high humidity, can trap moisture in the varnish and cause it to frost. A piece can be bathed in hot dry air from a hairdryer just prior to applying spray varnish if moisture content in the air is a problem. If frosting occurs, it can be removed by placing the piece in a warm area before resealing with a gloss of the same brand. Once completely dry and frosting free, a matt coat can be applied to remove the gloss effect.

If you've got a piece that you want to protect with both PVA and a varnish - such as a grassy hill with hard rockfaces, or a cottage on a grassy base - it's best to seal with PVA first, allowing it to penetrate and bond the materials before applying a coat of varnish. Using varnish first may seal the grassy elements, and stop the thinned PVA from penetrating.

Keep it simple, unless...

Whilst there are lots of ways and lots of products that can be used for sealing a piece, blasting with simple thinned PVA (including a little flow aid) has been the go-to method in the hobby for decades. Don't try to add new products and new techniques until you've got the basics down, and then only if the nature of the terrain dictates a tougher coating, or if a more 'professional' finish is required.

BETTER BUILDING

There are core materials and techniques that are common across terrain making, and each of those core materials has specific techniques that apply to them. Being able to correctly cut, shape and detail these materials and knowing the differences between them is one of the best ways to achieve better builds. All these materials need cutting and it's important to know how to cut correctly.

Correct Cutting

Excess force when cutting can often damage the edges of the cut, ripping away material from the sides, leaving an unsightly, jagged edge. Blades get blunt quickly when cutting – especially when cutting foam – and blunt blades are more likely to tear the edges, so make sure your cutting blade is sharp.

The cutting angle is also important: using a steep cutting angle puts less of the blade in contact with the material. The blade is forced through the material, splitting it rather than slicing it, and this drastically increases the chances of the materials tearing. Using a shallower cutting angle reduces both the amount of force required and the risk of tearing. While this may mean that multiple passes are required to cut through the material, the resultant clean cuts are well worth the effort.

Extra care should be taken at the very end of a cut as this is where the material is weakest and most likely to tear, often ruining a corner when it does. To avoid this, simply make the cutting angle shallower at the very end. Cutting at the edge of a table allows your hand to be lowered enough for the blade to be almost horizontal through the end of a cut.

If you're cutting thin sheets, there are scalpel blades with rounded ends such as Swann-Morton no.10s, which drastically reduce the chance of materials tearing, compared to when using straight blades.

Keep the cutting angle appropriate throughout the cut, and ensure the blade is kept vertical, to avoid under- or

overcuts. This is easier to do if the blade length is long enough to stay visible and not get buried up to the hilt in the material being cut. Elbow position also has an effect. If the elbow of the cutting arm is too far to the side of the cutting line, the wrist will twist, tilting the side angle of the blade as it cuts. Getting too far towards the ruler side results in an overcut at the bottom layer of the material, and too far to the other side results in an undercut. Keep your elbow close to the cutting line to ensure the final cuts are clean and vertical.

Clean cutting comes with practice but if you're struggling and you really need a cut to be sharp, err on the side of overcutting. An overcut can be cleaned up with an extra stroke of the blade, but there's no fixing an undercut.

When working with bulky materials, do a rough cut first. Leave about 5mm of material beyond the desired cut line. This will help to keep the final cuts clean. It also makes it easier to handle the material on the cutting mat. Removing the bulk of the material from one side of the cut helps the excess material peel away when doing the final cut.

When working with serrated blades, the same principles apply, but instead of slicing with a shallow cutting angle, serrated blades are best used in a sawing motion. Do this with the material hanging just over the edge of a table, or in a position that allows the blade to move freely back and forth. Long, gentle strokes are more effective than short, forceful ones.

When cutting curves freehand, long blades can bend and even break mid-cut if the curve is too sharp. Use a steeper angle and reduce the amount of the blade embedded in the material. Multiple gentle passes work best.

WARNING – Watch your fingers, use a metal ruler, and if a cut feels forced or awkward, change your position or cutting tool. Multiple passes are always safer than a single, forceful one!





Expanded Foam (EPS)

EPS, both large insulation sheets and protective packaging, is the softest of all the core materials. Whilst this means it's the easiest of the core materials to cut, its bobbly nature means it's also the messiest. It is made from small polystyrene balls, which are only weakly bonded - held in place only by the hardened surfaces of the sheet. Once this hardened surface is broken, the balls inside break away very easily. This can make EPS foam challenging to work with, but once you understand why it breaks, it becomes much easier to manipulate.

When working with EPS, it's always a good idea to keep a vacuum cleaner nozzle close by. For quick cutting bulk shapes, serrated blades such as steak knives, bread knives, and coping saws cut EPS quickly and relatively cleanly. For clean cuts, a long, sharp blade, used in multiple, gentle, shallow-angled slicing strokes, can cut EPS sheets without any tearing whatsoever.

Hotwire cutters also work well on EPS, cutting easily through the soft foam, although they are not ideal for precision cutting; even a small hand-twitch can result in relatively large mis-cuts. To shape the soft foam, quick passes of a heat gun will control the melting. An angular piece made from EPS sheets can be shaped into something more organic with this technique.

When melting EPS foam, more shrinking actually happens once the foam is hot rather than as the heat is applied, so it's best to use little blasts and let the foam shrink and cool before hitting it again, for better control of the shaping.

EPS can also be shaped by sanding, but because the balls are weakly bonded together, they can break away easily during the sanding if you're not careful. Use very fine grit sandpaper and work very gently. Sand along sharp edges rather than over them, to reduce the number of balls breaking away from the edge. More force or a heavy grit paper can be used for bulk shaping EPS, but it will rip bits away to leave an uneven, patchy surface. When working with EPS, it's best to accept that bits will break off. Focus on minimising the breakages and fix any that do occur with filler afterwards.

Whilst EPS can take acrylics and PVA without difficulty, spray paints, superglues, and hot glues all cause rapid melting of the soft polystyrene, meaning it needs to be sealed before using these glues or spray paints. This can be done with thinned filler or PVA, with sealing and texture gloops, or with commercial foam coatings. It is recommended to coat EPS pieces, especially with a texture coat, since even a smooth-sanded EPS surface will have a bobbly appearance. EPS foam is best suited for substructure work and should always be given a protective coating for gameplay.



Extruded Foam (XPS)

XPS foam sheets are denser than EPS foam sheets with an extruded, closed-cell composition. This means they are firmer, less prone to breakages, more resistant to melting, but also more difficult to cut and shape.

Straight cuts can be achieved in the same way as cutting EPS, but because of the higher density, more passes will be required. Straight blades can be used for freehand work on thin sheets, but a serrated blade is best when cutting curves out of thicker, 2" sheets. Hotwire cutters work well on XPS but at a much slower cut rate, so care should be taken to not to force cuts and let the heat do the work. Heat guns also have less of an effect and are more suited to smoothing, rather than shaping XPS pieces.

The dense, closed-cell nature of XPS means that it doesn't have to be sealed to hide its surface texture before painting. Additionally, its surface can be etched or impressed, so it can be detailed to replicate surfaces ranging from brickwork, to rockfaces, even thatched roofing. There are commercial texturing rollers that can be rolled across flat foam, impressing details as they do, allowing stonework and flooring to be created very quickly. A stone-like texture can be created by using a ball of rolled-up kitchen foil to create irregular indentations in the foam surface. For cracks and crevices, use the sharp edges of small rocks to create deeper impressions in the foam.

For stonework, brickwork, and fine detailing, XPS can also be etched using pencils, pens, and plastic probes, depending on the desired depth and width of the line you want to etch. Detailing should first be lightly sketched onto the foam with a pencil, before reinforcing the design with

a ballpoint pen. When doing brickwork, it's best to texture the foam first with rolled up kitchen foil and then etch the detailing with a pencil and pen. If you apply the texture afterwards, it can flatten out the detailing. Individual bricks and stones can be slightly recessed by pressing the brick downwards with a flat-headed probe. For deeper recessing, a shallow cut around the brick with a scalpel, separating the brick from its neighbours, will allow the brick to be recessed further without dragging those neighbouring bricks down with it. XPS can also be textured by scoring the surface with wire brushes to create striations to replicate thatching, for example.

Whilst XPS can be painted directly with acrylics, a sealing coat will help. XPS is dense enough to not need a hard, protective coating. Detailing, impression and etch work is best sealed with thinned PVA. If you use fillers or gloops, these may fill in the etching and impressions.

The accelerant in spray paints can melt XPS, nowhere near to the extent they melt EPS but enough to ruin any detailing, so it's best to seal XPS before spray painting. Alternatively, you can use specific 'foam-safe' paints, to be sure. Superglues melt XPS too, so cannot be used for bonds, but hot glue is fine, as long as it's a low temperature glue and applied in small amounts. Otherwise, it may melt the surface to the point where it can't bond with the material being laid on top of it.

XPS is the go-to material for most big builds such as hills, rocks and cliff faces because of its strength, ease of shaping, and ability to hold detailing. But it's also good for creating ruins and buildings, and even entire castles have been constructed from thin XPS sheets.

Polystyrene Foamboard

Traditional foamboard or mounting board, made of a thin layer of XPS foam between thin card sheets, is the go-to material for buildings and ruins. It is lightweight, sturdier than XPS foam of a similar thickness, easy to cut with a blade, and works well with all the common glues and paints. Foamboard is available in a number of finishes, the most common being glossy white and matt black. The former has a texture much like the printed side of a cereal box and the latter is more like the unprinted side. The black foamboard takes glues and paints better thanks to its more porous nature and is therefore better suited for making buildings. As a bonus, any little spots you miss during painting aren't as noticeable as they will be with white foamboard.

Foamboard is prone to tearing when cutting, so it's important to always follow the proper cutting technique when working with it. A sharp, straight blade and a metal ruler are the only tools really needed, but there are several hobby tools that can do circular or beveled cuts for more complicated structures.

Foamboard bonds well with PVA, although it often needs pinning, bracing, or spot gluing with hot glue to hold elements together whilst the PVA bonds. Superglues bond the cardboard well but, applied to the edge, can melt the exposed foam, resulting in a very weak bond, or maybe no bond at all.

Most foamboard buildings will have an exposed XPS edge on one side of each corner, which can spoil the realism of the piece. They can be concealed with a thin, skimmed layer of filler before applying textured paint, or by applying right-angled fascia strips of plastic or balsa wood.

Paints and glues also bond well to foamboard. Pieces can be basecoated immediately after construction without any sealing, texturing, or priming whatsoever. Foamboard is sturdy when braced with other elements, such as flooring and buttresses in a building, but exposed and unsupported

areas - like the top edges of ruined walls - can be prone to damage. In these cases, a thinned, liquid filler can be applied as a sealing and texturing coat, soaking into the foam and polystyrene edges, dramatically increasing the sturdiness whilst also giving a concrete texture to the surfaces of the foamboard.

Another benefit of using foamboard for buildings is that because the surfaces are cardboard, they can be easily marked up for general cut lines, as well as for features like windows and doorways. The use of pre-cut MDF, plastic, or cardboard templates can speed up the marking up of windows and doorways when building urban sets.

When it comes to cutting out windows and other holes cleanly, you can overcut the corners a little if the piece will later be textured to cover the overcuts. Alternatively, when cutting windows, start lightly at a corner point, cutting deeper through the midline and then stop, switch and start the cut again from the opposite corner. Repeating this around the window will ensure there are no overcuts at any of the corners.

Pens and pencils can do simple engraving on the cardboard surfaces, as well as poke holes in it to replicate bullet damage. Cutting away patches of card and cutting into the foam beneath is a good way to replicate heavier battle damage. For more detailed engraving and surface texturing, the cardboard surface can be completely removed, exposing the sheet of soft XPS foam (although this does reduce its sturdiness). This can be done by soaking the cardboard surface in hot water and then rubbing away the cardboard gently until the foam surface is exposed. Black foamboard and some of the cheaper white foamboards have weaker bonds between the card and the foam surfaces. This means you can warm them with a heat gun and once the adhesive is reactivated, the cardboard surface, in its entirety, can be pulled away from the XPS cleanly, quickly and easily. Once removed, the exposed XPS can be detailed in the same ways as other XPS sheets.



EPVC Foamboard

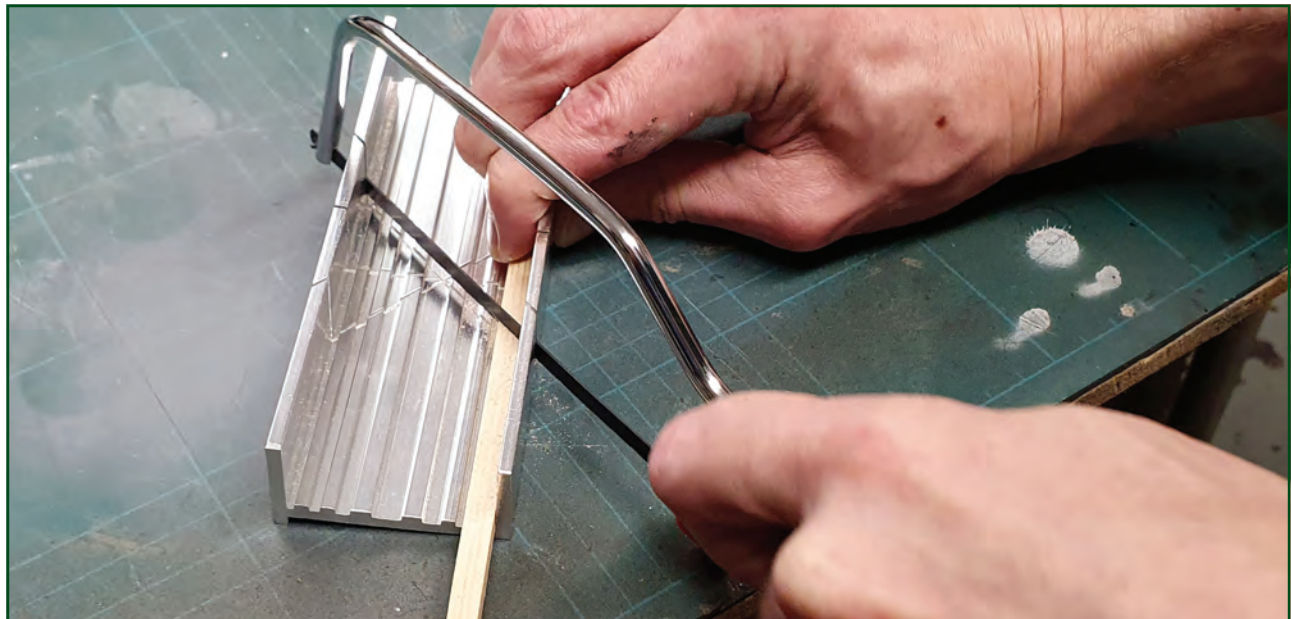
EPVC foamboard is a great basing material because it's the sturdier of the two foamboards, although it's also more difficult to work with. It's a thin layer of XPS foam between two layers of thin sheet styrene (or plasticard). Soft EPVC foamboard can be cut and beveled with a sharp, straight blade and then hand-sanded with relative ease whereas thicker (and harder) EPVC really needs power tools to cut and sand it effectively.

Beyond its use for bases, the softer EPVC foamboard makes very durable buildings and ruins because it is easy to cut cleanly and precisely with a blade. This is especially so for small-scale buildings; the thinner, 3mm EPVC foamboard is perfect for 6mm and 15mm scale builds.

Due to its non-porous nature and smooth surfaces, it can be hard to bond it strongly with PVAs and paints, but it will take them. It only melts under heat, so it can be spray primed, or bonded with superglues without risk. Superglues work best,

especially when bonding EPVC to EPVC. Hot glue, contact adhesives, and even latex glues also work well when bonding other materials to an EPVC base. Remember that bonds will be reinforced through the build process, so they usually only have to be strong enough to get you through to the next stage. Thinned PVA will work well enough for texturing bases, but hot glue and superglues should be used for bonding everything else.

The bonding issue is due to the EPVC's smooth, non-porous surfaces, which some glues and paints struggle to grip. Rubbing some sandpaper over the surface is a quick way to get better bonding. Alternatively, it can be coated with a 1:1 mix of filler and water or a texture gloop to prepare it for better PVA bonding. This is particularly helpful when doing non-grass work, like desert pieces or pathways, which don't have the extra bonding of the grasswork phase.



Wood & Balsa

If you don't include the work of building boards and bases, the woodwork involved in terrain making is pretty simple stuff. Occasionally, wooden dowels and strips are used for substructure support or as visual supports on pieces. These can be easily cut with a junior hacksaw and a hobby mitre block. More often, small, scratch bits such as coffee stirrers and cocktail sticks are used to replicate timber planks and poles. These can be cut easily with clippers, blades, or kitchen scissors. Wire BBQ brushes can be used to distress the surfaces, removing the manufactured look and adding a wood grain texture that drybrushes well. PVA glues work very well, and so do gel superglues, and hot glues. PVA is great for pieces that are pinned, taped, or clamped in place and gel superglues and hot glues are more suited to quick-fixing your fiddly bits.

Balsa wood (*Ochroma pyramidale*) is a very lightweight wood. Technically a hardwood, it's one of the softest hardwoods available and it's this softness that makes it perfect for modelling. Balsa wood is commonly available in long strips, beams, and sheets of various thicknesses. Whilst the strips and beams are designed to be used

directly, the sheets can be cut into custom strips using a sharp blade and metal ruler, or with a balsa stripper. A balsa stripper is a cutting tool with an adjustable guide that allows multiple strips or beams to be cut from a sheet quickly and accurately. Balsa can be cut easily with a straight blade, but its softness can mean that the blade can sometimes compress the balsa, spoiling the cut. In this situation, simply use a jeweler's saw for a clean cut.

Balsa can be distressed by lightly dragging a wire brush along its grain lines and it can also be engraved with a pen. Replicating planking on a single sheet is a simple matter of distressing and etching the lines between the planks. When it comes to gluing, it's the same as working with wooden scatter bits. The softness of balsa means it can be easily pinned, allowing entire timber structures to be created with PVA and pins.

Finally, whilst dry balsa snaps easily when bent, balsa soaked in water becomes very flexible. This property, combined with ease of pinning, means that sheets can be wrapped around curved shapes, pinned in place and allowed to dry. The balsa will maintain this shape once dry, after you glue it in place.



Plastics & Cardboard

Primarily used for dressing and decoration, plastics – plasticard, model-making pieces or wargaming accessories – can all be worked with a sharp blade and abrasives, although thicker pieces are best cut with a jeweller's saw. Plastic glue (aka polystyrene glue) is the best when bonding polystyrene to polystyrene, but hot glue and superglues are best for bonding polystyrene to other materials. PVA will bond plastic but it cannot penetrate the surface to key into it, making bonds weak. Although plastic will take acrylic without priming, abrading the surface will help the paint to key into it. If a build involves a large number of plastic pieces, sometimes it can be easier to prime them with a spray primer after they are cut, but before the build, especially if the build involves modular sci-fi kits or terrain accessories.

Cardboard is easy to work with and the best type is printed cereal box cardboard as the printed side has a smooth, glossy surface that takes paint well. Cardboard tends to warp when painted, so it's best to fix it to a surface or ensure it's braced in some way. Corrugated cardboard is best suited for bulkier substructure work. Once glued together, it can provide a very sturdy substructure to dress.

Yes, you can peel the top surface off corrugated cardboard to make a tin roof but it's much easier to buy corrugated craft card or a card crimping tool.

Pastes, Putties, and Clays

Fillers, stuccos and other air-drying plasters are commonly used in gap-filling, blending elements to their bases, and creating textures. Whichever you work with, getting the right consistency is the key to good results. For gap filling, a thick consistency is required and sometimes leaving the paste to dry out and firm up a bit first can help. For blending elements to hide join lines and create a more natural connection between them, a soft paste consistency works

best, typically applied straight from the tub. For creating a stippled textured surface or a sealing coat, adding water until it resembles a cream makes application much easier than trying to spread a firm mix over a large area. Air-drying products can also be thinned with water, taking them from a thick paste to a gritty texture wash.

Water also plays a part in shaping your pastes and putties. Applying water to a surface before applying the paste will allow it to form a stronger bond with the material. Water can also be used to smooth out your blending work. Small amounts can be brushed gently over the top surface, softening and smoothing out any irregularities from the application of the paste. It is possible to flood an area, however, thinning the paste to the extent that it no longer hides the join line. In these cases, more paste can be added but the excess water should be removed with a tissue first. When it comes to stippling pastes to create a texture, it's best to wait five minutes and allow the top surface to firm up a little; once it loses its glossy wet look, it's firm enough to hold a texture.

Fillers always soften their stipples, so they work well for groundwork, stuccos hold their stipples sharply, so they work wonderfully for creating waves and water.

Finally, air-drying clay is essentially a really firm putty that can be shaped on or off a piece, but holds its shape incredibly well, to the extent that it can be sculpted. As with the other air-drying products, water can be used to help it bond with a surface or to smooth it out when it's used for bulkier landscaping tasks. The downside of air-drying clays is that they lose volume as they dry, meaning they can shrink and cause warping issues. Alternatively, instead of warping, they can crack apart as their volume reduces. Cracking can be caused by uneven drying, so draping a damp tissue over surfaces as they dry will help avoid this. Clays can be messy and difficult to work with, so unless it has to be done on the piece it's a lot easier to do it on the desk and fix it to the piece with PVA once it has dried.

BUILDING YOUR CORE SKILLS

The terrain-making hobby covers many disciplines and uses an almost never-ending list of techniques and materials, but these practical skills will form the foundation of all your builds. It takes time to learn these skills, but once you have a solid handle on them, they become core skills, making building a piece much simpler, allowing you to not only focus more on applying the thematic skin but also expanding your skill base. You can always practice on spare bits, but the best way of learning is doing. Don't shy away from using a material and getting to grips with it when the opportunity arises.

BOARDS AND BASES

BUILDING THE BEST FOUNDATION



Wargaming is a “tabletop” hobby, which means you’re going to need a flat surface of some sort to play on, at the bare minimum. When starting out, the family dining table often provides the first battlefield, but it rarely matches our imagination of the landscape being fought over. Additionally, while most skirmish games can be played on a dining table, sometimes it’s simply not large enough for mass-battle games. Stepping up from the dining table typically requires either boards or battlemats.

BOARDS

Beyond the dining table, the simplest board for wargaming is a 12mm plywood or MDF sheet. 6'x4' is suitable for most large battle games and 3'x3' or 4'x4' is best suited to skirmish games. Whilst boards can be textured, they might be simply painted, typically green on one side and grey on the other, or some other colour to represent a certain landscape where a game is set.

If you're texturing a board, make sure you only use one grade of aggregate. Do not use a mixture of sand and grit. Gaming surfaces should be as flat as possible, and a single larger piece of grit on a surface can act like a seesaw!

Large boards, especially 6'x4' tables, can present some storage problems. Where storage is tight, they can be cut into three 2'x4' sections. Boards can be cut into smaller pieces, such as 1' or 2' square tiles, but all manner of different sizes and setups can be used depending on the needs of the table and the Terrainiac who is building it.

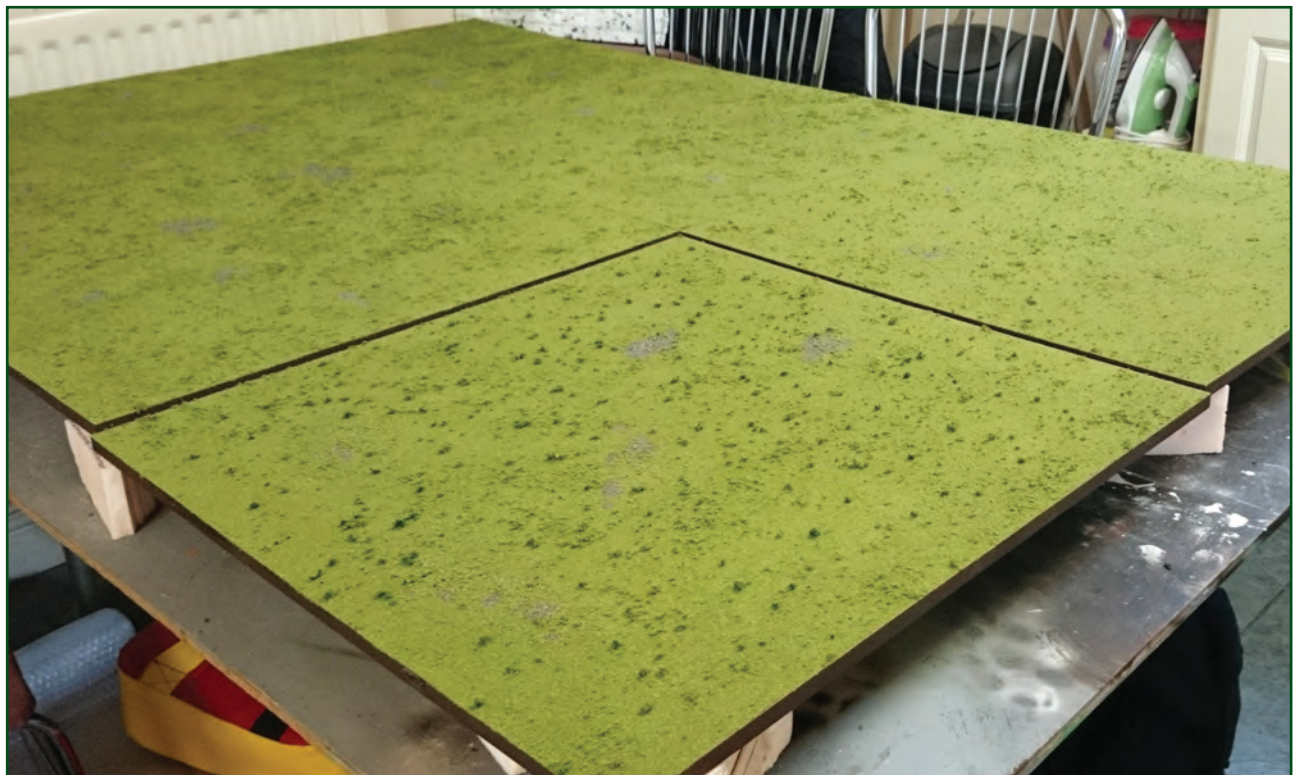
Tiles might be chosen because of storage or transport considerations, but they are more often used to represent a change in the playing surface, such as moving from a flat surface to a sculpted one, with some of the terrain

elements built directly onto the tile. How much terrain is added to the tiles varies greatly – from flats, where simple groundwork can match the scatter terrain to be placed on it, to fully featured tiles with all the terrain elements sculpted on them to create beautiful setups.

Tiles can also introduce modularity to board setups. Flats can incorporate roads and paths that line up at the tile edges, allowing them to be placed down to create different road layouts across the entire board. If you add a layer of foam to a flat wooden baseboard, you can cut into it to create a modular river that can run across the board, much like modular roads. Both roads and rivers increase the realism of a terrain board whilst maintaining a primarily flat surface on which scatter pieces can be placed. All manner of terrain elements can be added to a tile, taking the tiles from flats to fully featured boards, increasing their realism but potentially sacrificing their reusability.

I've always found the best modular tile setup to be one where roads, rivers, hills and other large features that need to be modular, are built into the tiles, while leaving plenty of flat space for scatter pieces. This gives an increase in realism, but sacrifices as little reusability as possible.





As the complexity of a tile increases, so should its base construction. A tile that has simply been painted requires nothing beyond a spray coat of matt varnish. A tile with a ground texture, however, could warp because of the glues applied, so thought needs to be given to preventing this. You could, for example, brace the tile with wooden battens around its underside.

A tile that has a foam layer on top of its wooden baseboard will need added side boards, usually EPVC foamboard or MDF, to protect the foam from damage. Alternatively, battens could be added to the top surface of the tile, matched in size to the foam's depth, thus both bracing the tile and protecting the foam. This works well if the tiles are

level at the edges, but modular hills that rise above the battening will need their own protective sideboards.

Measurements are important in terrain making, but when making tiles, getting the measurements absolutely right is essential to avoid gaps in your layout. It's easy to think that cutting a 4'x2' board in half will give you two 2'x2' tiles, but in fact, one tile will be shorter by 2 or 3mm because of the width of the cutting blade. When cutting, your saw doesn't split the wood but removes the wood in front of its blade, meaning a slight reduction in the length of the wood being cut. When cutting an 8'x4' sheet into 2'x2' tiles, it's actually best to go for square boards that are 0.25" smaller all around (making them 23.5" on each side) to avoid the blade edge problem completely.



BATTELMATS

Of course, boards are not the only gaming surfaces available to play on. Battlemats have been around for as long as wargaming boards. Simple green cloths, laid over stacks of books to create landscapes, were the original battlemats but, as with everything in the hobby, there has been a great increase in the variety of battlemats now available.

Commercial mats come in cloth and fleece sheets as well as PVC and neoprene material, all printed with various landscapes from green fields to urban settings to alien hellscape. Cut into various sizes and from a host of different manufacturers, battlemats are a great way to put down a good-looking ground surface without the need to build textured tiles.

Choosing a battlemat often depends more on the design printed on it rather than the material it's made of, although the different materials offer different benefits. Cloth and fleece mats are lightweight and easy to store, while neoprene mats are heavier but give a much flatter, stable surface to play on. PVC mats sit between the two, in terms of storage and weight considerations, but they have the added benefit that they can be drawn on with dry-erase markers and more easily cleaned.

No matter which material you choose, make sure your first couple of mats are as reusable as possible. When making a selection, look to see if features like roads, rivers, ruins, rock clusters, or any other element, might tie the battlemat to a specific period or layout, which could restrict its use. Some of these elements, such as ruins or rock clusters, could be covered with scatter pieces, but roads and rivers can't be easily covered so they would be present in every game played on the mat. For maximum reusability, it's best to stick to designs that are generic, without any specific features on them. Of course, if you have a specific need for a certain design, like beach mats for coastal gaming

or city streets for urban gameplay, feel free to grab those battlemats.

Just remember, if you're getting a battlemat that's bigger than your dining table, you're going to need a board to put it on anyway, so start with the board first.



Moving on from commercial mats, there are a variety of battlemats that can be made at home. Green cloths (like sheets, curtains, or tablecloths) can be sprayed various greens and browns with aerosols or with an airbrush, breaking up the flat green surface to provide a more varied looking ground covering.

Stepping up from simple cloth, sheets of "teddy bear fur" or plush can be painted with green and brown acrylics. Brush the colours through the fur material with a hairbrush or comb, to create a long grass mat. You can even cut the fur short with scissors or clippers before laying down acrylic caulking to create paths and roads, allowing you to create some very realistic greenfield mats.

Taking it even further, acrylic battlemats can be created to provide very realistic ground cover. These mats consist of a backing sheet with acrylic caulking layered on top. Once dry, these become a hard-wearing, flexible surface that can be textured, painted and flocked. When combined with teddy bear fur elements, these mats can give a very realistic ground covering, often matching the quality you find with textured tile boards, with the added bonus of being easy to roll up and store between games.

When starting out, it doesn't really matter whether you go for boards, tiles, commercial mats, or make your own. The important element is that they meet your gaming and storage requirements and they are as reusable as possible. Keep it simple when it comes to groundcover, there's plenty of time for fancy modular setups in the future.





ALL ABOUT THE BASE

If you want to make something solid and lasting, build it on a good foundation. For scatter pieces, this foundation is the base.

Better Bases

Whilst it is possible to create terrain without one, a base provides more benefits than simply a good foundation. For example, a base allows a number of terrain elements to be combined into a single piece, such as trees collected together to form a forest, or a thatched cottage combined with a wood stack and chopping stump. Bases also help tie different pieces together thematically; the bases can all be textured, painted and flocked the same way. In gameplay, bases can be used to define area terrain such as woods or difficult ground, and after gameplay a base provides a protective rim around a piece, helping to prevent damage during storage.

With so many factors depending on it, it is important to have the right base for the right piece. And what makes the right base depends on the material it's made from, the elements that are going on it, the location where it's going to be placed on the table, and a host of other factors.

Materials

The two primary basing materials are MDF and EPVC foamboard, with Terrainiacs often preferring one or the other. Both are available in 3mm and 6mm thicknesses, and while MDF is sturdier than EPVC foamboard, it requires power tools to work it efficiently. Whichever material is used, the required thickness depends on the size of the piece being built; 6mm is best suited for builds larger than 6" square, and 3mm for anything smaller. For small, scatter pieces of 2" square or less, it's often easier to base them on 1mm plasticard, although all manner of base materials can be used for small pieces, as mentioned earlier.

If it's flat, able to be cut, sturdy (or can be made sturdy), it can be a base. Two pieces of corrugated cardboard can be glued together with their corrugations perpendicular to make a sturdy base once covered in filler or a gloop. Cork tiles, CDs, foamboard, and polystyrene sheets can all be used for basing. The important thing is to do a quick test piece first. You don't want to build a whole set before you find out your bases are no good.

The elements being built on the base can also influence your choice of material. When it comes to base thickness, roads, paths, and rivers all benefit visually from having a low profile, so a 3mm material is a better choice for these types of pieces. Trees, towers, and other tall and top-heavy features might have a small base size but still benefit from a thicker base.





Standard bevel angles include 90°, 60°, 45°, and 30°

Shape

The actual shape of the base will really depend on its function. The base will usually extend 0.5" to 1" beyond the edge of the piece that's on it. Bases can extend further, to encompass small elements such as the wood pile and chopping stump for our thatched cottage, or they can be extended to provide stability and protection for overhanging elements of the build, such as a lopsided tree or an observation tower. Avoid extending a base unnecessarily, however, as it can create dead space on the base that'll take up room on the tabletop, make storage more difficult, and be prone to warping.

Most base shapes are slight variations of ovals and pear-shapes, used to base all manner of pieces from woods to hills, but there are certain builds that have specific shape requirements.

Urban buildings often have square and rectangular bases, not only to match their shape but also to reinforce the urban feel of the set by using the rims to represent pavements.

Urban ruins can have more varied base shapes, with straight edges for intact walls and curved, irregular edges for destroyed walls. This helps to keep the urban feel and allows the debris to more easily blend into the table.

Other factors that can influence the shape of a base include modularity or the desire to present a rolling landscape.

Roads, rivers, and other modular pieces that need to fit together will require bases that do just that.

If a set only consists of oval or curved bases, when laid down on the table, it creates an 'island' of terrain, with clear strips around the table edges. To avoid this, you'll want to make some 'table edgers', normal bases that have one or two straight edges, allowing them to be placed flush with the corners or long edges of your table. This helps create the impression of a rolling landscape and can create a more contained gaming space.

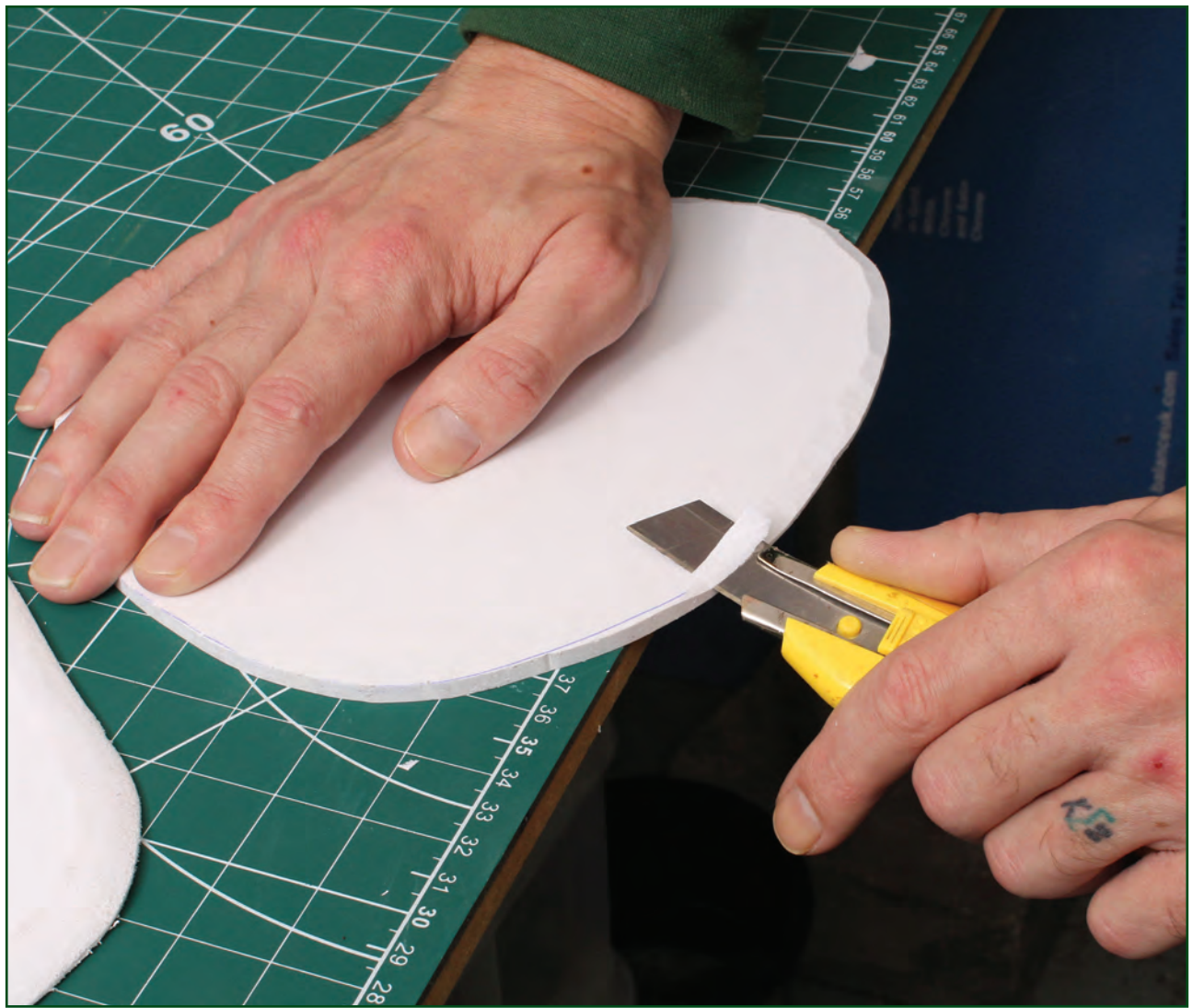
Bevel

The bevel is the slope of the base's edge as it meets the table. There are three options: straight, angled, and sloped.

Straights are vertical (90° from the horizontal) edges. Simply leave the edge untouched - beyond a little clean up - after it has been cut out. Straights are best suited to urban terrain, where they help to give the impression of the base rims being pavements.

Angled bevels are 'flat' cuts, but at an angle of 45-60° from the horizontal. They can be created at the cutting stage by angling the cutting blade of a jigsaw (or knife for EPVC foamboard) and are used as a quick way to give a token nod to blending the base into the table. Angled bevels are most often used when there is a lot of terrain to be made and time is an issue.





Sloped bevels are angled edges of around 30° from the horizontal that have been shaped and sanded to give a more organic appearance. Sloped bevels are the most time-consuming, but when done well they can make it look like the piece is sitting on a slight rise in the ground. Sloped bevels can be varied, for example by using a swallowed bevel to create a path leading to a door on the piece, giving a more realistic feel.

Some bases can be bases for other bases. Terrain plates are large bases devoid of any detailing beyond texturing, painting, flocking and the occasional small rock or foliage clump at the edges. They are built flat so that small scatter pieces, typically trees or objective markers, can be placed on them to help define a specific area of terrain. This allows small terrain pieces to be moved around for better model placement without disrupting the defined area. Plates can sometimes have recessed circular holes, allowing trees and rocks with

round bases of the same size to be placed into them, flush with the ground level of the plate.

Cutting them out

With the material, base shapes and the bevel decided, it's time to cut them out. Typically, a 2'x4' sheet will provide enough base coverage for a terrain-density of 30%, so is ideal for creating sets. When planning the cuts, always make use of the pre-cut edges of the sheet, using these to create table edgers. These straight edges and corners are also very useful when creating modular pieces.

Base cutting can be a time-consuming job, often requiring power tools and workbenches to be set up and cleaned afterwards, so it's always best to dedicate a session to it and work on multiple sets of bases at a time - double what is actually needed for the current build project. This will save you a lot of time when it comes to your next build and means you have spare bases during the current one.

LAY THOSE FOUNDATIONS

As with most things in life, a little forethought and planning goes a long way. With the right materials and bases designed to meet the needs of the terrain, any terrain set built on those bases will have a solid foundation.



Mel's Rule No. 61 - It's easier to plan an unused base than it is to cut out another one.

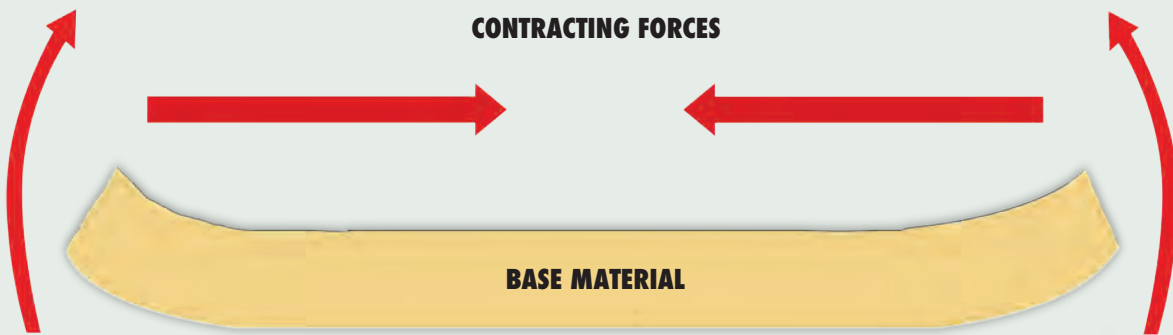
FIGHTING THE WARP

THE ETERNAL STRUGGLE



Warping is the bane of the Terrainiac, sometimes appearing at random points in the build process, or even long after the piece has been finished, with no obvious cause in sight. It's something that can affect terrain of all sizes – from a simple scatter base to a two-foot square modular tile - and the lack of clear cause can be a huge frustration, especially when it ruins a finished piece, that you've put a lot of hard work into.

Well, don't worry anymore! We're going to go through the physics of warping to explain why it happens. Then we'll look at how different materials (and their usage) affect the warping process, followed by the various techniques in our build arsenal we can use to reduce the chance of warping. Finally, we'll cover what you can do to fix things if you do lose the battle in the build stages.



UNDERSTANDING THE RUINOUS POWERS OF THE WARP

When it comes to the physics of warping, there are three important factors to understand: contracting forces, material strength, and layering.

While “flat” is commonly used to describe the profile of a base, a better description would be “box” – a box with a long top and bottom and very short sides that we like to bevel. When glues and paints on the top surface begin to dry, they typically contract and pull the edges of the base slightly upwards towards the centre. This principle of contracting forces is at the core of the warping effect.

We must also consider the strength of our chosen base material and its ability to fight against the contracting forces of the glues and paints. Some Terrainiacs choose metal sheets or thick sheets of hardboard, using their sturdiness to simply wipe out the contracting forces of the glues and materials applied. It works, but understanding the process and materials means you don't have to go to such extremes. Remembering that different materials have different strengths is important when combating warping.

Finally, there's layering. We often see the build process as a lot of individual steps, but remember that each additional step can incrementally increase those contracting forces, until there comes that one stage where the force is finally stronger than the base material's ability to resist it, even though that individual stage wouldn't have caused the piece to warp on its own. It can happen with a single heavy coat, or over time as more adhesives and paints are added. You never know which additional step will be the one to raise the base edges!

IT'S ALL ABOUT THE BASE

The type of base material, its ability to absorb liquids, its thickness, as well as the shapes and size ratios we choose to cut our bases, all play a role in reducing the risk of the dreaded warping.

First, consider the base material itself. Obviously, the stronger the base material, the more likely it will resist the cumulative contracting forces of the glues and paints we put on it. Some materials are stronger than others and are more suited to the task. Materials such as card, plasticard, foamboard and cardboard are relatively weak compared to EPVC foamboard, MDF board and plywood.

Absorption should also be considered. Some materials, mainly wood and card-based products, are porous and will absorb the glues you apply to them. If a glue soaks in, it will strongly grip the top surface, helping the contracting forces to pull at the edges. If you compare the warpage of an MDF base and an EPVC base of the same strength, the absorbent MDF would warp more because the glue penetrates its surface and provides a better grip.

The thickness of the material is another important factor. The thicker the base material (the more material there is), the sturdier it will be. A 6mm thick MDF base will be sturdier than one that is 3mm thick.

Then there's the shape and size ratio of the base. Pieces often warp along their longest dimension. Rarely do they warp across their width, (except for excessively warped pieces, often referred to as spinners).

In practice, this means that round bases are the least likely to warp, while long, thin, strip bases are the most likely to



do so. If the base is irregularly shaped, some parts may be more susceptible to warping than others.

Over time, I've discovered that anything with a ratio of 3:2 length to width is a perfectly fine base shape, so round, oval, egg, pear, square, and rectangular shaped bases are normally dilemma-free. The moment you move into anything 2:1 or greater, you're going to have problems, so keep an eye on your initial base measurements and plan ahead!

We've talked a bit about round bases, but you might want many of your buildings and ruins to have square or rectangular bases to help create roads, pavements and a general urban environment. Urban bases are often not beveled, so the sides make the curbs between pavements/buildings and the road. For square and rectangular bases, warping often occurs at the very corners of the base, especially if the structure has a pavement around it. It's perfectly acceptable to cut off the tips of the base corners diagonally. This deals with the tip warping issue and, if you've done it selectively, leaves you with a base shape that still fits into an urban theme.

THE BATTLE OF THE MATERIALS

When it comes to warping, build materials fall into two broad camps: contracting or fixed. The contracting camp tends to be air-drying materials like PVA-based glues, spray primers, caulking, acrylic paints, texture gels and water effects, air-drying clay, and many other products. There are always exceptions to the rule but, generally, if it's air-drying it contains water, which evaporates as it dries. As the water evaporates, the volume of the material reduces, contracting its size and pulling on the base it's applied to, typically causing warping.

Remember that we're just sticking little bits of foam or sawdust scatter to little bits of wood. We often use so much glue for this, it'd make a builder blush. We only need to fix our texture down, not cement it. If it's early in the build process, you're going to be adding more layers of adhesive, paints and sealing coats that help firm up the bond. When gluing, get used to using as little as you need to get the job done rather than a "more is a better" approach. A few dots of PVA glue will hold a foam hill in place just as well as a complete coat but with considerably fewer contracting forces, reducing the chance of warping.

On the other side of the battle, we have the fixed camp. These materials either cure through chemical reaction (like two-part epoxy putties and resins), or they're air-drying products specifically designed not to reduce their

volume as they dry, such as shrink-resistant crack filler. The fixed camp also includes materials that don't dry or cure, but are inert, such as sand, and more importantly, foam, foamboard, balsa, lollipop sticks, as well as various plastic and metal sheets and rods etc. It's easy to assume that these fixed and inert materials don't have any effect on a piece's tendency to warp, but that's not the case. In fact, fixed materials can increase the sturdiness of a piece and therefore improve its ability to resist warping.

Texturing an MDF base with a coat of shrink-resistant filler that's been stippled will make it sturdier, whereas texturing it with PVA and sand increases the chances of it warping. What you build on the base also has an effect. A base with a foam hill, foamboard building, or even a coffee-stirrer fence will be much sturdier than a base for a forest, road, or hedge. With that in mind, the best techniques and materials for fighting warping often depend as much on what you're building on the base, as on the materials and techniques used to build the piece.

Even if you're not building anything on a base that helps brace it, that doesn't mean it can't be braced. Items such as lollipop sticks, metal screw guide strips and even CD,s super glued down and covered with filler (below) will go a long way to make a thin base sturdy without affecting the build or the look of the final piece!



WARPING

THE PRACTICAL APPLICATION!

All these different factors may make terrain building seem like a nightmare endeavour but in practice, most pieces are built without any warping issues, especially common pieces like hills and buildings. Warping is often more of a problem with pieces like roads, fields and forest bases; it's the combination of a long, thin base shape with no reinforcing structures that opens the door to warping issues.

In such cases, all that's needed is a little preventative planning and preparation. You may have to add some reinforcement in the form of metal rods or strips along the edges of a road or river, hidden under its banks, or a lollipop stick superglued between a hedge and its base to make it sturdier.

You can also change texturing and base-coating materials and techniques, such as using filler and then stippling it before gluing on patches of coarser grit, instead of laying PVA across the entire surface to grit and texture it. This is an excellent way to tackle large, flat terrain boards instead of the more common method (glue, seal, and paint) because it replaces three contracting layers with a single, fixed layer, greatly reducing the chances of warping.

The "combining layers" technique can also be applied to grass and snow work where, instead of gluing and sealing multiple layers with watered-down PVA, each layer is fixed in place with a coat of hair lacquer and then finally sealed with a single soaking of watered-down PVA. This bonds all the temporarily fixed layers together and uses a lot less PVA than the layered method.

Overall, the key thing is to be aware of which base shapes and build types are going to be problematic. As long you spot this early and modify the materials and techniques used to apply them, warping should never be a problem during the build process.

There are times when you just know, no matter what, the piece is going to warp, just because of what you must build. At times like these, remember that most of the contracting force occurs as the materials dry. If you think it's going to warp, cheat! I've hot glued the bases of long strips of hedges to my cutting mat, knowing they'll only come off once they're completely finished. I've fixed 2'x2' tiles to slabs of wood with screws. I've nailed things down with the intention of filling the holes afterwards and I've clamped things you would think unclampable. In this battle, no one said you must play fair, so if you need to, cheat - fix it down during the build stages and then pop the piece off nice and flat once it's all done!



ENVIRONMENTAL EFFECTS

You might think that with your pieces built true and correctly stored, the struggle would be over. Alas, this is not the case. It's called "the eternal struggle" because no piece is frozen in time regardless of how well built or stored it is. Pieces always react to the environment they are stored in. Temperature, humidity and light can all have an effect.

Common causes for post-build warping include PVA breaking down when it freezes and excessive sunlight drying out foliage. Humidity is also our enemy. As we covered earlier, some porous base materials absorb the moisture in the glues used, and this also means they can absorb moisture from humid environments.

While edges typically raise due to contracting forces acting on the top surface, we find that edges can also raise as the bottom surfaces absorb moisture and expand, pushing the edges outward and upward against an unchanging top. This is often the cause of mystery warping of pieces thought



CORRUPTION FREE STORAGE

Warping from the build process isn't the only way to turn your bases into bananas. Improper storage (above left) can also cause your bases to bend and bow, producing similar results to warping. Although terrain is often lightweight, it can still sag if it isn't laid flat or properly supported. Admittedly, it might not sag much, perhaps only a tiny amount each time it's stored but, much like the layering principle, little by little, the sag can increase. The problem is made worse by the fact we rarely store our terrain upside down to allow it to bend and bow back straight again.

It's not just bowing and bending you need to consider, there's also buckling. This is a similar effect caused by stacking your bases vertically, and then placing terrain on top of them. Remember, terrain doesn't weigh much but it does weigh something and little by little that has a cumulative effect too!

The key to winning the eternal struggle is careful storage (above right), where your pieces are stored either level on a flat, supporting surface, or vertical but not carrying any weight.



to be well stored. An unknown damp patch can cause much confusion when it comes to taking the pieces out of storage, finding them dry but warped.

It doesn't always happen in one go either. As with the layering principle discussed earlier, each repeated exposure to moisture in the air causes the base material to expand a little more.

Tackling these environmental challenges that affect the piece long after it's finished is quite easy. If the warping is due to the bottom of the base absorbing moisture, then simply stop it absorbing moisture! This can be done right at the start of the build by using non-porous base materials, or by sealing the bottom of the base or even the entire base before building on it. Various materials can be used, some being better in more humid and damp environments than others, but simply sealing the base with a coat of paint at the start of the build is the best way to prevent warping after it's finished.

If you know humidity or moisture is going to be a problem, plan for it. Plan to store your terrain in airtight, plastic, stack-and-store boxes. Throwing a few Silica gel, moisture-absorbing dehumidifier sachets into the box certainly helps, but a handful of uncooked rice in a paper bag works just as well.

FIGHTING BACK!

With so many ways for warping to occur, either before the piece is finished or long after it's built, and with so many preventative techniques, it's easy to think the battle is lost when it does occur, but you can fight back!

The technique for fixing a warped piece is simple to understand but can be the most awkward to apply. The idea is that what warped your piece one way, will warp it back the other. Since adhesives can cause the edges of porous base materials to raise when they dry and contract the top surface, they can be used to fix warping by applying PVA to the bottom surface of a base, creating contracting forces to pull those edges back down again.

The tricky part here is applying the PVA glue. Your warped piece must be placed upside down and level, so the PVA can be applied evenly. If it runs towards a dipped side, it can cause an uneven contraction across the base and drip over an edge, often ruining the scenic effects. Remember that we're using this glue coat as a contractor, not a coating, so there's no need to go directly to the edge. Using very slightly watered-down PVA makes for a smooth application, provides

a strong contracting force, and is less likely to run to a side if your base is not level.

There are not many terrain pieces that can be just flipped over and placed upside down, so pieces need to be supported to keep them level and prevent the weight of the piece damaging any of the delicate, taller features, such as trees, antennae, etc.

Some smaller pieces simply need a tea towel around their edges, essentially cushioning and holding them in place. Other tall and more delicate larger builds may need to be lifted and propped up completely.

An easy way to achieve this is to stick bamboo skewers into soft foam - floral foam is best, but most foams will work. Carefully rest the piece on the supporting skewers and press gently downwards until the piece is supported away from the foam and level (above). Then apply the PVA and wait for it to dry, contracting the bottom surface and bringing the edges back flat as it does so. You can apply more coats if you need to but wait until it's completely dry to avoid warping it so far back that it goes from a banana to a bridge. It's a battle that's difficult to win, so when fighting back and unwarping pieces, go carefully, give it a coat, let it dry, and check it before repeating.

It often takes only a single, slightly thinned coat of PVA to flatten out warped bases. You rarely need more than two coats because when you're aware of warping, you tend to act early before it gets worse during the build. In the case of more pronounced warping, the application of a little brute force in pre-bending can certainly help the PVA do its job – just go easy and don't snap or damage the edges as you bend it over the side of a table. Use a towel as a cushion over the edge you are bending it on and take care not to damage your piece at the holding points on either side, as you might need to use a considerable amount of force prior to a PVA coat to make it flat again.

VICTORY!

You should now have a good understanding of why bases warp and the effect different materials and techniques can have on that warping. You're now equipped with the knowledge of how to plan and prevent it from happening in the first place, and you also know how to handle the problems from long-term storage and how fix them if they do happen. So warping need never be a bane of your terrain building again!



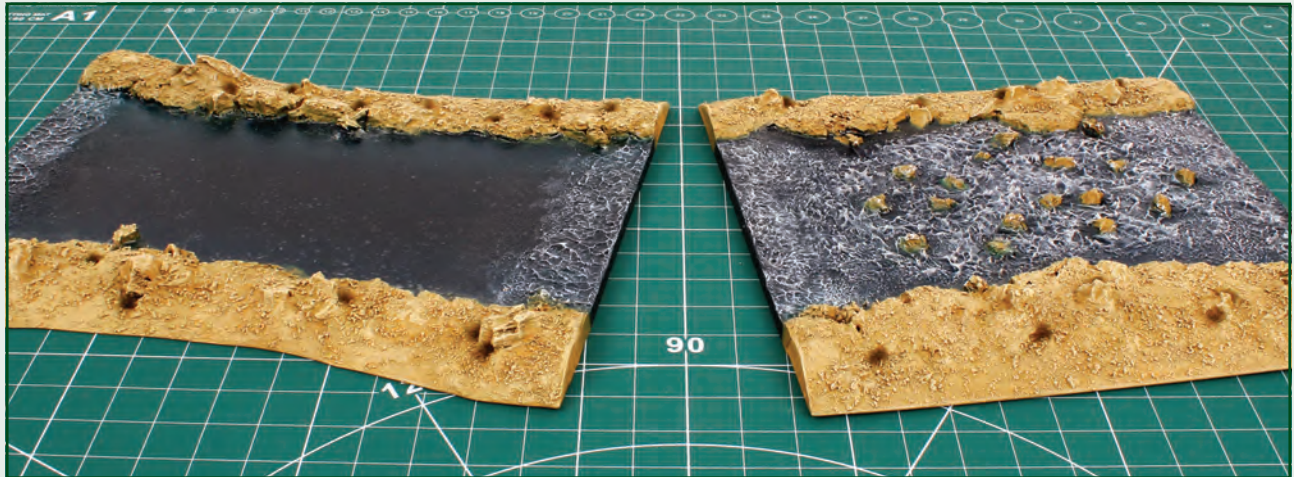
Mel's Rule No. 56 - (When sealing) Always, always, always check your ratios when switching PVA brands. Never forget the see-saws of 2016!

MAKING IT MODULAR

LINING IT ALL UP

MEL'S DEEP THOUGHTS

Modularity is a design principle that allows terrain pieces to be built using standardised modules. This can be used to create large pieces or especially long pieces that would be difficult to store as a single piece, or to allow the modules of a piece to be rearranged, allowing different setups and thereby increasing its reusability. Whilst all that may sound complicated and usually the merest mention of modularity is enough to put most Terrainiacs into a panic, the fact is that modularity is used quite frequently in terrain making, especially when making sets.



ON THE ONE BASE

Modular terrain isn't limited to just combining pieces on the fly, pieces themselves can be modular, with the simplest form being removeable roofs on buildings, allowing models to be placed inside during gameplay. This can be extended from not only the roof, but entire individual floors, stacked on top of each other to form a large building yet still allowing gameplay within it, whilst making it easier to store between games.

On the practical side, all that is required to make them modular is ensuring that during the planning and basic building stages, the separate elements fit together without any visible gaps or unwanted overhangs, whilst ensuring there is space for models height-wise inside the building. Beyond this, simple runners can be fitted to the underside of the top element, designed to prevent the top element sliding around during gameplay. Alternatively over-hanging walls can stop the elements from sliding whilst also hiding the join line.

Remember to factor in the head room for models taken up by guiding runners, if space is an issue, just put your runners in the various corners, well out of the way of any potential model heads.

Simple modularity can be used beyond getting models inside a building on a single piece, it can also be used to vary the piece such as having two roofs, one of which is fire damaged, or a bunker with an interchangeable platform which could mount a radar dish, anti-aircraft weaponry, or a radio antennae, as well as damaged versions for in-game changes. Beyond gameplay functionality, it can also be used to make elements removeable such as trees, flag poles and other elements that could be prone to damage, reducing the risk of breakages during transit and storage.

With removable smaller elements, the peg and hole mounting method works well for most elements. This could be a piece of plastic tubing mounted into the terrain piece that the peg of the removable element fits into, or if depth for the peg is limited on the base, a large flat head nail can be fixed to the base and used as a peg, while the hole is drilled into the element. Any unsightly join lines can easily be hidden by mounting small scatter or clumps around the peg, blocking the join line from view. Large elements can use slightly recessed areas as a mount using the same principle on a larger, albeit flatter, scale. Magnets can also be used, replacing the peg and hole in the case of small elements, whilst assisting the mounting of larger ones.

If you feel something is going to get broken in transit, expect it to be broken in gameplay. In these cases, your pegs are going to get broken or bent, so just use magnets for mounting instead.

LINING THEM UP

Moving on from modularising a single piece, the next most common form of modularisation used is linear modulation. Walls, hedges, fences and a host of defensive features are designed to use linear modularisation. Each individual piece designed to match the rest visually, creating a set that can be laid on the table next to each other in a line creating a boundary of some type. The same applies to roads and rivers, the only difference being the extra consideration of making sure that the set runs the full length of the table without falling short or hanging over the table's edge. Pieces that are designed to use linear modularity don't have to be designed just to be placed in a single long line, roads can have junctions, rivers can have splits. Linear modularity simply means that pieces are designed to be used together in long lines to create a larger terrain feature on the tabletop.



Border pieces such as walls and hedgerows benefit from having bases that are rounded at the ends, allowing the pieces to be setup at varying angles to create winding paths and irregular field borders. Large wooden tongue depressors work well as border piece bases without any further work. Alternatively, border piece bases can have flat edges, designed to meet flush with the next. Whilst this reduces any gaps between the pieces, it also restricts their layout, meaning specific bends, corners, and junction pieces need to be included in the set.

When creating a border set, if it is unclear which sections are passable or which don't block line of sight, these need to be indicated on the piece. You can do this by modifying the piece to include stiles, gates or gaps to shoot through but it's always best to include an indicator on the base, such as yellow flowers on all the pieces that allow movement or shooting across them, saving a lot of potential arguments in the long run.

This also applies to road and river pieces, although the need for the pieces to stretch the length of a table without overlapping edges means a little extra planning is required. The easiest way to tackle this is to design the pieces – specifically the straights – to be either 12" or 8" or 6" long. When laid out in multiples, these can stretch an entire 4' or 6' table length without fear of overlap. When planning bends, corners and junctions, extra care should be taken to ensure the combined pieces still line up with the table



edges, and it is well worth cutting test pieces out of paper and testing potential layouts before committing to the design by cutting bases. Whilst pieces do have to be designed to fit together and work together over the length of the table, only the meeting edges and overall length need to be standardised, what's between them can be varied from piece to piece, so roads and river straights can have little wavy bends in them, track and river pieces can narrow or widen as long as the meeting edges stay standardised. Adding these little variations helps break up the regular, angular appearance of road and river sets, greatly improving the realism of the pieces. Whilst it's important to ensure edges line up width-wise, roads can have verges, rivers have banks, so the end profile of the pieces needs to match as well. This same principle applies to larger modular pieces.

Getting lots of sharp clean cut edges for roads and rivers and perfect right angles for corner pieces can be challenging without the right tools. Sometimes it's easier to capitalise on the straight edges of pre-cut bought materials, a 12" wide MDF shelf can easily be split into 4" sections creating roads with perfectly straight meeting edges. The same applies to the corners of sheets, which be used to make modular hills. Cork tiles can also be used, being easy to cut whilst being perfect for roads and rivers, especially junctions and crossroads which require multiple flat edges which can be a struggle with shelves and sheets of material.





GOING UP

Moving beyond the flatness of road and river pieces, modularity can also be used to build larger bulkier pieces, often hill pieces, but modularity can be used to make any large terrain features not only for storage reasons but also to vary the setup possibilities of each piece. The best example of this is a castle, with the walls and towers all designed to fit together in a way that allows a wide range of setup possibilities. Although the edges of modular pieces are standardised to fit together, both the bases and the profile of the connecting edges don't always have to be the same. It's also possible for pieces to have two different standardised modular sides so that they can be combined with different modular pieces. This multivariable design method allows a large number of modular pieces to be built but without them all looking identical. The most common use of this technique being table corner hill pieces, with a short and a long modular side, allowing either a long thin table edger to be created or a more jutting table edge ridge.

Cake stacking terrain. Imagine creating two half-moon modular table edger plateau hills, that when put together, have enough flat space to place a small scatter piece such as a radar or shrine on top of it. Taking it further, imagine having four corner hills that when put together, have enough space for the half-moon hills to sit on. Six hill pieces that separately can be used to represent a valley or together, a mountain, that's modularity

Much like roads and rivers, as long as the meeting edges of the pieces are standardised, hills, buildings and larger structures can be made modular. With large pieces, templates can be cut from cardboard and used to check the edge profiles are cut correctly, ensuring they line up with each other. It's best when shaping hill pieces, especially out of foam, to leave a little extra foam at the modular edges when doing the bulk cuts, coming in after to shape the edges with more care and precision, ensuring they match the guide template and ultimately line up with the other pieces.

Cardboard templates are great for guides but it's also possible to pre-cut thin plasticard, EPVC foamboard or MDF side plates, all cut identical with the same profile that can be attached to the pieces' sides and blended in. These will give your pieces a protective hard modular side edge that matches perfectly with other modular pieces whilst helping the pieces meet flush up against each other.

GETTING THE BEST FROM BOARDS

It's not just the pieces that go on the boards that can be modular, so can the boards themselves. The simplest example of this is a 6'x4' that's been split into three 2'x4', all painted, textured and flocked to match each other, put together for gameplay but being easier to store than a full board between games. This simple method of modularity can be used on more detailed builds, such as large feature builds for shows and demoing games, often to make transit and storage easier between shows. Whilst these feature board are made modular for logistic reasons, it's also possible to design the boards to be setup in a few different ways, increasing their reusability.

The more common and complicated use of modularisation is when boards are made from modular tiles. Commonly these are 2' tiles but sizes can vary, with modularisation being used not only for general layout but also for board features such as roads and rivers, along with rolling landscapes and large hills as well as buildings such as large fortification walls. The more complicated the features built onto the tile, the more time and attention needs to be put into the planning, as any errors can ruin a lot of work. With each tile having four sides needing to be standardised, it's best to set a basic template for level ground and then limit the number of alternative templates for rivers, hills and other features that extend across the tiles edges. Too many edge variations can lead to situations where tiles can be difficult to lay down or only in a very limited number of ways, drastically reducing setup options, so they should be limited to the bare minimum needed for the features on the tiles to keep the potential setups as varied as possible.

MAKING SURE THEY MATCH

Whether building a set of modular hedges or a fully featured modular tile board, the key principles to ensure success are the same. Planning, testing with cut outs, and regularly checking with templates against other pieces during the build, are the best way of avoiding errors that can't be corrected later. When checking, it's important to check the pieces meet cleanly with nothing on the sides of either piece getting in the way and causing gapping. In the case of hills and other large features, jigs can be used for checking that edges are not only flat but vertical, as even a slight tilt can result in an unsightly gap at the top of the piece. These issues can be easily resolved by using pre-cut identical hard edges out of plasticard, EPVC foamboard or MDF, attaching them to the sides of the piece and blending them into the build, giving a perfect join line.

If you have access to power tools, clamping all your thin edger sheets together and then cutting the profile shape out of them all in one go, is a lot quicker and more precise than doing them individually.

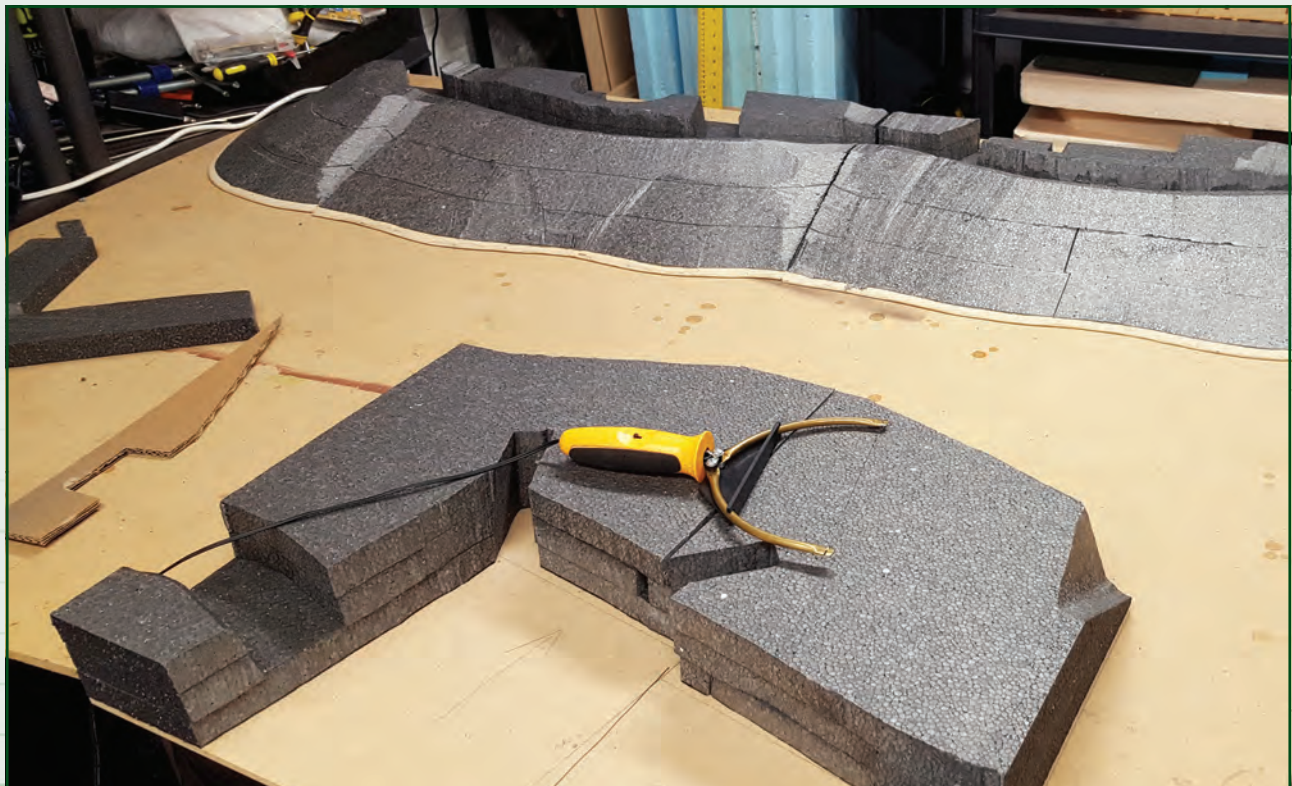
Another key way of avoiding errors is to ensure that all the pieces are not only cut in a single session, but built, textured, painted, flocked and sealed in single sessions, helping to keep the style and look of the pieces the same. Subtle changes in any of these, whilst not noticeable on separate scatter pieces, appear as stark contrasts at the join lines of modular pieces, with even a slight difference in pressure when drybrushing between pieces being easily visible when next to each other. It's for this reason,

premixed paints should be used or dedicated bulk mixes should be made up in advance, not only ensuring pieces match but also making expanding the set in the future a lot easier.

The same principles apply to flocking, especially when working with tiles, as any differences can be quite stark when the join edge is 2' long. Care should also be taken with laying down patches of scatters, ensuring that any near the tile edge run close to but don't cross the edge, resulting in semi-circular patching when boards are put together. Groundwork variations can be laid down to cross the edges of tiles or large pieces, but their crossing points should be planned and marked out on the edge template, ensuring these patches match position-wise when tiles or pieces are put together.

Don't try anything fancy or anything you haven't got a solid handle on anywhere near your edges, they're too important for figuring things out on the fly. So, on the edges, use the KISS principle – keep it simple and standardised!

Modular pieces and board tiles are best sealed together, especially when using PVA sealants which can darken pieces, avoiding the chess board effect when tiles are sealed with different amounts of PVA. Finally, when storing modular pieces and tiles, ensure they are all kept out of direct sunlight, as UV fading on a single piece or the top tile of a set stacked against a wall can also result in contrast issues when placed next to unfaded pieces on the tabletop.



MANAGING THROUGH MODULARITY

Modularity is a great method to make large pieces and even boards more manageable, as well as increasing the reusability of pieces, and allowing features to flow across the tabletop, increasing the table's realism and often playability. Whilst it may appear daunting, especially when tackling large pieces or board tiles, all that's required is a little bit of forethought and planning, a set of cardboard guide templates, and plenty of checking along the way. Always take care when doing any work at the standardised edges but remember that what's between them is fair game and variation between modular pieces helps with realism and stops all your pieces in a set looking exactly the same.

GROUNDWORK

THE TEXTURE YOU'RE STANDING ON



Wargaming is a hobby that has you putting miniature 'boots on the ground', which means one of the first challenges a Terrainiac will face is the creation of a realistic, playable, and durable surface that mimics the ground of the setting, including its landscape, texture, and colour. This can, of course, vary – from flat, featureless deserts to post-apocalyptic, rubble-strewn settings – and with a few specific exceptions, all of these can be achieved using a core set of techniques, materials, and colours. A little planning will be required, however.



IT'S NOT JUST ABOUT THROWING GRIT AT IT!

There are a few things you need to consider first, like functionality, landscaping, and scale.

From a **functional** point of view, texture should be laid down so that it doesn't impede gameplay. Model placement should be considered, particularly where pieces contain paths or areas where models will move through tight spaces. These areas should be textured with as low a profile as possible, using small grade aggregates to allow models to be placed on them without wobbling. Texturing can also be used to deny model placement; large and uneven aggregates can be laid down in areas such as uneven slopes or around delicate plant or detail work to stop or discourage players placing models there, protecting delicate work or preventing models from constantly falling over and disrupting gameplay.

After shaping a piece such as a hill or a slope, check it with a model. Any areas where the model almost always falls over can be heavily textured with large, uneven aggregates, whilst using finer aggregates on the other areas. Players will instinctively know where to place (or not place) their models, drastically reducing wobbly model syndrome, and making the terrain more enjoyable to use.

Although model placement typically requires a flat surface, natural **landscapes** are rarely flat. Undulations can be used to break up large scatter pieces such as woods and scrubland before they are textured to create more realistic

terrain pieces. Ground substructures can also be used to blend larger pieces (like rocks and hills) into their bases, creating a more realistic join between the base and the items glued to it.

When preparing to texture a base, the **scale** of aggregates should also be considered. It can be easy to think that most fine aggregates are all small enough to represent a ground texture, but they should be compared to the scale of the models that will be used on them. Sand and fine grit can be used for ground texture for most wargaming scales, but for the small scales (15mm and below), even these can look too large compared to the models. Rodent bathing dust or a small scattering of fine aggregates on untextured ground is more suitable for small scale pieces.

At most wargaming scales, the variation in a real-life ground texture wouldn't be visible to the naked eye, but that approach results in a flat surface that doesn't look particularly attractive. Texturing is used to create a surface that can be painted for a more realistic appearance when viewed from the table's edge. The key point is to ensure that the grades of aggregates used are large enough to create a texture that can be painted whilst not too large that, at scale, it looks out of place.

To check the scale of your aggregate, before laying it down on your piece, simply spread some on your desk and stand a model in it, covering the base so only the feet are showing. Look at the model's feet and compare them to the size of the grit to get a feel of how appropriate it will appear.

TEXTURING IT UP!

Ground texturing is one of the most important terrain-making techniques. The finished surface should not only seem realistic but also be durable enough for gameplay. There are numerous ways to achieve this, each with its benefits and shortcomings. The four main techniques fall into two categories: aggregate-based (layered, or bonded), or paste-based (texture gloop, or filler stipple).

Layered Aggregates

Layering sand, grit, and stones on top of a base that is covered with PVA, and then sealing with watered-down PVA, is the most time-consuming way of creating groundwork, but it is the simplest and gives the most control over how it looks. Therefore, it's a good starting point for most.

Fig 1.1 – Undulations were created by adding filler, then smoothing it and blending into the base with a wet, fine-bristled, flat-head brush before leaving to dry.

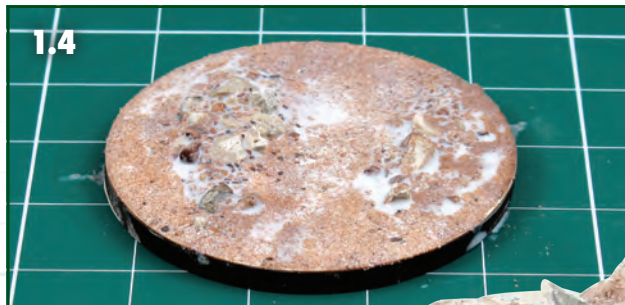
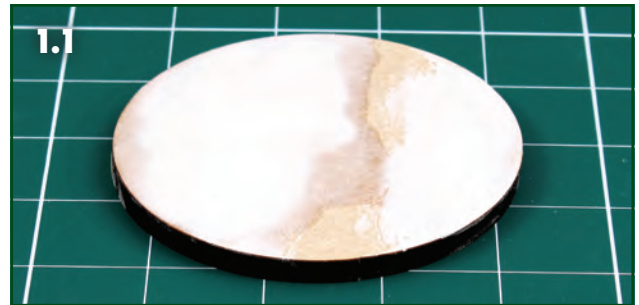
Fig 1.2 – A 1:1 mix of PVA and water was then brushed onto the base, with undiluted PVA used in areas that larger aggregates were added to.

Fig 1.3 – Fine sand was then added, allowing the thinned PVA to soak through it.

Fig 1.4 – Any loose aggregates were then shaken off before a 1:3 mix of PVA and water was applied to the entire surface.

Fig 1.5 – The final surface is very durable, but this method of laying aggregates in stages can require a little cleanup with a file or wire brush. This is best done five minutes after the second coat has been applied because the PVA bonds are weakened slightly when they get wet again.

Occasionally, patches of the base are missed when applying the first layer of PVA, especially when applying white PVA to a base coated with white filler. This usually shows as a white patch in the sand texture when it is shaken off. To remedy this, simply sprinkle sand over the patch after applying the second, sealing coat of PVA. The sealing coat alone will be strong enough to bond the sand in place, seamlessly hiding the bare patch of base.



Bonded Aggregates

Aggregates don't have to be glued down and then sealed in a step-by-step process. If there is grit down and it's soaked in PVA, it will all bond to create a realistic ground texture. This technique is the quickest to apply and produces very realistic results, since the loose aggregates can be easily knocked off before they are sealed, this technique requires the most care in execution.

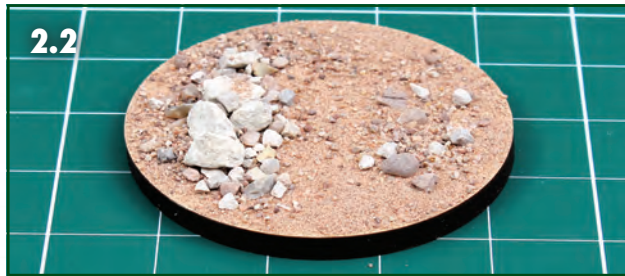
Fig 2.1 – Large aggregates were added directly to the base unglued, sometimes piled to build volume.

Fig 2.2 – Fine aggregates were then sprinkled over the exposed surfaces and between the larger stones to fill gaps.

Fig 2.3 – A 1:3 mix of PVA and water was then applied to the entire surface using a pipette or syringe.

Fig 2.4 – The final surface is very realistic and durable but larger rocks might not bond as well depending on the amount of contact they have with the base. This can be fixed by filling any gaps with fine aggregates and adding a drop of 1:3 thinned PVA again or superglue.

When working on larger pieces or building up multiple layers, hair lacquer can be used to temporarily hold the loose aggregates in place whilst working, before applying a final sealing coat of PVA.



Texture Gloop

The quickest way to apply a ground texture to a base or entire board is with a ground-texture gloop. Containing a higher concentration of aggregates than a normal texture gloop, it adds a very durable ground texture to any surface. It can add weight to the piece, however – depending on the aggregates used - and is the least realistic-looking of the techniques. With some additional work, this can be improved on.

Fig 3.1 – A ground-texture gloop of a 1:1 mix of ceiling stucco (Artex) and aggregates was applied to the whole surface, thicker in certain areas to represent undulations.

Fig 3.2 – Larger aggregates were then placed and slightly pushed into the wet gloop, whilst areas to be flat were smoothed with a wet, fine-bristled, flat-head brush.

Fig 3.3 – A 1:3 mix of PVA and water was then applied to the aggregates to seal them.

Fig 3.4 – The final surface is a realistic ground texture that replicates a rockier or rubble terrain.

The final texture is dependent on the grade and quantity of aggregates used with the gloop binder. A texture mix containing proportionally less aggregates of smaller grades can be used to texture large, flat areas quickly and easily.

Filler Stipple

When working with bases made of plastic, EPVC foamboard, or other materials that PVA struggles to adhere to, a filler paste can be used to create a hardwearing ground texture by stippling it before it has dried.

Fig 4.1 – A layer of filler was applied to the base, thicker in some areas to represent undulations in the ground and smoothed with a wet, fine-bristled, flat-headed brush.

Fig 4.2 – Before it dried, the filler was stippled with a damp, hog's hair brush, with damper, softer areas being re-stippled as they dried.

Fig 4.3 – Once dry, slightly thinned PVA was brushed on in specific areas, with various aggregates added after, starting with the largest first.

Fig 4.4 – A 1:3 mix of PVA and water was then applied to the aggregates to seal them.

Fig 4.5 – The final surface is a realistic ground texture that is closer to compacted earth than the gritty textures achieved with aggregates, due to its non-granular nature.

Don't over-concern yourself with fixing little bits here and there that don't look quite right. Instead, decide which areas break the realism of the piece and won't be covered over by scatter or clump foliage at a later stage. Look for exposed bases, hot glue blobs, or rocks that appear to defy the laws of physics; fix these and forgive the rest.



WHICH APPROACH?

Whilst there are other techniques and materials, these core techniques can be used to replicate most ground textures needed for wargaming, and each has its own merits in looks and functionality. It is also possible to combine techniques on a single piece, using a ground-texture gloop on the flat slopes of a hill, whilst creating rocky outcrops and scree (talus) piles using the bonding technique, creating a playable hill with realistic detailing.

If you don't have a lot of time, large flat areas can be covered very quickly with textured paint spray cans. The result will be fairly uniform in texture grade, but variation can be created by spot spraying different grades of textured spray paint, or by adding thin patches of aggregates whilst the paint is wet and sealing them with a blast of untextured spray primer of the same brand. Spray adhesives are also a good way of quickly fixing a fine texture to a large area, but they can be difficult to apply precisely and only fix the aggregate layer they

come in contact with. Aggregates on top of that layer will need bonding with glue/paint or removing. If the loose aggregates are removed, the quick bonding time means basecoating can start far sooner than with the core techniques, often five minutes after the application, speeding up the build process considerably.

However you plan to texture the piece, it's not only important to get the texture looking right and being playable, it's also important to get the lay of the land looking right and playable. In some cases, this means doing a little bit of landscaping before you lay down your final texture.

Whilst I say, "smoothed with a wet, fine-bristled, flat-head brush", I actually use my fingers. It's up to you how you do it, but I've always had better results and more fun by getting my fingers wet and messy!



LANDSCAPING

Not all ground is flat, and whilst texturing techniques can be used to create realistic ground textures, they rarely have any real bulk. This means that when applied directly to bases, these techniques can result in quite flat bases unless applied in considerable amounts, which can drastically increase the weight of a piece.

There are several reasons why a piece would require undulations or landscaping, from blending in larger features stuck to the base (such as trees), to creating rims around water features so that they can hold acrylic or resin water effects. When landscaping a piece, there are three basic methods, depending on the purpose of the piece, and the amount of landscaping needed: putties, gloops, and foams.



Putties

For blending small features such as large rocks and tree bases into the surface of a piece, putties are the best option. Filler is the go-to 'putty', applied thickly and then blended smooth with a wet, fine-bristled brush (or fingers!). DAS clay is a bulkier putty and is easier to shape but only adheres to porous base materials such as MDF. To apply the DAS, pre-wet the base to help the clay soak in and get a grip, then apply the clay, shaping it with wet spreader tools or fingers.



Fig 5.1 – DAS applied to the left is far bulkier and more controlled than the filler on the right, although the filler bends at its edges better than the DAS and results in smoother undulations.

Fig – 5.2 – The piece was textured with bonded aggregates consisting of fine sand and cork pieces before being sealed with watered-down PVA.

If you want to use DAS on EPVC or plastic bases, first apply it and then, when it's dry, pop it off and re-glue it with a gel superglue or hot glue!



Gloops

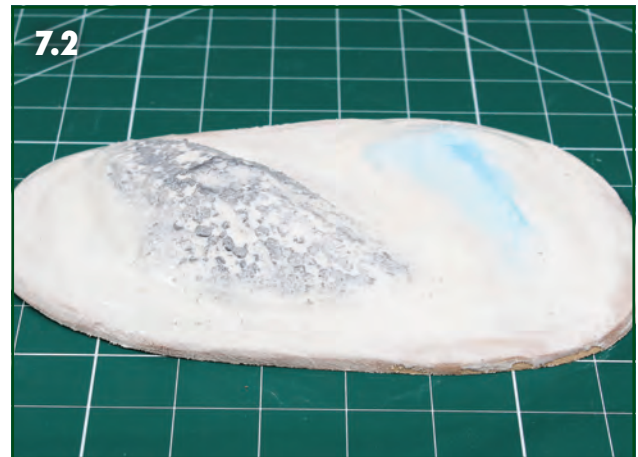
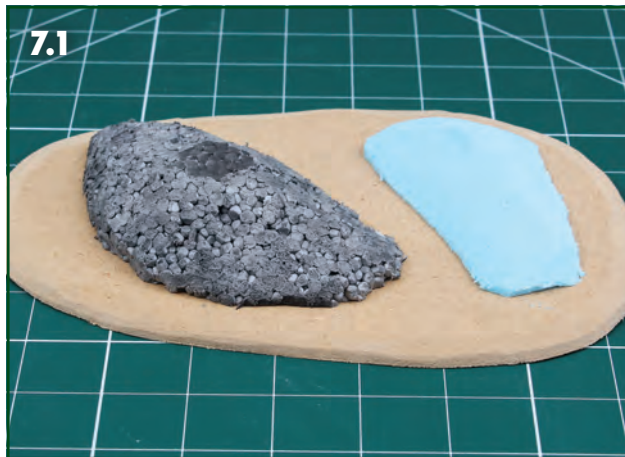
For blending in larger features or creating a more broken ground terrain effect, bulking gloops can be very effective. A commonly used mix is casting powder or premixed filler/stucco combined with shredded paper as a bulking agent. Using paper means the pieces are lighter than if using putties, but these gloops are more difficult to lay down and shape. However, this technique can result in more realistic landscaping, especially when modeling broken ground.



Fig 6.1 – A 1:1 mix of ceiling stucco and shredded tissues was applied to the base in clumps before being smoothed down and roughly shaped with wet fingers.

Fig 6.2 – The piece was textured with a scattering of fine aggregates, and sealed with watered-down PVA.

Using paper as a bulker can result in tough clumps where you really don't want them, such as in the middle of a path. Just flick them to the side and smooth it out whilst it's still wet.



Foam

For the largest type of undulations, foam (EPS or XPS) is the go-to choice, with pieces being shaped before being glued onto the base and blended in. Essentially, these are small hills and they can be used to great effect when creating undulating ground, defensive positions, or craters and trenches.

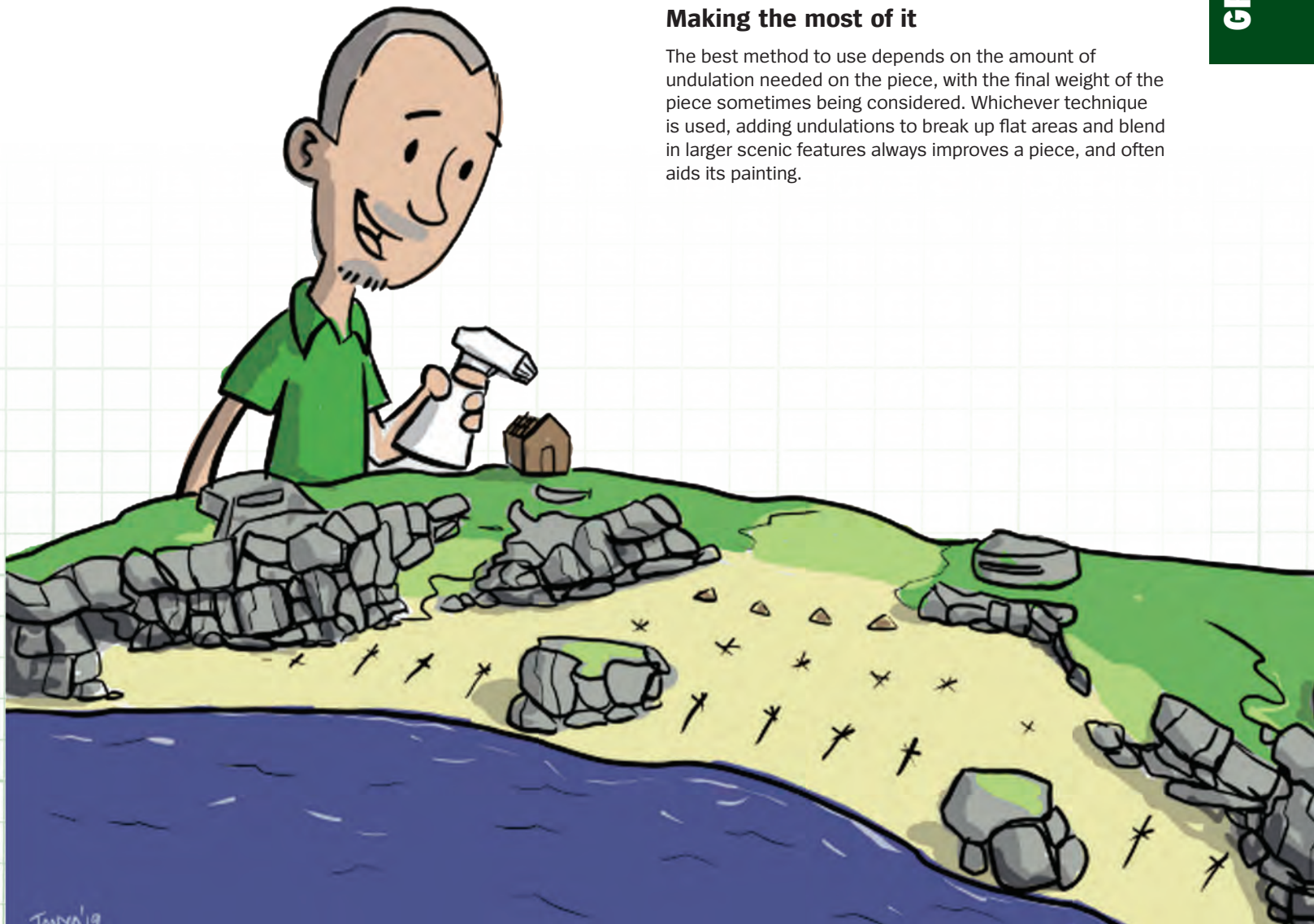
Fig 7.1 – The undulations were carved from foam and glued to the base.

Fig 7.2 – Once fixed, the foam pieces were blended into the base with filler.

Fig 7.3 – Finally, the piece was textured with fine aggregates consisting of sand and cork before being sealed with watered down PVA.

Making the most of it

The best method to use depends on the amount of undulation needed on the piece, with the final weight of the piece sometimes being considered. Whichever technique is used, adding undulations to break up flat areas and blend in larger scenic features always improves a piece, and often aids its painting.



PAINTING

Once a piece has a textured ground surface, the next stage is to paint it. Whilst the colours used for painting groundwork can vary greatly, along with the techniques used to apply them, there are some common approaches. All the core painting techniques - basecoating, overbrushing, drybrushing, and washing - can be used, but some are better suited to certain ground effects than others.

Although earth colours vary depending on what they consist of, the most important factor to consider in selecting colours and techniques, is the water content of the earth. We can think of earth as being parched, dried, damp, or soaked.

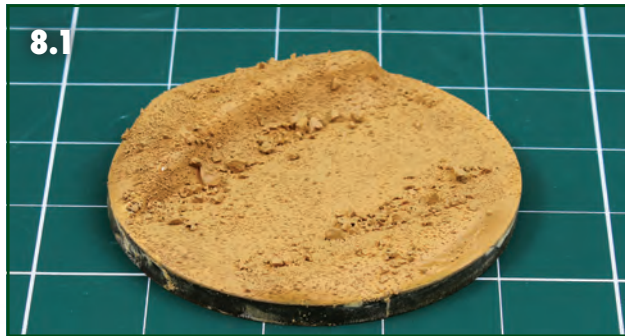
Parched Earth

In areas of extreme heat, such as deserts, or during droughts, earth can become completely dried out, or parched. This earth is usually very light brown, often with a yellow tint, but is also dusty and sun bleached, which is best achieved by drybrushing.

Fig 8.1 – The ground was first basecoated with light ochre (yellow-brown).

Fig 8.2 – The piece was then drybrushed with a 1:1 mix of the basecoat and a light beige.

Fig 8.3 – A final drybrush of a 1:3 mix of the basecoat and light beige was applied to the piece.



The result is a very light, earthy colour with a dusty look which is perfect for deserts and parched areas. The drybrushing is used to replicate sun-bleached top surfaces, so take care not to overdo this. Drybrushing typically provides a dusty feel which is perfect for this situation.

Dried Earth

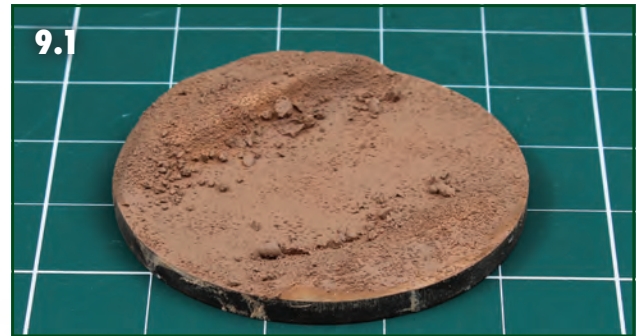
With dried earth, only the very top layer of the earth is dried out, with moisture remaining in areas that are in shade and away from the drying effects of the sun. This needs a slightly darker earth colour with a stronger contrast between its exposed, dry surfaces and its moisture-rich, shaded areas. A mixture of drybrush and selective area washes can be used to achieve a dried earth effect.

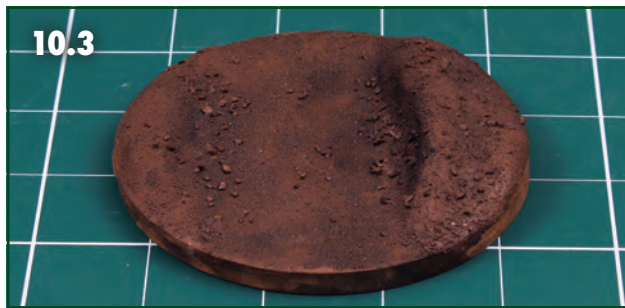
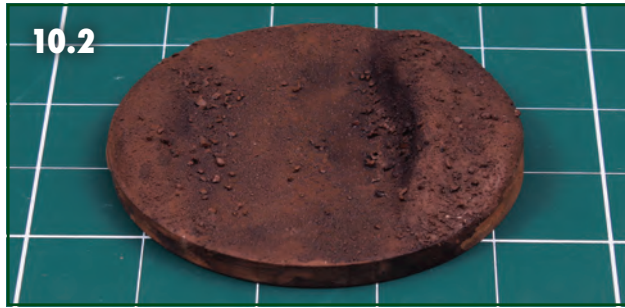
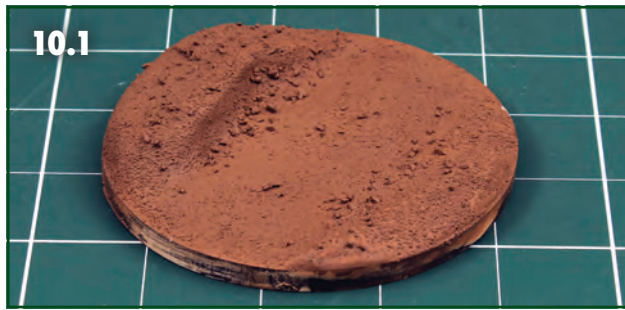
Fig 9.1 – The piece was first basecoated with a desaturated mid-brown.

Fig 9.2 – A darker brown wash was selectively applied to the recesses that would contain moisture.

Fig 9.3 – Finally, a drybrush with a 1:1 mix of the basecoat and a light beige was applied to the piece.

This produces a great contrast to the parched earth method, with the wash darkening areas that would contain moisture and the drybrush lightening areas that would be exposed to sunlight. The key to this technique is keeping the colours used as close to each other as possible, colours with large changes in their shades produce too much of a contrast to be realistic.





Damp Earth

When earth is damp, it is much darker than dried earth and has even less tonal variation; its top layers contain moisture, as do the recessed and depressed areas. This can be difficult to achieve by drybrushing and so overbrushing, and washes with darker earth colours are used to create a more subtle effect.

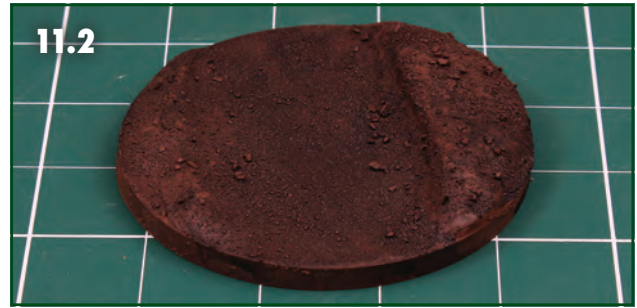
Fig 10.1 – Basecoated with a saturated mid-brown.

Fig 10.2 – A 1:1 mix of a dark brown and black wash was selectively applied to recesses and depressions to create shade.

Fig 10.3 – A light overbrush of the original basecoat was applied to the higher areas.



Beware the rare quicksand basing!



This simple technique results in very realistic damp ground. The washes first darken down the entire piece whilst providing subtle shading, before the dark wash creates a little variation on large flat areas and increases the depth of the soil's darkness in areas that would have the most moisture.

Soaked Earth

Soaked earth is the easiest of all the ground effects to reproduce, as soaked earth has a near-uniform darkness to it with only the slightest variation in tone between areas exposed to sunlight and its recesses and depressions. To achieve this effect, a dark basecoat followed by a dark stain is the way to go.

Fig 11.1 – The piece was basecoated with a very dark brown.

Fig 11.2 – A stain mix of 1:1 basecoat brown and black was then applied to the entire surface.

The stain darkens the base brown, leaving only a subtle difference between the lighter top surfaces, where the stain is thinnest, to darker depressions where the stain has pooled. This produces a very dark ground that still has subtle variations between its high and low points and gives a feel of saturated earth.

This is only the beginning

Although the base colour of earth can vary depending on its location, and mineral and organic content, the techniques used to replicate it stay the same. Drybrushing and overbrushing are great techniques for representing drier earth, whilst overbrushing and washes are better for representing wetter earth.

With these techniques, it's easy to replicate a wide range of different earth types by simply picking a base colour to be lightened by drybrushing or darkened with washes depending on how dry or wet the earth should be.



Mel's Rule No. 5 - If in doubt, it ain't dry!

SPECIAL TEXTURES

Whilst the techniques covered so far can be used to replicate common variations of earth textures and colours, the actual list of variations is near endless, especially when exploring fantasy and sci-fi worlds. Here are a few common variants.

Heavy, dead-foliaged ground

Ground covered in dead and decaying foliage is common in woodlands and jungles alike. This ground covering of dead plant materials, often leaves from trees and bushes, can vary widely depending on the plants growing in the area. These dead leaves can be laid thick on top of the earth or be mixed in with it where the earth is soft, such as on muddy paths. Of all the variants, this is the easiest to replicate by simply using dried, dead plant material to represent dried, dead plant material.

Fig 12.1 – First a few mounds were created on the base with DAS clay before a layer of dried herbs was glued to the base, leaving a path in the middle. A texture gloop consisting of filler and mixed dried herbs was applied to the path.

Fig 12.2 – Once dry, the herbs were stained with a brown wash whilst the path was basecoated in the same brown before being given a darker brown wash. A final overbrush of the basecoat was applied to the centre of the path, once dry.

This technique is very realistic and is very easy and quick to apply. Care should be taken to ensure your dried herbs (or other dried foliage) are in scale with what is being replicated as some herbs are too large to be realistic at the scales used in most wargames.

Remember, PVA reactivates when wet, so always ensure that a piece is fully dry before attempting the next stage. The last thing you want to do is start painting your paths and wipe away a patch of texture.



Rubble

Typically placed around destroyed buildings and urban combat boards, rubble is often seen as just laying down large grade aggregates, but is actually a little more complicated. Rubble is rarely flat and often consists of numerous irregular mounds, so it requires a bulkier landscape. As rubble is broken buildings, it consists of more than just broken bricks and masonry. It can contain beams, girders, piping, wiring and common household items broken into bits, from bars to bathtubs. Rubble also tends to be densely packed, resembling a mound of dust and dirt, studded with bricks and rocks rather than a pile of large rocks. Creating realistic rubble groundwork is easy, as long as these considerations are factored into the process.

Fig 13.1 – A bulking gloop consisting of tissue and ceiling stucco was applied to the base in large, irregular mounds. Then various bits of balsa wood, wire, plastic girder and piping and also a model bin (from Mantics' Terrain Crate Accessories) were inserted, ensuring they stuck out from the piece.

Fig 13.2 – Once dry, a texture gloop consisting of ceiling stucco and a heavy mix of aggregates of various grades was applied over the surface. The piece was basecoated with a mid-grey whilst picking the elements out in various relevant colours. A dark grey wash was applied before the piece was dry brushed with lighter greys and creams.

This technique can be used to create rubble or rough ground scatter pieces, or combined with damaged buildings to help create realistic ruins and larger, post-apocalyptic pieces.

Make sure that the content of the mounds is consistent with what was ruined! Bricks that are wider than the wall they supposedly came from can throw the realism of the piece. The same can be said for the other man-made elements in it, if the building doesn't have wooden beams, they wouldn't be found in its rubble mounds.



KEEP YOUR FEET ON THE GROUND

Whilst there are many other different types of ground effects, including man-made ones such as roads and floors, these techniques and painting schemes will allow you to replicate the majority of the common ground effects used in wargaming.



Cracked Earth

Dried-up waterholes, apocalyptic deserts, and parched riverbeds often consist of patches of dried earth that have lost so much water they crack, producing a texture that cannot be easily replicated using standard methods.

There are acrylic texture pastes called 'crackle mediums' that can be used to create cracked earth, but for a more realistic effect over large areas, creating a cracked earth sheet consisting of a layer of plaster with an open weave substructure is the way to go.

Fig 14.1 – First a sheet of greaseproof paper was taped down, and a layer of gauze material was taped over it.

Fig 14.2 – A casting powder was then mixed, poured over the gauze, and smoothed thin and level with a wet hand.

Fig 14.3 – Once dry, the plaster was cracked, first upwards from underneath to crack the plaster sheet, then downwards to widen the cracks. This was repeated until the desired effect was achieved.

Fig 14.4 – A patch was then cut with a pair of kitchen scissors, before being stuck to the base with PVA.

Fig 14.5 – The sheet was then blended into the base with filler before a little scattering of fine aggregates was applied around the edges.

Fig 14.6 – The piece was then painted up using a dried earth scheme with a dark brown wash being applied to the cracked area between the basecoat and overbrushing stages.

Sometimes, when you lay the sheet down, you can have quite a lip to blend in. It's often best to sand the edges down a little, first, to reduce the height of the lip edge.

This technique can be used to create small, dried-out patches or strips along the edges of a river piece to represent a drought, but it can also be used to create an entire parched desert table. Simply create numerous large sheets, glue them to the baseboard, fill any gaps with smaller pieces cut to shape, and then blend everything level with filler and fine aggregates to hide the joins.

Whilst large areas of cracked earth can be laid flat, in the real world, cracked earth like this is usually found in lower areas and depressions. For boards that use foam as a ground base, first, create recessed patches by sanding the foam. Then lay the cracked earth sheets into the recesses before blending them level with the surrounding ground. With scatter pieces, it is not possible to create a depression, so extra care should be taken to ensure the base and overall profile of the pieces are as low as possible.

COLOUR SCIENCE

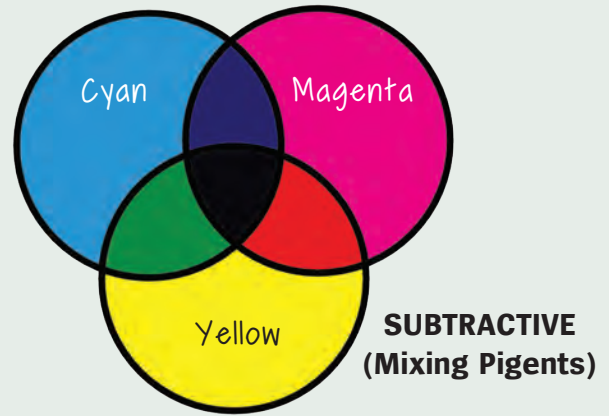
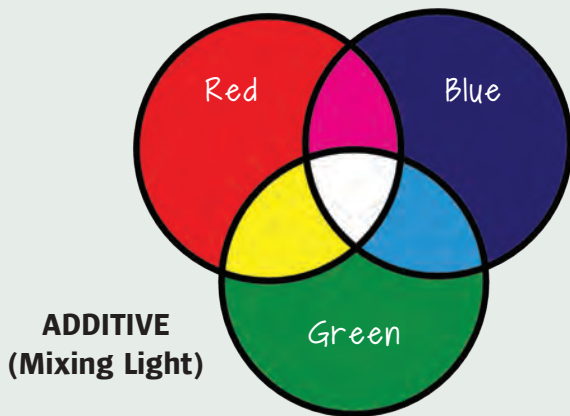
UNDERSTANDING WHAT GOES WHERE AND WHY



This hobby involves a lot of painting and colour work where the aim is replicating reality, so knowledge of the science behind creating realistic colours – along with working with light and colours in general – is very useful. The hobby community tends to rely on a range of pre-mixed colours, reducing the need to mix colours on the fly and avoiding the need to understand the theory behind the process. Whilst these pre-mixed colours certainly make it easier to keep things consistent when starting in the hobby, an understanding of a few key elements can go a long way to improving the realism of your pieces.



VISIBLE SPECTRUM (low to high wavelength)



SEEING THE LIGHT

Visible light, made up of many colours, is emitted from a light source. It travels from the source until it hits a material. Then, depending on the makeup of the material, some of the colours in the light are absorbed and others are reflected off the surface. These reflected colours are picked up by the eye and the brain turns them into an image. That may sound like a simple process, but light sources can vary, the light can be affected by the environment before it hits the material, it can be reflected multiple times, altering each time before reaching the eye and so on and so on. It's thanks to these factors (and more) that reality is so colourful and so difficult to replicate. However, it becomes much easier to understand when we break it down with colour science.

Light and Shadow

Pure white light is the product of all the colours of the rainbow combined together. But light often has a colour tint, depending on its source and the environment it travels through, and it also has a strength and a direction.

Direct sunlight has a yellow tint and is strong, high-energy light traveling straight from its source (the Sun) to the materials it hits. When modelling hot environments like deserts, ensure that shadowed areas have a strong, dark

contrast, avoid pure white (or tint it slightly with a yellow or cream) and keep colours bright and vibrant. These things will help keep your paint scheme believable and more realistic.

Skylight is sunlight that has been knocked off course, had its strength reduced and tinted blue by our atmosphere. For modelling, the blue tint would only be noticeable when creating strong shadows and the reduced strength means that the colours in shaded areas are more muted or desaturated.

Heavy clouds and overcast skies remove the yellow and blue tints, diffusing the light to result in a desaturated light that softens all but the hardest of shadows and mutes all the colours, making everything look dull. When modelling locations known to be cloudy and wet, desaturating all your colours and softening the contrasts between their shades helps to reinforce an overcast feel for the piece.

Daylight in all its forms is the most common type of lighting to be replicated in terrain making, but occasionally you may need to model other light sources with different effects. Object Source Lighting (OSL) is the name given to a painting technique/approach to produce a light source that illuminates an area around it. Examples include torches on castle walls giving off a yellow glow, and red warning lights in dark rooms. OSL effects are easily modelled by adding the colour of the light source into those being used to paint

the area around it. This can be done by adding a little of the colour of the light to the base and highlight colours. With stronger light sources, the colour of the light may be stronger than the base colour of the area. This means that instead of tinting the base colour of the surface with the light source colour, the light source colour has to be tinted with the base colour. And then, to be realistic, this glow has to fade correctly to replicate what is known as 'fall off'.

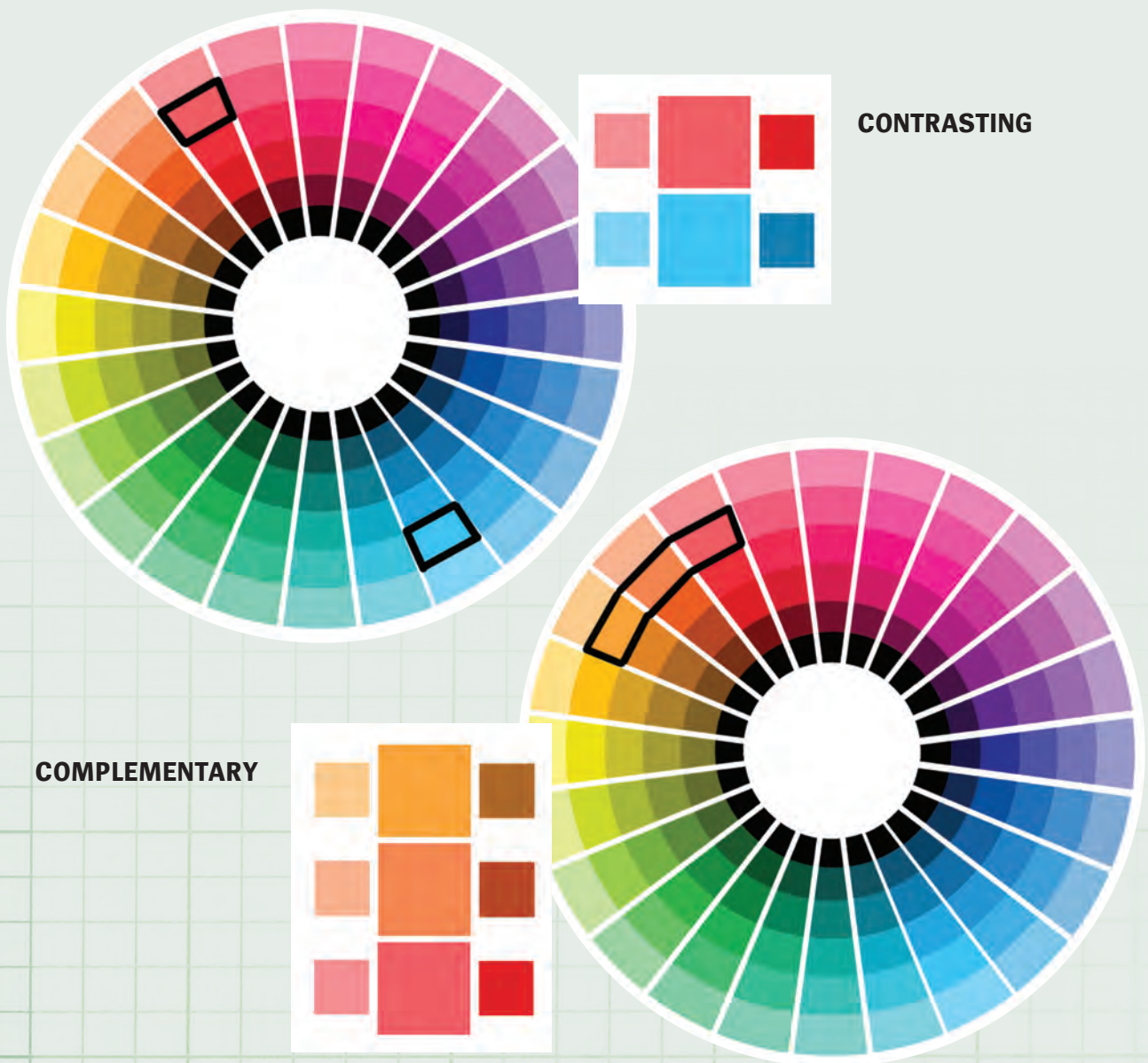
In practical terms, decide how far your light source will illuminate your piece, then divide the distance from the source to the limit of its range into quarters. In the first quarter, go pretty much full-on glow, in the second go for 1/4 glow, in the third go for 1/9 glow and in the final finish with a 1/16 glow. Following this realistic fall off instead of an even fall off will give a more believable lighting effect.

Beyond OSL, there are other lighting situations from moonlit terrain, to underground caverns lit by luminescence, and when it comes to magic, sci-fi technology, and alien planets, anything is possible. As long as you understand where the light is coming from and how it will affect the area that it illuminates, any lighting effects can be modelled on a piece.

Before we move on from light sources, it's important to talk about shadows and their direction. Most terrain sets

are made for daylight settings and in the real world the position of the sun in the sky and the direction of the shadows it casts vary. In terrain making, zenithal lighting is typically used; daylight is treated as coming from directly above the piece so the shadows are evenly spread under any overhangs without having a specific direction. This allows pieces to be placed in any position without different directional shadows on the board throwing off the realism. Directional shading should only be used in terrain making either when it's localised to a specific piece (as with OSL effects), or when building a feature board or diorama where the shadow-casting elements are fixed in place so all shadow directions can be coordinated.

It's increasingly common for LED lights to be used when modeling, but the pieces are more often used under an incandescent, or fluorescent light, and some large venues use other types of lighting, all with their own tints. The result can be that pieces that looked one colour under the modeler's LED light, look very different under the gaming light. It's best to paint under the same kind of light you play under, but if that isn't practical, do a small test piece and check it before you attempt a large project. That way you can save an upset when setting out your terrain at the venue.



CONTRASTING

COMPLEMENTARY

Colour Theory & Wheels

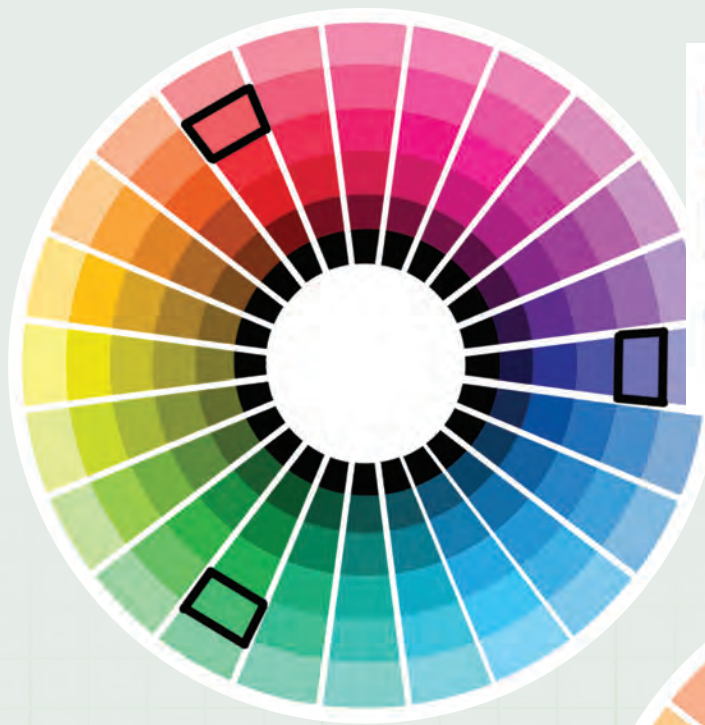
Colour theory encompasses the colours themselves, their composition, how they can be mixed together to create new colours, and the way different colours complement each other visually. Fortunately, most of this information can be found in a simple guide called the colour wheel. This is a circle with all the colours (hues) positioned around its edge so that the wheel can be a guide to altering colours by tinting, desaturating a colour, and composing colour schemes.

There are a variety of colour wheels, all using the same wheel but varying in positioning based on which colours are the 'primary colours' in that system. Primary colours are three core colours that all other colours can be mixed from. In the traditional system, the primary colours are red, yellow and blue, between these around the edge of the wheel are the secondaries – green, purple, and orange – which are two neighbouring primaries mixed together. This mixing of neighbouring colours continues into tertiary colours, and then beyond to create the 10 million different colours

(hues) the average eye can see. As the understanding of colours has developed over time, other systems have been developed in which the colour positions around the wheel varies. The latest system is the CMY wheel where cyan, magenta and yellow are the primaries. This is used throughout the printing industry and in home printers to print colour.

Colour positions on the wheel can be used to work out colour combinations that are visually pleasing. Colours directly opposite to each other on the wheel are called complementary and work well together. A split complementary is where a colour and the two colours either sides of its complementary colour all work together well as a trio.

Working out your own colour schemes can be challenging at times. Knowing about the various complementary systems is handy, but since you're only going to be using this for non-natural elements such as signs and buildings, it's sometimes easier to have a look at the shop signs in your high street and just pick a colour combination you like.



TRIADIC

TETRADIC



The interesting thing about complementary colours is that if a colour is mixed with any other colour on the wheel, it changes the colour (hue) and its position on the wheel, but if a colour is mixed with its complementary colour, it reduces its chroma (the saturation of a color) until it is greyed out, much like turning the colour down on a TV until the picture is black and white. This becomes important because reducing the chroma of a colour helps to make highly chromatic acrylic paints look more desaturated and therefore natural. Sometimes it's not possible to use a complementary colour to desaturate another colour, the complementary colour might not be available or, in the case of hobby and house paints which are composites of many colours, the combination can sometimes produce weird tints. Although not the 'correct' technique, simply mixing a neutral grey with any colour will desaturate it – the more added, the less overall colour pigment in the mix and the greater the desaturation.

Beyond the hue and chroma of a colour, there is a third factor, the brightness of the colour, or its intensity. A colour can be lightened by adding white (in art terms, this is called a tint) or darkened by adding black (a shade). Understanding all three factors gives you complete control over your colour needs for a build.

Finally, the colour wheel can be used to give an overall feeling of warmth or cold to a piece. The wheel can be split in half, on one side orange and the other blue. Colours on the orange side are considered warm colours and evoke feelings of warmth or fire or hot days, whereas the colours on the blue side are considered cool and evoke feelings of cold or snow or overcast days. By limiting the colours you use to warm or cold colours, you can emphasise a piece's setting in a warm or cold environment. When an opposite colour needs to be used - such as a blue in a warm palette - it can be tinted with a warm colour to warm it up and help it connect with the rest of the colours in the palette. It's well worth investing time in planning colour schemes, particularly when making terrain located in hot or cold environments.

Nature's Little Tints

It's not only artists that like to mix their colours, nature does too. Elements of nature are often described in single colours, grass is green, water is blue, earth is brown, yet all of these actually consist of thousands of different hues of green, blue or brown. Trying to replicate such a subtle but wide variation with two or three colours is the reason why paintwork can seem flat and unrealistic. The secret is to introduce subtle variation to the core colours by tinting

them. Which tints to use, however, depends on what is being painted.

Earth is often thought of as brown but it varies greatly in reality. Tinting earth with a yellow ochre gives a dried, sandy feel, tinting with orange replicates clay, tinting with red replicates peat or areas of strong iron ore deposits, whilst tinting with green gives a sense of rotting vegetation such as a riverbank or swamp.

Snow is not just bright white, but reflective, so on an overcast day, it's slightly muted but on a clear day, it takes a blue tint from the diffused blue skylight.

Greenery may be green, but that green can vary considerably. Evergreen foliage has a strong, dark green colour but deciduous foliage changes colour as it grows and dies with the seasons. It has a yellow tint when growing and a red or purple tint as it dies, meaning small amounts of any of these can be used to add subtle variation when making flocks and clump foliage.

White, grey, and black are rarely pure in nature, almost always having some slight tint due to the materials, light, aging, or weathering. Whilst any colour can be used to tint the white/black scale, creams work well for whites, taking the edge off them and warming them. For greys, yellows make them look more natural and for blacks, a touch of dark brown will make it considerably more realistic.

Variation in nature can seem infinite but understanding the common variations, along with confidence in the colour wheel, means that replicating the variation is a matter of simply identifying the different hues and then working out what colours need to be added to a core colour to get them.

There are a lot of artist colour schemes for various elements of nature available online. Searching for things like "tree bark artist colour scheme" will provide plenty of colour reference material.

Authentic Replication

It's perfectly possible to produce really good pieces without knowing any of what has been covered in this section, but applying any of this knowledge to your work can only improve the realistic feel of a piece. Start by working with the wheel to master your colours and once you can replicate any hue, its intensity and chroma, take that knowledge and skill and apply it to replicating natural variations. Remember, there's no point trying to replicate variation in nature if you can't mix the colours you need first.

OUT OF PLACE

The challenge in achieving a realistic look for a piece in a natural setting, largely stems from our subconscious survival mechanisms. We're geared to notice things that don't look quite right in nature; they draw our attention and produce an uneasy feeling. This is a throwback to the times when there were still things that could hide in the bushes and jump out to kill you. This is the reason why the military invests so heavily in getting their camouflage right; it's not just the shade of colour that matters, shadows, shapes, and anything that doesn't look like we'd expect it to look in nature, can all draw an uneasy eye.

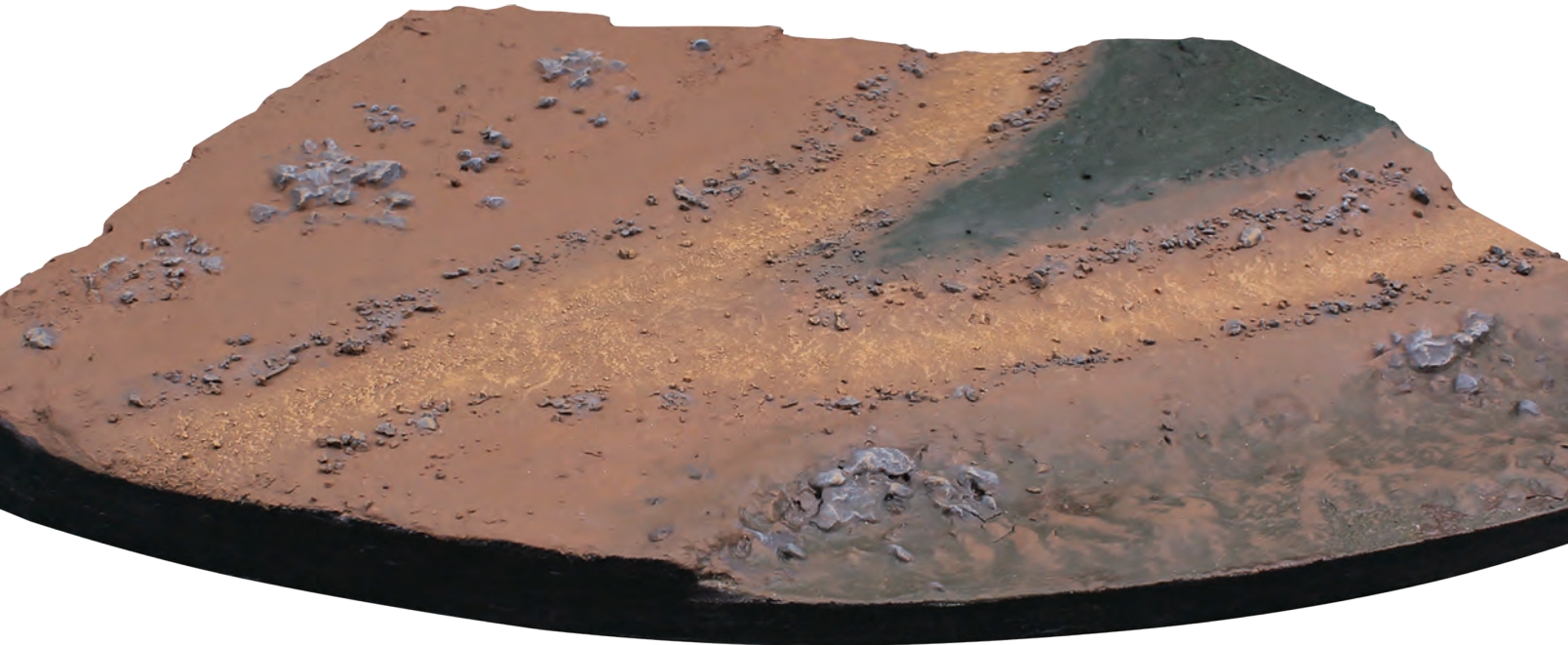
It's for this reason that modeled pieces can feel unrealistic even when realistic materials are used; placement and composition also need to be realistic. This comes with practice but as an exercise, when you look at a scene, look at the landscape, its shape, peaks, dips, dry bits, damp bits, the colours of the ground and grass and how they change depending on their position. Next, imagine replicating it as a model, think of grass and ground having a limited palette of colours and then think of where you would lay down each on the landscape. Doing this repeatedly will not only help you choose the correct colours, but also the correct placement to create realistic pieces.

GRASSWORK

FLOCKS AND CLUMPS AND TUSSOCKS



Grasswork is a core element of the terrain-making hobby, including everything from laying down scatter, tufts, and clump foliage in a stylised manner, through to creating super realistic landscapes with a wide array of scenic materials. The techniques to apply them are essentially the same, which means that if you can apply a stylised theme, you can create a realistic one. Creating realistic grasswork may seem challenging, but the realism comes from the materials you choose and their positioning.



FUNCTIONAL FLOCKING

Wargaming terrain needs to be functional, so whether you want a simple, stylised theme, or a beautiful, realistic landscape, it must be able to withstand the rigours of gameplay whilst not impeding the gameplay itself. Areas for grassworking fall into three broad groups: functional, decorative, and edging.

Functional areas are designed for model placement and are relatively clear of large or delicate garnish, and are durable for gameplay.

Decorative areas are those where no models will be placed: recessed patches of ground, or steep and rocky slopes. More delicate, realistic-looking materials can be used here without affecting functionality.

The amount of functional space you need depends on the game and the miniature bases. The further apart a unit's models can be placed, the more garnish you can add. If it's a rank and file game, with movement trays, it's best to keep functional areas as flat as possible.

Edging areas (the rim around a terrain piece), are a mix of functional and decorative; rarely used for model placement, but with some functional needs. Edges need to be durable, as they are often the point of handling and regularly get bumped during storage. They also need to help blend the

piece with the tabletop. This can be achieved with simple, well-sealed groundwork that includes clusters of decorative garnish patches slightly back from the edge, increasing the piece's realism whilst leaving clear places for handling.

Scenic materials and their application have a purpose beyond the piece itself – tying a piece thematically to the rest of its set and the board or mat on which it will be placed. When making boards and sets, use a common set of scenics across all the pieces, varying them slightly according to the landscapes and features being modelled, giving a consistent feel to the whole set.

Foundations

Strong grasswork is created in stages, each building on top of the others, increasing depth and realism. The colour and texture of the groundwork foundation will also affect the grasswork applied to it.

A green foundation helps create a feeling of depth, and by varying the shades of green over an area, you can give the impression of variation to what might actually be an even covering of scatter or flock. One advantage of a green foundation is that any small, missed patches, or grasses that fall off, won't appear as a stark gap. The downside is that at the painting stage it needs to be blended with any tracks, roads, earth patches, or ungrassed areas to



GRASSWORK

give a naturalistic transition from grass to dirt. This can be restrictive in the grassworking stage since areas will be predefined and need to be heavily grassworked to cover the green foundation. For this reason, a green foundation is best suited to large areas such as fields and meadows, which are typically heavily foliated.

With a brown foundation, there's no need to worry about exactly where to flock, giving you more freedom to create a varied landscape, especially one of broken ground consisting of patchy grass, which is common in exposed and highland landscapes. However, any patches missed during gluing can appear as stark brown blobs after the loose scatter is shaken off, particularly on expansive areas, so the occasional patching might be needed. When working with a brown foundation, it's best to treat it as all bare ground, painting it so the grasswork can be laid without needing to cover specific areas that haven't been detailed in the painting phase.

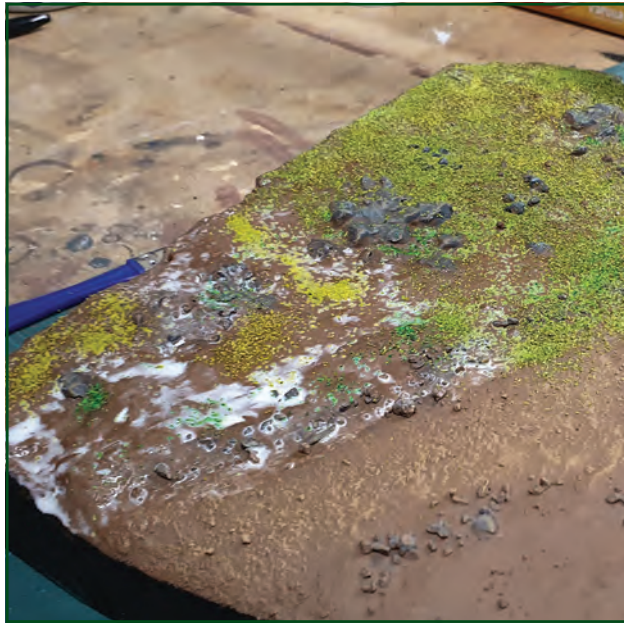
The texture of the groundwork can also affect the grasswork laid on top of it. A completely flat surface will result in flat grasswork, which works well for placing large bases but

can look unrealistic, so the grasswork should be more varied in size and garnish to disguise the flatness. Smooth, undulating groundwork is great for most grassworking and more irregular undulations can create an impression of rough ground by varying the height of the grasswork across the area. It can be difficult to apply grasswork over rocky and heavily textured areas without covering the rocks and creating little grass balls. When grassworking these areas, a "sprinkle and seal afterwards" approach works best.

When it comes to wargaming, a brown earth foundation works best for scatter pieces, whilst a green foundation works best for large areas such as boards and tiles.

It's perfectly acceptable to have painted grass. A subtly textured, green surface, drybrushed with a mix of the base green tinted with yellow, can produce a good looking, durable play surface that suits club and tournament settings well. And remember, just because the grass is painted, it doesn't mean other materials can't be added.



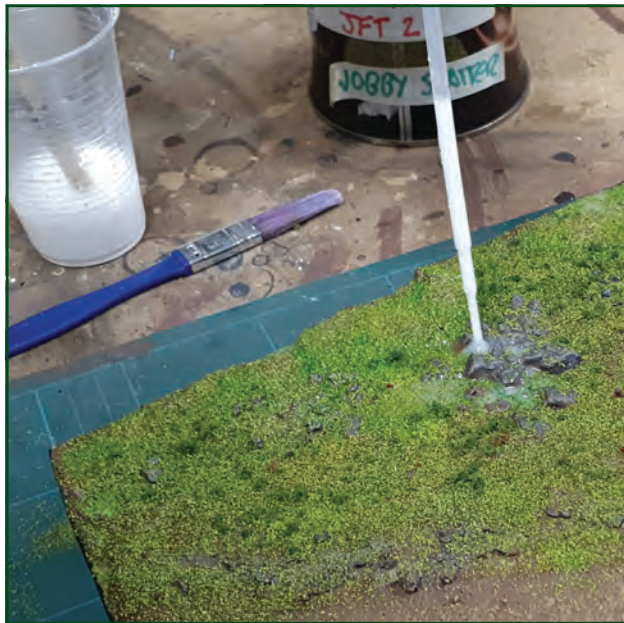


SCATTERING

Laying down scatter to create a grassy look varies from laying down a solid covering of a single scatter over PVA, to creating realistic landscapes using a wide array of specialist scatters applied with a range of techniques.

The scatters themselves can be fine or rough. Fine scatters (typically, stained sawdusts) are used for large areas of grass, while rough scatters (finely ground clump foliage, either loose or lightly bonded) are used to break up those large areas and blend the edges with the features of the terrain piece. Rough-ground mixes can contain ground clump, fine scatters, and flock to vary their appearance.

Most scenic materials are colour-fixed, so their colour doesn't change when sealed, and include a wide range of colours - mixes of greens along with reds, browns, yellows, whites, and even purples. Non-colour-fixed, fine scatters will leak their colour when they are being sealed. The colours of the scatters blend into each other, giving the grasswork a more realistic look. These fine scatters can be laid to suit the landscape, with the lighter greens applied to the raised, more exposed areas and darker greens applied to lower, more damp areas. Mid-green scatters can then be used to blend the two together.



Scatters are either glued (and sealed) onto the piece with PVA, or laid onto the piece and sealed in place later on. With time and practice, both techniques can be used on the same piece depending on what is needed. The first approach is suited to those learning grasswork, or when grassing areas that need a solid covering, whether large expanses like fields, or the rims of pieces, to ensure they blend with the table surface.

It takes very little glue to fix sawdust down, so PVA should be thinned to make applying it with a brush easier and also to allow the glue to soak up through the scatter. This will create a better bond than if neat PVA is used. Once dry, excess, unbonded scatter can be shaken off before sealing, or left in place to be bonded during sealing. The downside of this technique is that it can leave sharp transitions between grass and ground at the edges of the glued areas, but in most cases, these can be hidden with rough scatters and other garnish. Hard edges are also common when a base is coated in glue and dipped in a tub of flock (typically for speed), so it's best to add the scatter by sprinkling near any glued edges that can't be hidden, for a more realistic look.



The alternative approach is to sprinkle on the scatter and then seal it in place, avoiding any hard edging, allowing more control, and giving a more realistic look. This method suits thinner applications of scatter, since large amounts of loose scatter can be problematic during the sealing phase; the thinned PVA has the potential to move the scatter and cause clumps. More extensive coatings can be applied but these are best done as layers, with each layer sealed in place before adding the next – either permanently with PVA, or temporarily with hairspray. After the final layer is added, seal them all with PVA. This method also suits the non-colour-fixed blending flocks which work best when applied in smaller quantities. Remember, it's easy to add more scatter, but taking it off is challenging.

The next step is to add the rough scatters. Consisting of bulkier materials, rough scatters can be used to break up open ground, giving it a more realistic look without impeding model placement. Rough scatters can also be used to



blend the join lines between fine flocking and the features of a piece. Placed up against the edge of a feature, they can replicate the heavy foliage that's common around the bottom of walls and rocks.

Rough scatters aren't essential; stylised pieces often skip this stage, going straight to larger garnish such as clump foliage and tufts, giving a clean and simple grasswork scheme. There's no reason you can't add rough scatters later to improve an old piece, so you can get playing first, and get fancy later.

The application technique for rough scatters depends on what you're trying to achieve. To break up open ground, it's not practical to glue down every tiny little bit. So, when it comes to sealing, it's best to drip the thinned PVA onto the piece rather than spraying it on. The force of the spray can blow the rough scatters across the piece into unwanted areas, or off the piece entirely.

When applied in patches to hide join lines or to create the feeling of rougher overgrown ground, rough scatters can be fixed in place by applying slightly thinned PVA to the

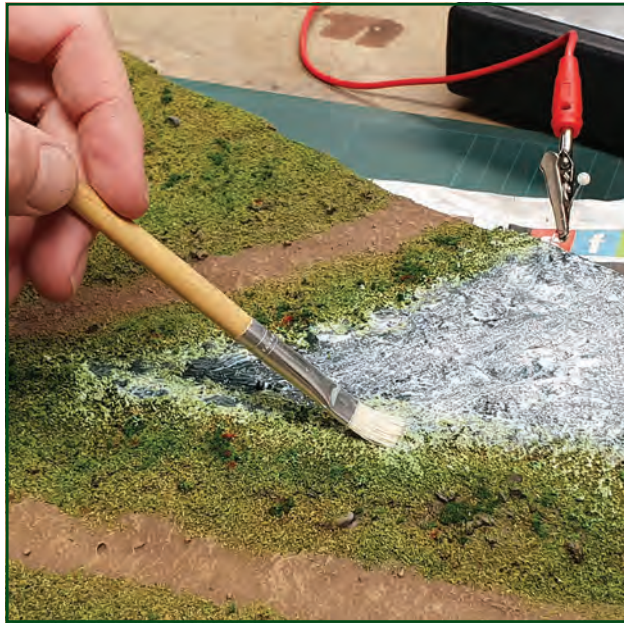
area before sprinkling on the rough scatter. The PVA will only adhere to the bottom of the rough scatter patches, however, so they will still need drip sealing to bond properly. The initial PVA helps to create a stronger bond and keeps the patches in place whilst the piece is being worked on.

PVA isn't the only way to apply scatter. Spray adhesives can be applied to broad, open areas before fine and rough scatter are sprinkled on, fixing them in place immediately. Whilst this is a quick approach and avoids applying PVA to large areas, it can be difficult to control (over spraying is a common problem) and it only bonds what it touches, i.e. the very bottom layer of scatter. Spray adhesives are better suited for laying down grasswork patches on boards and tiles rather than on scatter pieces.

What's next?

Whether you're going for a stylised look or a more realistic landscape, once the basic grasswork is laid down, it's time to dress it up with some scenic garnish. The most commonly used is long grass, so it's time to look at flocking techniques.





FLOCKING

Flock, or static grass, consists of short strands of coloured nylon fibres, available in colour mixes of greens, yellows, reds, and browns. In differing quantities, they can be used to replicate the long grass of different regions and seasons. Flocking has long been part of the terrain-building hobby and was originally used instead of scatter, to create a rough-looking grasswork base, often to help blend pieces in with the static-grass, paper mats that were used as a play surface. More recently, flocking has come to be used to add depth to a piece, with only large, overgrown boards and tiles being heavily flocked.

Flock can be laid down loose, either sprinkled directly onto thinned PVA, or applied dry, to be sealed later - much like rough scatters. It's actually best to combine the flocking and scatter stages, if you are only sprinkling small amounts of flock to help break up the appearance of the grass.

Alternatively, flock can be applied with an electrostatic flocer. These devices generate static electricity to cause the flock to stand on end, replicating real grass. How well this works depends not only on the strength of the applicator's charge but also on the strength of the glue and its ability to hold the grass upright while it sets. Flock applied through an electrostatic flocer has to be glued, so it is important to make sure all your previous grasswork has been sealed first, or it gets very messy.

At some point, you'll think it'll be ok to add a bit of glue to some loose scatter to add a bit of flocking before sealing. Just don't, seriously, just don't!

Flock is available in varying lengths, from 1mm all the way to 15mm, although most hobby applicators only work with fibres up to 6mm; they don't have the charge to cause the longer, heavier fibres to stand on end.

WARNING – Although the charge in electrostatic applicators isn't that high, shocks are common and can sting quite a bit. Don't mess with applicators if you have any heart problems or have any electrical medical devices such as pacemakers etc. Stick with the safer option of buying pre-made tufts and patches and applying them with PVA.



Raw PVA brushed onto an area will hold static grass up well. Thinned PVA doesn't have the same strength and the grass may fall sideways slightly to give a rougher grassland look. This can be advantageous when feathering the edges of raw PVA patches. If you thin the PVA around the patch, the grass will stand up strongly in the centre and become more ragged around the edges, which helps to blend the patch into the base grasswork.

Water-based latex glues work even better than PVA. Their thicker nature gives them a much higher grip strength whilst curing, resulting in more upright grass. Latex glues can still be thinned slightly, allowing edges to be feathered as when working with PVA.

Static grass applicators work by creating a static charge between the piece and the flocer (typically some kind of metal sieve that carries the flock), sprinkling it on by shaking the sieve much like when sieving flour. A negative charge is applied to the piece via a probe or other wire connector, either directly on the glue or close by it, whilst



a positive charge is applied to the sieve or applicator. This setup helps generate a static charge in the sieve, and any nylon fibres sprinkled on it are pulled upwards and stand on end, replicating real grass. Keeping the applicator close to the surface will create a stronger charge and more upright grass, whilst moving the sieve further away reduces the charge and lets the grass fall sideways a little; this can be used to vary the look of larger, flocked areas.

WARNING – Never let the applicator touch the glue or the probe. There will be a bang, causing you to instinctively jump backwards, and throw a sieve-full of static grass into your face as you do. The body can't break down nylon fibres if they're inhaled. Static grass inhalation has caused the death of a commercial terrain maker in the past due to buildup of lung scarring, so make sure you mask up if you're doing a lot of flocking or if it's getting up in the air. Avoid breathing it in!

Whilst applicators are great for laying down flock and getting it to stand up on end, they aren't essential. Large areas can be loosely scattered, building up the effect in layers, temporarily sealing them with hairspray as each layer is laid down until all the layers are bonded with a PVA seal at the end. Alternatively, for more upright grass, there's a whole range of products, varying from small grass tufts (tussocks) and patches, to rolls of static-grassed paper and diorama base sheets that can be cut out, glued down with thinned PVA, and then blended in at the edges.

And now onto...

With the bulk of the grassworking done, the next step is to dress it, to make it look more interesting. It's time to add the garnish!



Mel's Rule No. 39 - When flocking the edges of scatter pieces, tough on the outside, delicate in the middle.

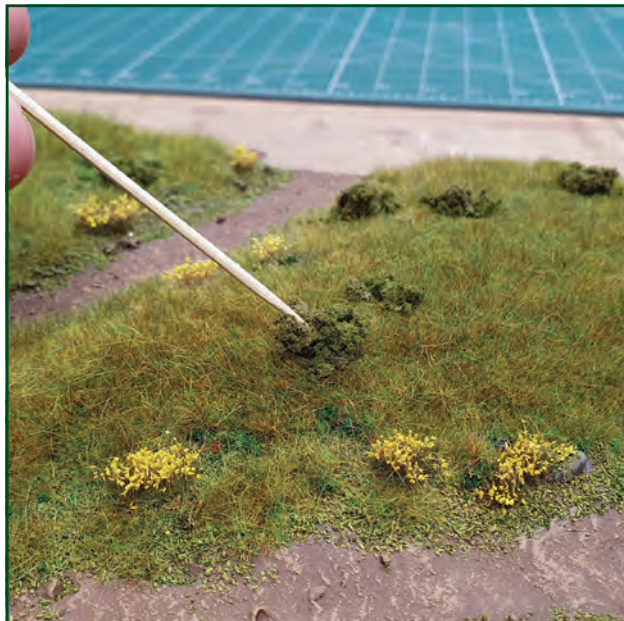




GARNISHING

Whilst scatters and flocks can create very realistic grass landscapes, it's the little bits such as tussocks, small plants and bushes that bring it to life. Much like dressing a meal with garnish, landscapes can also be garnished with a variety of scenic materials. For stylised pieces, items such as tufts, clump foliage, and lichen are all that's needed to produce a good-looking piece. For a more realistic finish, more varied and delicate materials can be added. No matter the desired level of realism, remember that garnish materials will disrupt model placement and so should be kept to the decorative areas of a terrain piece.

You can use scatterings of garnish materials deliberately to prevent model placement. Applied to awkward slopes or near delicate features, your garnish can be used to inhibit your players' model placement to fit the terrain design. The delicate nature of flower tufts do this well, as no reasonable player will want to crush the flowers with a base. I've also noticed that players treat terrain with more overall care if it has flower tufts.



Garnish bits can be used to hide any mistakes still showing from the previous phases, and also to hide any join lines between the grasswork and the base of any features (much like rough scatters do). They are also placed to improve the overall look of the piece, according to personal taste and any reference material you might have.

Clump foliage represents larger bushes, and so should be placed where they would be able to grow in nature. This means it's best to avoid placing them in the middle of exposed, open areas and instead put them up against features that would have protected them as they grew. To provide a more realistic appearance, use a mix of small, differently coloured pieces, applied as a larger clump, instead of one large clump of a single colour. Avoid placing rows of alternating colours, but ensure the colours and spacing between them is irregular. This also applies when using lichen to represent larger bushes; mix colours and vary their placement but keep them confined to areas where they would realistically grow.



Clump foliage and lichen can be fixed down with a blob of raw PVA, but as they are lightweight, spongy, and have open, irregular surfaces, PVA can struggle to create a decent bond and might not be tacky enough to hold the bits in place as they dry. This can result in bits of PVA-covered clump rolling across your piece as you're working on it. Thanks to its gel nature, Modge Podge is far better for bridging the gaps between irregular surfaces and holding pieces in place while it dries, but the best and quickest bonding is delivered by a little hot glue, which bonds the pieces in place quickly, as well as ensuring they don't come loose during sealing.

Clump foliage and lichen are spongy, so when you press them into the hot glue, it can soak through and burn your fingers. It's always best to push them down with a probe or pencil and keep a cup of water handy for when you forget... as might occur, for example, when writing a section on grasswork for a book.

Tufts, flowers, and diorama (or scenic) patches can all be added to further increase realism. Tufts are self-adhesive patches of latex glue to which static grass is electrostatically applied to represent various tussocks. Taken further, by applying coloured scatters to the tips of the standing fibres, tufts become flowers.



Diorama or scenic patches are larger affairs created by combining small selections of tufts, flowers, small clump foliage, and occasionally cork rocks, on latex patches and then flocking them with short flock to fill any gaps and blend the edges. The results are highly decorative patches that can be applied directly to basic grasswork to quickly give a realistic look.

Whilst latex-based garnish bits are self-adhesive, it's always a good idea to dip the bottoms in a little PVA and push them firmly into place with a finger or probe to ensure a solid bond. These bits can be applied in the same places as clump and lichen, but they also grow in more exposed areas, so are the go-to garnish for breaking up large, open areas without overly restricting model placement.

When using commercial tufts, especially when they're all one size, remember they can be placed next to each other or cut on the sheet with scissors to vary their size.

Tall grass and reeds are also a regular garnish on terrain pieces, especially those with water features. Made from

materials such as synthetic fibres, dry grass tips, and brush bristles, these can be glued to a piece in clumps to replicate natural, tall grass patches. The challenge is often to keep them standing up straight while the glue sets. Superglues and hot glues are much better at this than PVA. Alternatively, they can be glued together as clumps and allowed to set before they are fixed to the piece in a batch process, which saves you having to hold them still individually while each one sets.

Beyond the core set of garnish materials, there's a wide range of manufactured and natural products that can be used to increase the realism of a piece. It's important to place these bits in the same manner as the core materials – in areas they would naturally be found.

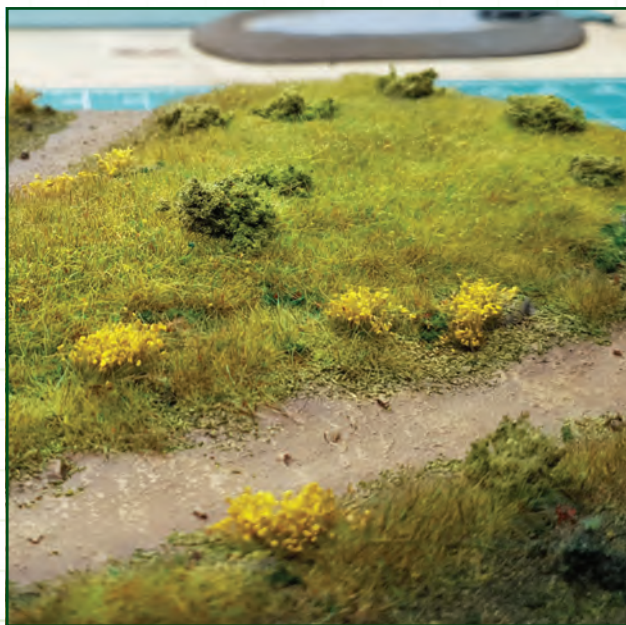
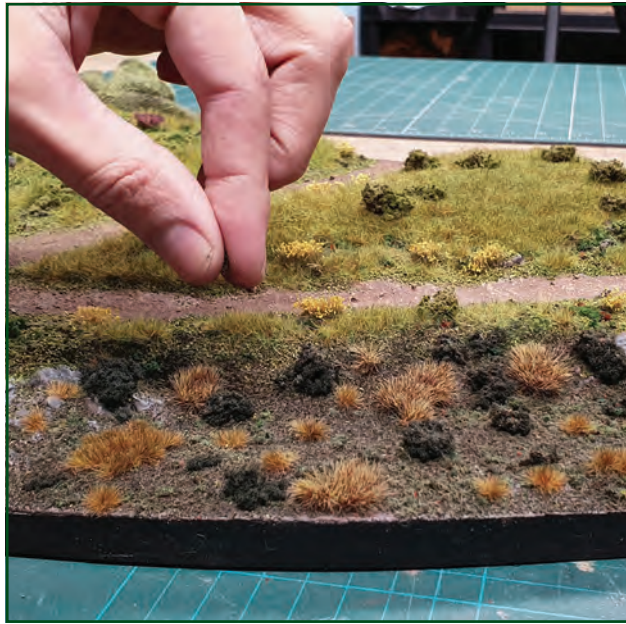
One step beyond

With the grasswork dressed up with scenic garnish, it's time for a final seal to bond it all together and toughen it up for the games ahead.



Mel's Rule No. 3 - When placing clump foliage, hide the flockups first.





LEVELING UP

After your scatters, flocks, and garnish bits have been fixed in place and sealed, you can also use washes to vary their appearance. Although best applied with an atomiser or airbrush, thinned brown washes can be wetworked onto grasswork to dirty it up. This wash can be applied broadly across open areas to break up grasswork and create a realistic look, and also at the bottom of large clumps or lichen pieces to shade them. When blending grasswork with bare groundwork, ink-based washes will stain the grass and ground and are best suited to drier themes, whereas paint-based washes are more opaque and will suit wetter, muddier ground transitions.

Scatters can also be drybrushed. A light drybrushing of yellows, creams, and browns to exposed areas can help give a weathered autumnal feeling, while light yellow-greens can give a feeling of spring and growth.

It's not just scatters that can be drybrushed, flocking, especially when applied with an electrostatic applicator can be drybrushed using the same colours for the same effects. Raw PVA can also be applied to the tips of flocking in little, random patches or applied broadly across it. Once applied, coloured scatters can be sprinkled on to create the appearance of flowering meadows. Additional layers of fibres can be electrostatically flocked, increasing the height of grass patches. This can be repeated to create quite tall, long grass but make sure the PVA is fully dry before the next layer is added, otherwise the grass will come apart when brushing on the PVA. When creating tall grasswork, it's best to do so after the final sealing and then use a blast of hairspray. A watery sealant can reactivate the PVA and cause your tall grasswork to fall apart.

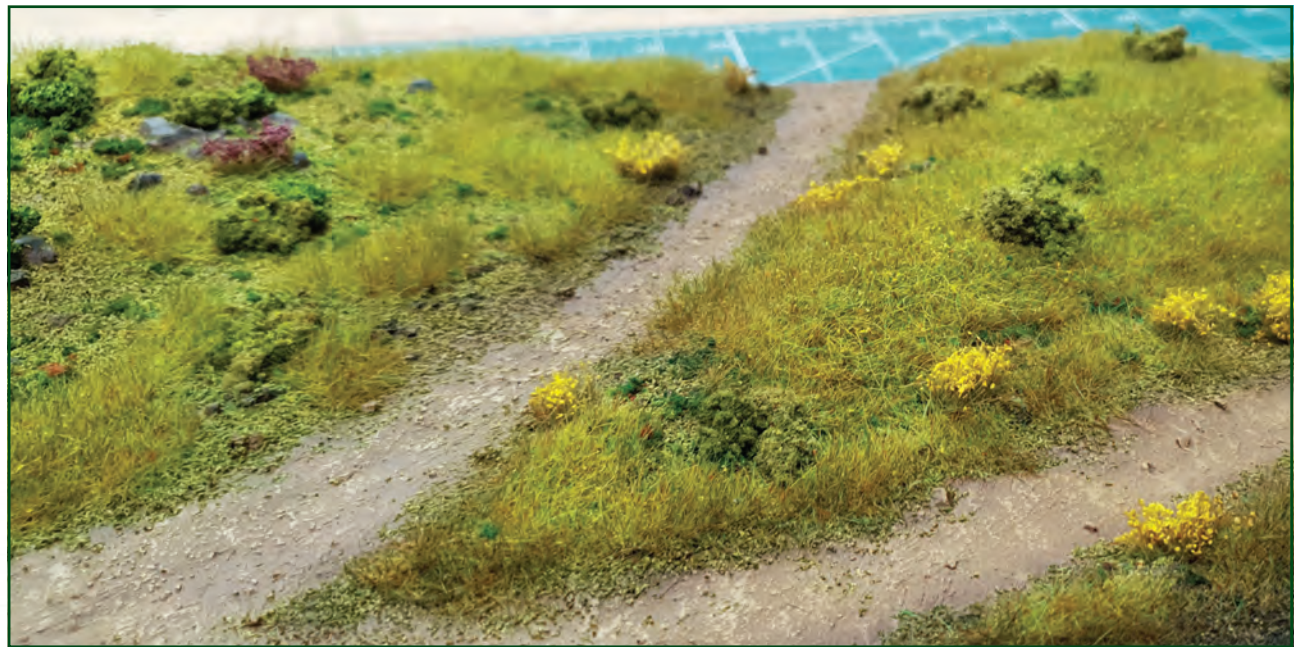
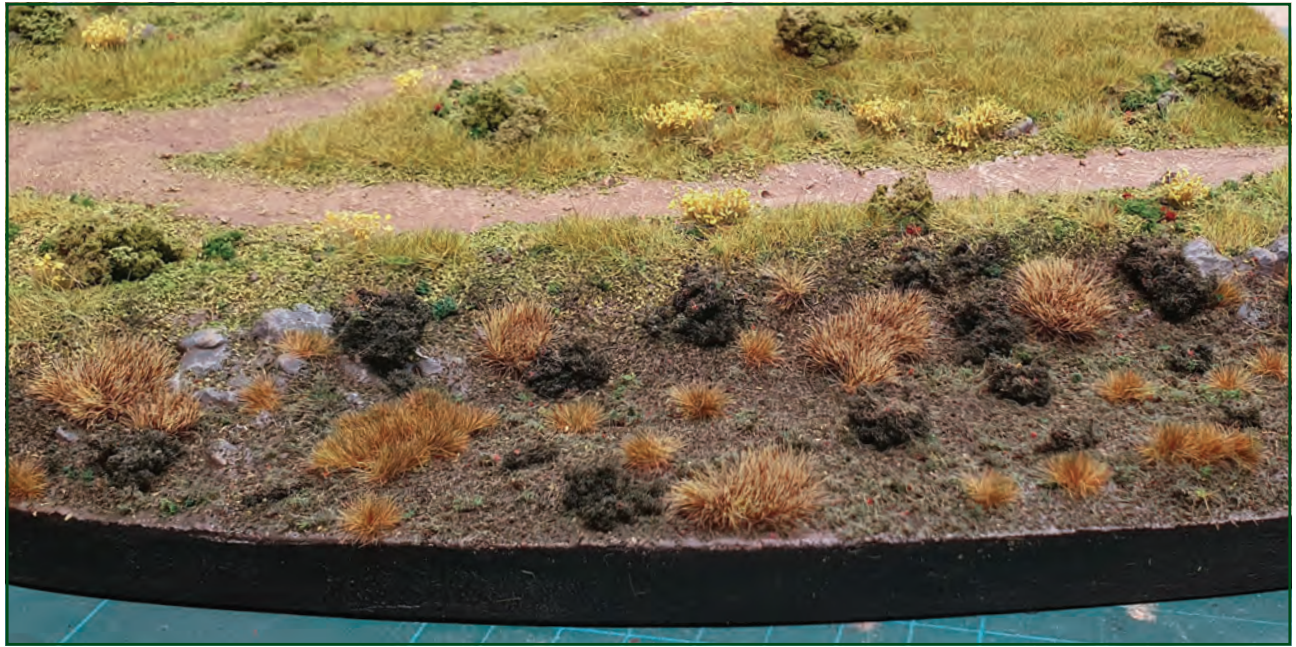
Removing material can be as important as adding it. Tufts and long grass patches might have a regular height across the entire piece, especially if commercial products are used. A pair of nail scissors can be used to trim tufts and long grasses to vary their look and heights, with any loose bits either shaken off, lifted off with a damp brush, or just left in place to be sealed later.

Finally, large, single-colour clumps can be lightly sprinkled with yellow-green scatter, replicating a bush's lighter sun leaves, or coloured scatters to replicate berries and flower buds. This breaks up the single colour of the clump making it look more realistic and less stark.

With these few simple extras, it's possible to take a stylised, grassworked, dressed piece just using the core hobby scenic products and drastically increase its realism without the need for expensive specialist scenic products. It's always best to focus on getting the best you can with the basics before adding more materials to the mix.

MAKING IT BEAUTIFUL!

It's perfectly fine to lay down some PVA, dip it in a tub of flock, shake off the excess, glue on a bit of clump foliage and some tufts, before giving a blast of a sealing coat. This will give you a good-looking, stylised piece that's durable for gameplay. However, when you understand and apply all the elements of this section, it'll be possible to create pieces that are not only a pleasure to play on but also a pleasure to look at!



GRASSWORK



MAKING YOUR OWN WHEN YOU NEED IT IN BULK

MEL'S DEEP
THOUGHTS

There are times when you need your core scenics in bulk quantities and buying them isn't viable for a host of reasons. There are always options for making your own. Beyond the natural materials that can be foraged from outdoors and preserved for modelling, it is possible to make most of the core scenics from common, cheap materials.



Scatters – These can be made by staining sawdust with watered-down inks or thinned artist acrylics. Mix the sawdust and stain together, then spread out across a sheet of greaseproof paper to dry. Once dry they can be pushed through a sieve to form fine scatters.

Rough Scatters – These small foam scatters can be made by grinding wet sponge bits finely in a coffee grinder or rubbing a sponge across a cheese grater. Once formed, they can be coloured with thinned artist acrylics before being laid across grease proof paper to dry out. Once dry, a quick shake to loosen them before pouring them into a tub is all that's needed.

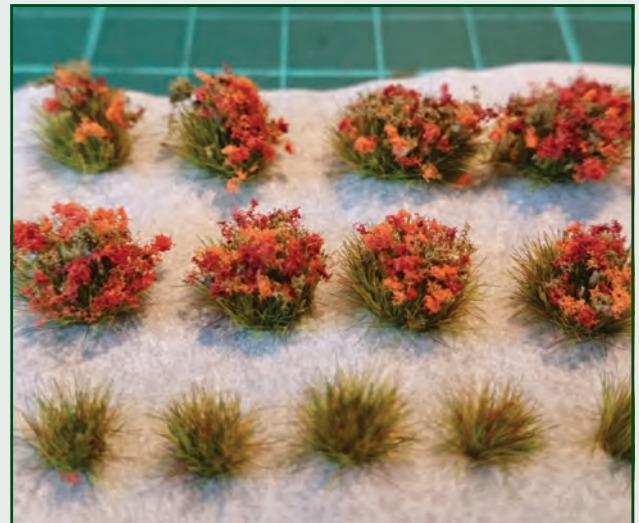
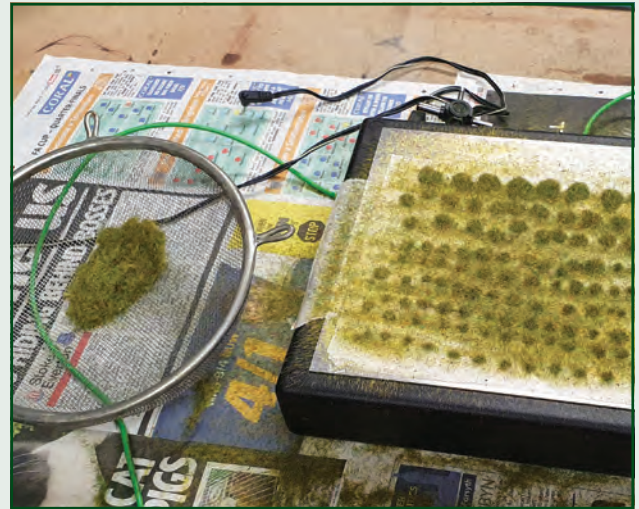
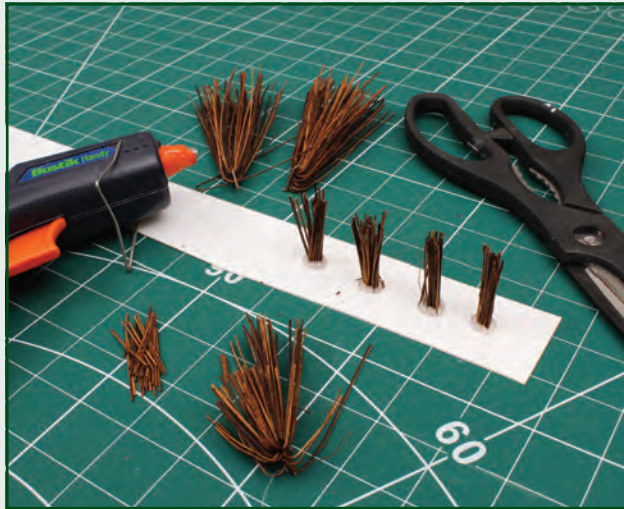
Rough Scatter Mixes – These are simply mixtures of all the common scenic materials chopped up and combined. First, add clump foliage, lichen, and maybe a few small twigs into a blender and blend it till it's a fine mixture of small bits. Next, pour it into a tub, add some fine scatters and some flocks, and mix it all up.

Clump Foliage – Vast quantities of clump foliage can be made quite quickly and cheaply. Most dense sponges can be used but upholstery foam gives the best results. Rip the foam into chunks and add it to a blender - include some water to stop it burning out and ice cubes for the blade to cut the foam against. Once blended into clump foliage-sized bits, the excess water is squeezed out and artist acrylic is mixed with the foam bits in a tub until a solid colour is achieved across the foam. Next, add some PVA to the tub

(about 50% of the original paint volume) and mix it in to help the foam to clump together. Once mixed thoroughly, spread the foam across greaseproof paper and leave it to dry. If there's still the original foam colour showing, you need more paint in your mix. If the foam isn't clumping, you need more PVA. If it's solid and frosted, you need less PVA, and if the foam is solid but isn't frosted, you need less paint. Ultimately, doing a couple of test batches to work out your ratios is much better than spending a day creating 10kgs of clump you can't use. Finally, as it's almost dry on your greaseproof paper, sprinkle on some light green or colour scatters and mix it up gently. This can result in some very expensive-looking, realistic clump foliage.

Flocking – Although the process of making nylon fibre isn't easy or pleasant, hobby flocking products are just mixes of commercially available flocks, meaning you can mix your own quite cheaply. A wide array of single colours and lengths can be purchased from automotive flocking suppliers as it's used to create the plush velvet interiors in cars. A mid green along with a light green and yellow will create a spring mix whereas a mid green with reds and brown will create an autumn mix, allowing you to create the same hobby mixes at a fraction of the price.

Tufts, Flowers, and Patches – Commercial tufts are just patches of electrostatically-applied nylon flock fibres, often comprising of fibres of different colours and lengths to give a realistic look whilst being stuck down to a plastic or glossy surfaced material with stay-tacky latex glue so that



they can peel off the backing. It doesn't take many packs of commercial tufts for you to realize that buying a flockbox or handheld applicator might be a more cost-effective method of getting tufts, especially for the tournament or club terrain making side of the hobby, where dressing with commercial tufts can sometimes be the most costly element of the build.

When it comes to making them, the principles that apply to flocking groundwork apply to creating tufts. Latex glues work best, with stay-tacky versions creating self-adhesive tufts. The difference is the backing material and how the charge is applied to it. Thin greaseproof paper or the shiny backing sheets of peel-off stickers work best as the latex glue won't bond with them. As these materials can't conduct a charge themselves, they are either placed on the flat metal platform of a flockbox or on a metal oven tray, with the ground probe of the applicator attached to the tray. Beyond this, it's a simple matter of putting lots of little dots and blobs of latex glue across the backing sheets and with a quick bit of sieving, it's possible to put together a few sheets with over a thousand tufts in around an hour.

Flexible flocked grass patches can be created by flocking larger patches of latex glue, taller tufts can be created by reflocking, as can flower tufts by adding scatters, and the same can be said for diorama patches which are just little collections of scenic materials on a latex patch that's then flocked with 1 or 2mm fibres to blend them together. So it's possible to make all the common tuft and patch products

quite quickly and cheaply. Tufts can be enhanced even further by adding two or three hog's hair brush bristles to the tufts while they're setting, brushing PVA onto these bristles and adding colour flocks instead of on the tufts themselves. This can create great-looking tall flowers but it's best to place them where they're protected from damage, as they can be quite fragile.

Tall Grass – Finally, tall grass materials can be acquired quite cheaply by buying a birch-bristled yard brush and simply cutting all the bristles off. For finer looking tall grass fibres, hogshair brush bristles from cheap house-painting brushes can be cut off with ease. The bristles can also be stained by working a dark green and then a lighter yellow-green through the fibres. Once stained, a line of liquid superglue can be run across the bristles just above the metal ferrule allowing the bristles to be cut away from the brush in a single block. After that, it's just a simple matter of breaking tall grass clumps off, and cleaning their bases a little before gluing them down, without ever having to hold them in place.

KEEP IT REPEATABLE

Using all of these methods, it's possible to make all the core scenic materials in bulk quantities quite cheaply. Just remember, when it comes to colours, you should work on a three tone system for your greens. Don't forget to desaturate those acrylics too, for a more realistic colour palette for your home-made hobby products!

ROCKS AND HILLS

BUILDING NATURAL HARDSCAPES



Hills and rock piles are some of the most popular types of scatter terrain for wargaming. They can vary from small scatter pieces to huge cliff faces running across entire table edges, and they really help to turn a tabletop into a three-dimensional landscape ready for your models to fight over. They can also have a major impact on gameplay itself, as your hills and rocky outcrops block movement or line of sight, provide cover for artillery, or elevated positions for snipers.



KEEPING IT FUNCTIONAL

As hills and rock piles can play such a significant role in your games, it's important to make sure that the pieces you build meet your gameplay needs.

When it comes to providing an elevated position, the type of hill you need will depend on how many models you want to put on top of it and how they like to stand. Games which use rank and file units will need large, flat areas for placing movement trays. Sloped, stepped, layered, and plateau-style hills will work best, sacrificing a little realism for a lot of functional placement space. Skirmish games using smaller units with looser cohesion rules still require placement space, but this can be spread over the hill, allowing you to create a more realistic, but still functional piece. Smaller scaled game systems benefit from having gently sloped hills for placement, but the scaling does mean that more realistic pieces can be created, especially large hills with cliff faces that are still quite functional.

Marking out placement areas on your hills before you shape them can help prevent you from accidentally removing too much foam so there's no longer enough flat area to place your models.

When it comes to line of sight (LOS) and cover, some rule systems use 'area terrain' rules, meaning a piece might block LOS no matter what shape it is. Other systems use true LOS rules, where the actual shape of the piece will influence gameplay. In these cases, no matter what level of blocking is needed from the piece, the key is to ensure that the piece clearly does or doesn't block LOS. Shape your terrain so that there can be little to no misunderstanding. As a rule of thumb, leave at least half a model's height more than what's needed to hide the model, and you will usually avoid any arguments.

Having blocks of foam or cardboard tubes cut to set heights for cover and blocking helps ensure that cuts aren't too low during the shaping process. Simply mark out your desired height line, paint it red below the line, paint the ½ inch above it orange, and paint the rest green, to make it easy and quick to check when you're building.





Movement rules can also play a part in shaping a piece. Some games require clear paths for models to ascend hills, and some systems use abstract rules, where the way your models actually get to the top is left to the imagination. Even in these cases, the rules often have limits to the distance that models can ascend or descend in a single turn. Follow the same principle as with blocking LOS, ensure the height needed to reach a placeable area is clearly in, or out of reach to minimise disagreements. Pieces might also allow movement from one direction but not another, like a sloped hill with a sheer rock face. Impassable or difficult terrain areas should be clearly identified on the piece. This usually isn't a problem as the rock face is normally enough but other scenic indicators such as a specific colour flock or tuft can be used to define terrain types on a piece.

Other factors can also influence your design, for example whether the pieces are to be table edgers, corner pieces or designed to be modular, allowing them to be put together to create even larger hills, rolling landscapes, or an entire cliff side. Whilst these factors might alter the design of the pieces, the build process remains the same.

Hills and rock piles are great fun to build as they can be the most messy, crafty, bulky sorts of terrain. It can be as simple as shaping some foam, sticking it to a base, and texturing it up. But even if foam is unavailable, hills, rocky outcrops, and cliffs can be made in a few different ways with some common materials like upholstery foam, corrugated cardboard, and even balls of rolled up newspaper. If you have it, HD XPS foam can be used to create very realistic pieces - especially when combined with rock-simulating materials or casts.

As with everything in this hobby, it's best to start with the basics and build up - literally in the case of hills!



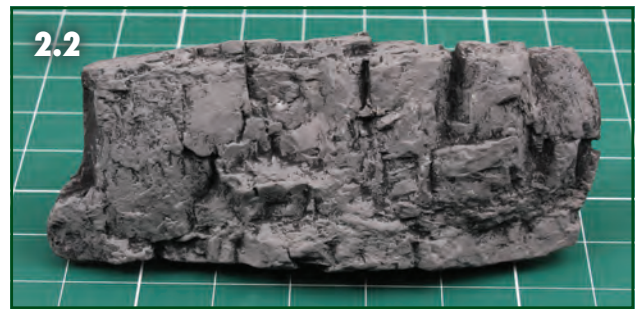
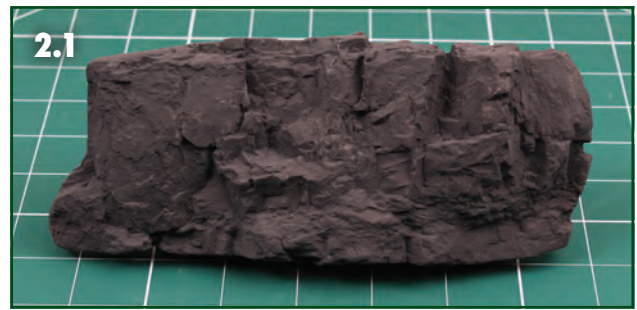
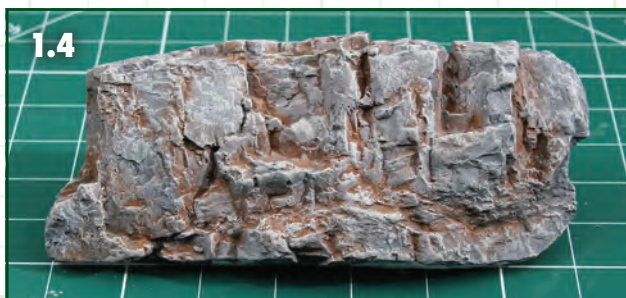
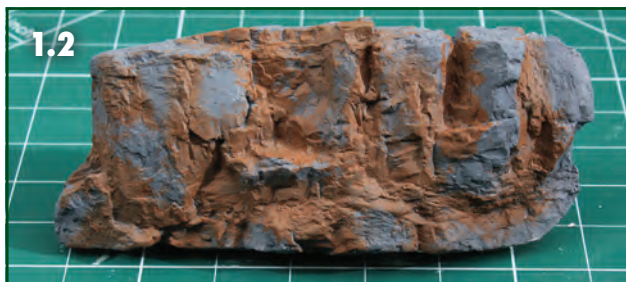
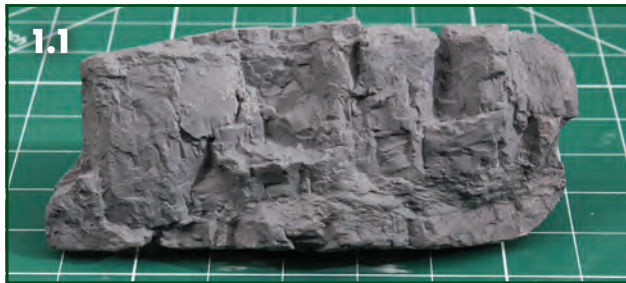
ROCK PAINTING

Hills and rocky outcrops require different, rock-specific painting techniques. In nature, the colours of rock faces can vary considerably and, if you include fantasy and sci-fi settings, anything is possible, but there are some common colour schemes. There is also a core set of techniques for applying them, with some more suited to certain rock surfaces than others.

Simple Stylised

The easiest of the techniques is best for simple, low detail rock surfaces such as stylised hills. The technique relies heavily on overbrushing and drybrushing, so it works well on jagged surfaces, but can also be used on large, flat areas.

First, the entire surface is basecoated dark grey and, once dry, a mid-brown is layered into all the recesses to create a strong contrast. The surface is then overbrushed with the original, dark grey, tidying up the brown and defining the recesses. The piece is then drybrushed with a mid-grey, before a final highlight of a light grey and cream mix. Stylised schemes work best with contrasting colours and clear changes in tone so that the layering can be seen.



Stippling

For flatter surfaces, stippling can be used to break up the surface to help create a contrast. This doesn't mean that it's only suited to flatter surfaces, but deep narrow recesses can be a challenge to stipple without oversaturating the surrounding area with paint.

First, the entire surface is basecoated very dark grey. Next it's stippled with a mid-grey, tinted with a tiny amount of yellow to give it more natural look. This grey is then tinted with yellow to warm it, progressively lightened and applied in smaller amounts until only a tiny stipple of very light grey is applied. This is then followed by a light stipple of cream to help break up the grey tones. Finally, sap green and raw umber are wet washed to give the surface a weathered look. As this technique relies on creating subtle variation, similar colours/hues with slight changes in tone work best to avoid stark, contrasting areas.

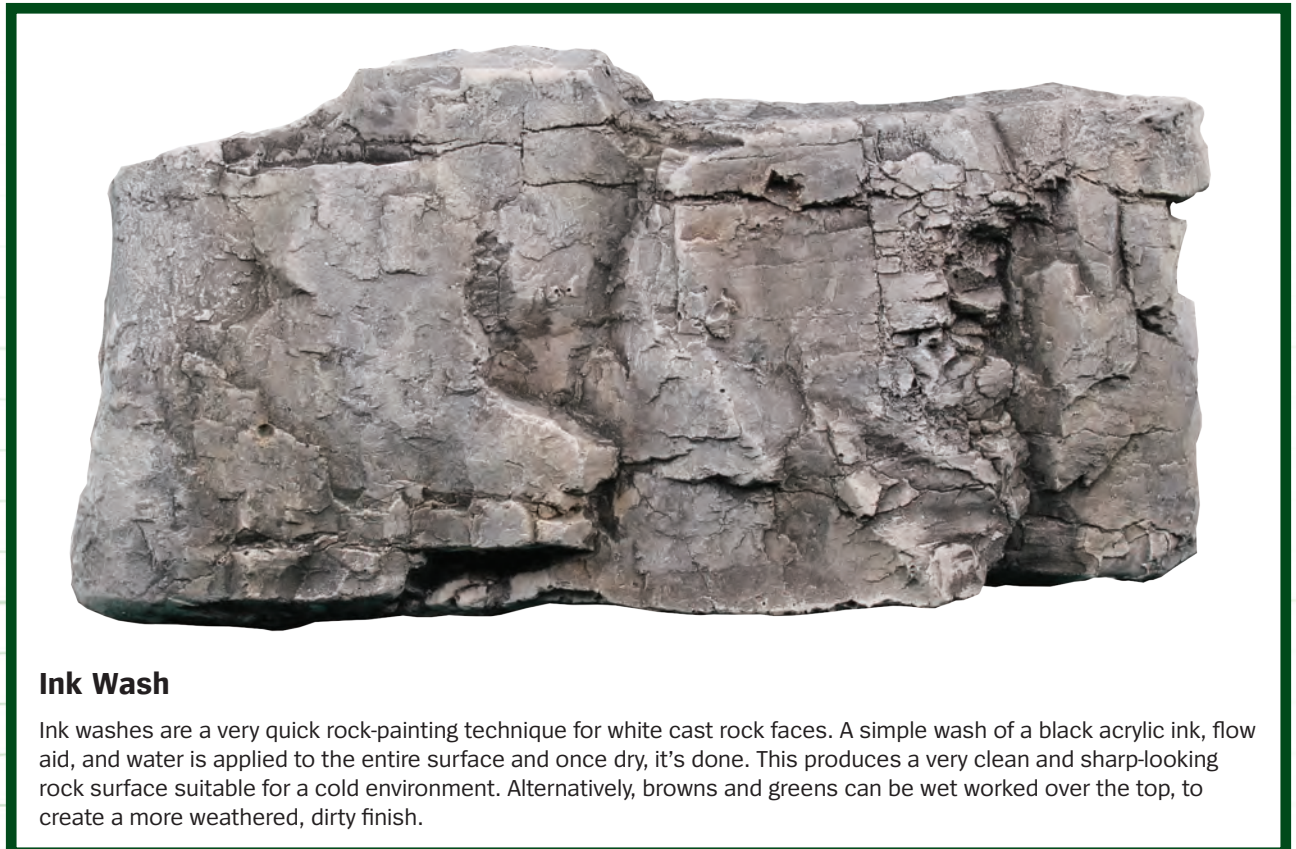


Wet Working

For detailed surfaces and those that fall somewhere between flat and jagged surfaces, wet working is a quick and easy way of getting a realistic look. This technique works well on plaster cast rockfaces and makes use of the whiteness of the material. If applied to other materials, they should be basecoated with white first.

The surface is first pre-wetted, before a heavy wash of mid-grey is broadly applied to the surface. Once completely dry, a

darkened raw umber is wetworked into the recesses, whilst the raised areas are wetworked with burnt umber and sap green in spots across the surface to break up the grey. A darkened sap green with a touch of burnt umber can also be heavily wet worked across the bottom layer of the surface where it meets the ground to help represent dampness, algae and moss. Finally, a very light drybrush of light grey and cream can be applied in a downward motion to redefine ridges and sharp edges, breaking up the wet work.



Ink Wash

Ink washes are a very quick rock-painting technique for white cast rock faces. A simple wash of a black acrylic ink, flow aid, and water is applied to the entire surface and once dry, it's done. This produces a very clean and sharp-looking rock surface suitable for a cold environment. Alternatively, browns and greens can be wet worked over the top, to create a more weathered, dirty finish.



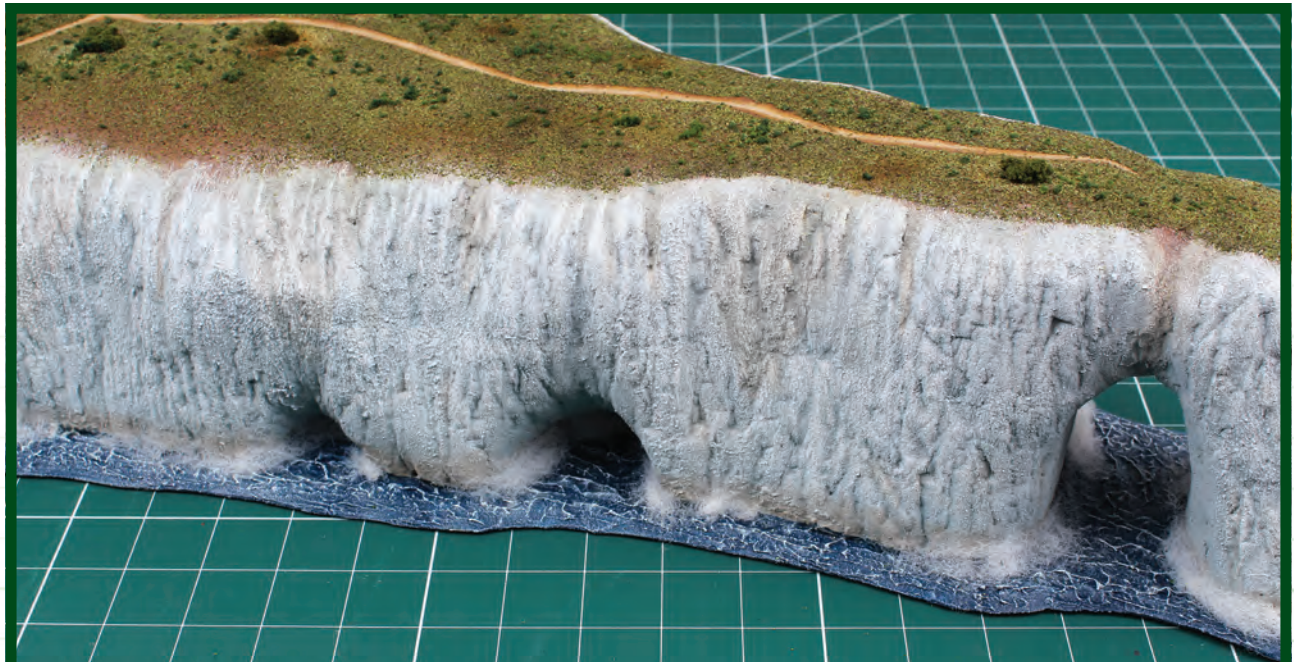
Leopard Spotting

This technique comes from the model railroad community and is a simple way of quickly creating a natural looking rock surface. Designed to be applied over white cast rockfaces, it can be applied to other surfaces, but they might need a white basecoat. First, two neighbouring colours (see *Colour Science*) such as ochre and burnt umber are applied as heavy washes in multiple places, so that each colour takes up a third of the surface area in total, leaving a third white. Finally, the entire surface is given a thinned grey wash, blending the colours together to produce a natural looking piece.



Sandstone

The warm, red tint of sandstone comes from its iron oxide content, and the strength of the red tint is determined by the amount of iron oxide present in the rock. Sandstone colours can be replicated with reds and warm browns, such as burnt sienna along with tans, ochre, and warm creams.



Limestone

Limestone and chalk rocks can be replicated with light greys and white, with a slight blue tint to give them a cool feel. This can be then broken up with weathering, especially earth erosion from the landscape above which is common with sedimentary rocks.



Glacial

Glacial ice and icebergs have a blue white colour scheme. The strength of the blue hue depends on how dense the ice is. Typically, the older the ice, the more compressed it is, and the more strongly the colour tints its translucence. Algae can also get trapped during this compression, giving the blue a green tint, whose strength depends on the concentration of algae. To replicate this, light blues, along with the blue-greens like cyan and teal work perfectly.



Volcanic

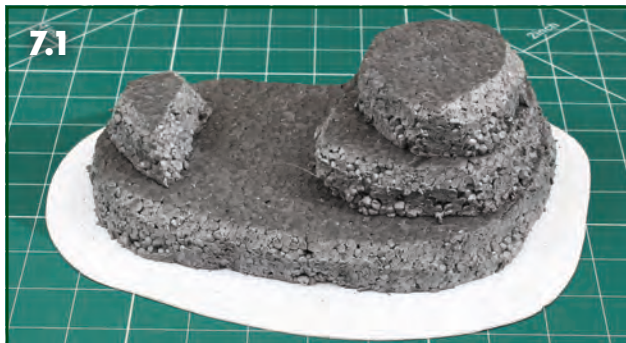
Volcanic rock can be replicated with a black basecoat tinted with a touch of purple. The tinted-black, base colour is then lightened by mixing in a mid-grey, and the mix is progressively lightened, moving through overbrushing to drybrushing.

Lava streams can be created in many ways. In this example, hot glue was used to create the shape. For the vibrant look, the glue was basecoated white before having red layered over it. Orange, yellow, and finally white were then layered and wet blended to produce the glowing effect, whilst a

little of the red and orange was drybrushed at the edges in a simple Object Source Lighting (OSL) effect.

Gather your reference material

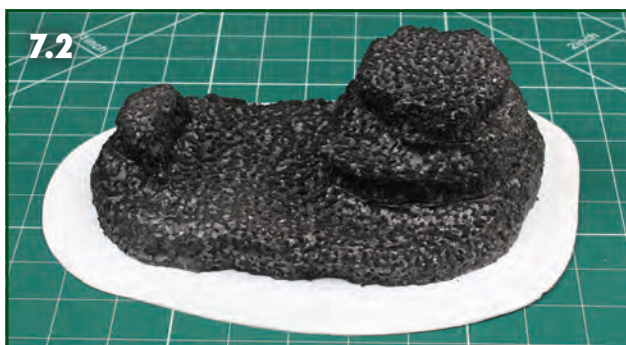
These techniques and paint schemes will cover the majority of your terrain-building needs, but in a hobby where anything is possible, the key to tackling the uncommon is actually quite easy. Look at your reference materials and choose your colours and your weathering, then look at your surface and decide the best way to apply them.



SIMPLE STARTER HILLS

When it comes to the surface, it will depend on how you build your hills.

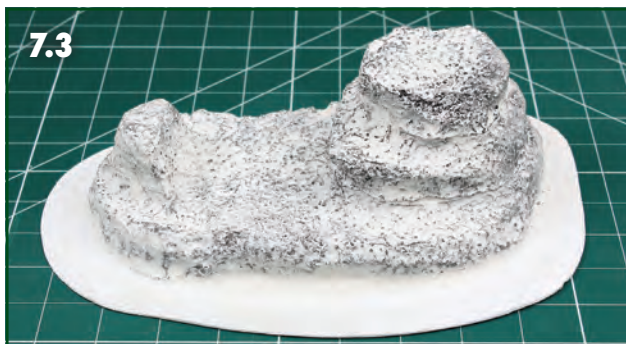
It can be easy to look around at the work of others and feel inhibited, because XPS foam can be difficult to come by. Hills made with XPS foam can certainly be wonderful pieces but most Terrainiacs start with much simpler pieces, created from either softer EPS foam or a host of non-foam alternatives. Keep your focus on functionality over realism and go for stylised builds, they'll enhance your gameplay more than a realistic piece that doesn't work with the rules.



Bobbly Foam

Soft, bobbly, EPS foam sheets are cheap, lightweight, and easy to shape with a moderate amount of precision, making them the go-to for easy-to-make, low cost hills. EPS - especially its bobbly edges - is very recognisable, so melting the edges, or covering them with a texture gloop will greatly improve the look of the piece.

Creating EPS hills is a simple matter of first cutting out the elements from the EPS sheet and gluing them to a base with PVA and then building up the layers from there. Always overcut a little, dry fit, and then do the final shaping before gluing them altogether. Ensure that at least ½" of the base is still showing, to allow you to blend the hill into the base and add grass work to blend the piece into the table.

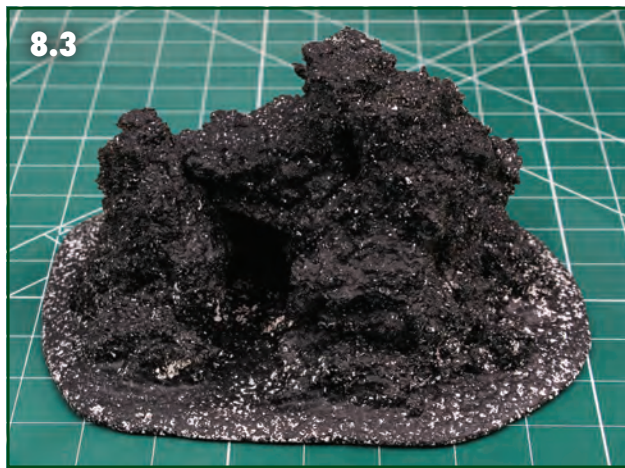


Once the glue has dried and the piece is fixed, it can be shaped with a heat gun. This will both change the bobbly edges, and give flat sheets more natural slopes. Any gaps caused by melting, and any bobbly surfaces can be fixed with a layer of thinned filler, spot fixing first with unthinned filler before applying it later as a sealing coat. After this, it's a simple matter of texturing up the surfaces, painting the rockface with the stylised technique, and then greenworking it.



To avoid the top surfaces melting when you melt your edges, and to keep them flat for rank and file games, melt the edges after they're cut but before they're glued together. Remember the fumes and fire risks!





Upholstery Foam

If XPS or EPS insulation foams are difficult to find, upholstery foam can be used as an alternative. Available in sheets, it's easy to cut with a blade, so it's suitable for layered hills or plateaus, and its edges can be torn away in small pieces to create a rocky surface. Alternatively, recycled foam can be ripped into pieces, tearing away any recognizable, flat, regular surfaces before being reassembled to create jagged, rocky outcrops. The downside of upholstery foam is that it is very soft compared to other materials and it doesn't take acrylic-based paint well. Both of these issues can be easily resolved with an application of a protective, hardcoat gloop, along with other techniques.

To create a rock cluster, prepare the foam pieces by breaking them into small pieces and removing all the flat

surfaces. Then, hotglue some pieces to the base, before adding more pieces to build up the cluster. Pins and pegs are handy for holding pieces together while the hot glue sets, whilst any gaps can be filled with a bit of foam soaked in thinned PVA; the PVA will easily bond it in place once dry.

Next, the foam can be firmed up and blended into the base with filler. First, unthinned filler is applied around the base, blending into the foam, before thinned filler is worked into the foam, setting it solid once dry.

When the piece is solid and ready to take paint, spray with a textured spray primer to create a rock formation with a volcanic look. In this example, resin crystals were added using hot glue, and the entire piece was highlighted with a mid-grey, tinted with a touch of burgundy red to match the crystals.

LARGER SUBSTRUCTURES

This section focuses on making scatter terrain pieces, but it's possible to use these techniques to create much larger hills for display and demo boards, along with large hill and cliff table-edgers. These can be created using the techniques in this section on a much grander scale using a larger feature substructure.

Creating the bulk of the feature's shape can vary from using a collection of small cardboard boxes that you can affix newspaper wads to, before the plaster bandage is applied, through to using chicken wire mesh to create an undulating landscape supported by wood dowels and covered again in plaster bandages or papier-mâché. Afterwards, it's a simple matter of texturing it or using it as a base to fix rock faces to.



Mel's Rule No. 45 - To avoid wide base rims, carve your foam before you cut your base!



Newspaper & Bandage

While upholstery foam can be soft, the softest material of all is used in one of the oldest techniques. Sheets of newspaper are rolled and secured with masking tape to create balls or wads which, when fixed together with hot glue or more tape, can be used to build a substructure. Whilst this technique could be used to create gentle slopes, it's particularly well suited to creating boulder-type pieces, or even large, feature hills.

The best balls or wads are created by laying a sheet flat before rolling it in towards the centre from each corner. The rolls are then held in place with a bit of masking tape, giving you quite bulky balls to play with when creating substructures for hills and landscapes.

The downside of using newspaper is that even with a filler or hardcoat gloop over it, the wads will collapse the first time any real weight is put onto them, so a tougher coating is needed. Plaster bandage is an open weave bandage that is impregnated with plaster of Paris. Available in rolls, it can be cut into pieces, soaked in water, and then applied

and shaped around the substructure with your fingers. Two layers, the second applied directly after the first (with no need to dry in between) is usually all that's required to give the piece a sturdy, durable surface that takes paint well. Once dry, a texture gloop can be applied if the bandage texture is still showing.

For this example (shown earlier in the chapter), a mid-grey basecoat was applied, highlighted with a broad overbrush of light grey before the recesses were shaded with a mid-brown wash with a green tint to give it a damp feel. Finally, a raw umber wash was applied to the entire piece before swamp flock and marsh tufts were added.

If you don't have plaster bandage, you can use papier-mâché – simply cover the balls of newspaper with strips of paper soaked in thinned PVA. A couple of layers will give a hard, durable surface that can be textured. The downside is that papier-mâché is so PVA-heavy that it always shrinks and warps the base. To avoid this, build up your balls and papier-mâché on a piece of greaseproof paper. Once they're dry and hard, simply push the bottom in a bit and glue them to a base, covering any little gaps with filler.

PUTTING DOWN THE SMALL STUFF

Like most terrain pieces, hills and rock piles can have aggregates added to create a ground texture followed by greenwork. Where these are laid down is influenced by a number of factors.

Playability: large rocks, clusters of larger aggregate, and clump foliage shouldn't be laid down in the middle of a space for placing your minis. This space may already be limited by the build so shouldn't be reduced further. Keep your aggregates and clumps to the edges and leave the middle flatter so that models can be placed without wobbling.

Hiding mistakes: you will always make small mistakes on a build, often not spotting them until further into the build, beyond the stage to properly fix them. Typically, these are gaps that haven't been filled, overcuts in the foam, and unpainted areas in deep recesses that are difficult reach. All of these can be hidden during the texturing or greenwork stages. The secret is to ensure that anything you add is put down with the third factor – realism – in mind.

Creating a realistic look: Hills and rocky places are littered with all sizes of rocks and different types of plants, but they are usually in specific places; replicating

this on a piece helps to improve its realism. It's rare to find large rocks on the top of a hill, usually they are on the slope of a hill or around the base of a rockface where they've rolled or fallen. Limit the size of the aggregates you use at the top of a piece, and increase sizes towards the bottom.

For greenwork, larger bushes and plants tend to grow around the base, in crevices and on steps where they are not only protected from the elements, but also well-rooted in buildups of washed down earth and well-hydrated by the channeled rainwater that carried the earth there. Plants growing on top of hills and in exposed areas tend to be smaller due to exposure to the elements and are usually lighter in colour as well. So, use smaller and lighter flocks and foliage near the top and in exposed areas, whilst placing darker and larger foliage lower on the piece and in any deep crevices.

***Plant science:** If a plant gets plenty of sunlight, it'll use chlorophyll alpha to collect energy, which gives its foliage a light, yellow-green look, whereas plants that don't get as much sunlight use chlorophyll beta to collect energy, giving their foliage a dark green look. The point is, the higher and more exposed the area, the lighter the foliage, the darker and deeper the area, the darker the foliage.*



Stacking Cardboard

Corrugated cardboard can also be used to create hill substructures. Whilst not the strongest of materials, especially when wet, its general sturdiness and ease of cutting can be put to good use in creating stratified hills and rock formations. Cut out and glued together, cardboard shapes can be used to create a layered substructure that is sturdy enough to take a textured, hardcoat gloop.

First, cut out the corrugated cardboard shapes, varying them in size or shape slightly. Having different thicknesses of cardboard helps with varying the look of the piece but is not essential. Once cut, the sheets are glued on top of each other creating a stratified substructure.

This technique can be used to create plateaus or rock stacks, layering the sheets directly on to the base or, as in this example, the substructure is built off the base, cut at angle and then mounted to the base for an alternate look.

The substructure is then coated with filler, firming it up and disguising its edges, whilst a bulking gloop of tissue and stucco was used to blend it into the base. Next, a fine-aggregate, texturing gloop was applied to the entire piece and more aggregates were added to the base, once dry. After that, it's a simple matter of painting it up (drybrush techniques work best) before the greenwork is applied.

You can use (almost) anything!

If it can be shaped and is sturdy enough to keep that shape while a hardcoat gloop is slapped on, it can be turned into a hill, so there's no reason a set of terrain can't have a batch of good looking and functional hills.



Mel's Rule No. 8 - Model placement before rock placement, an unfunctional hill is a lump.



POSH FOAM

Stepping up from the more basic materials, high-density XPS foam is an ideal material for making hills and rock pieces. Its availability as thick insulation sheets suits this type of bulky work, and its sturdiness helps create very durable pieces. Above all, it's the fact that XPS can be cleanly cut and shaped that makes it a go-to for hill and rock work, amongst other things.

Whilst there are a huge array of techniques and tools for creating rock-like texture, there are three core ways to take advantage of XPS foam's properties to create great-looking rock terrain: stylised rockfaces, boulders, and impressions.

Stylised Rockfaces

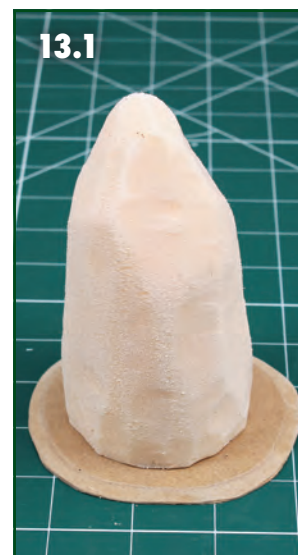
Much like stylised hills, the rockfaces carved into them can also be done in a stylised manner. This involves creating

almost vertical, slightly irregular cliff sides as you shape the hill. These sides are then beveled to meet the top surface of the feature. Next, deep, diagonal crevices are cut into the sides, getting shallower as they reach the top and spread irregularly along the rockface. After that, multiple small, diagonal crevices are cut across the original deep ones and any of the original cliff surface is slightly beveled until the entire surface is fairly irregular. A little light sanding, along with an optional sealing coat of thinned filler or PVA, will give a surface that takes the stylised painting technique very well, creating simple pieces that look good on the tabletop.

Increasing the irregularity, both in the shaping of the cliff surfaces in angle, direction and height, and also in the depth, direction, and positioning of the crevice cuts, can dramatically improve the realism of this technique.

Impression Technique

XPS foam retains the texture of material pressed into its surface and that makes it great for rocky surfaces. First, the piece is cut to the general shape of the rock surface, and then any cut or ridgelines are sanded away. Once prepared, a general stone texture can be created by pressing a rolled-up ball of crinkled kitchen foil across the entire surface, rotating the ball to avoid any obvious repetition or pattern in the texture. Next, the sharp edges of larger stones can be used to create cracks and crevices, although it's especially important to rotate edges and swap stones as any repetition is more noticeable when making larger indentations. After that, a thin coat of PVA or filler will seal the piece ready for painting without obscuring the detailing. Take care to remove any excess that gathers in the cracks. Impressed surfaces tend to be flat, so stipples and washes work best for painting up your rocks.



Bouldering

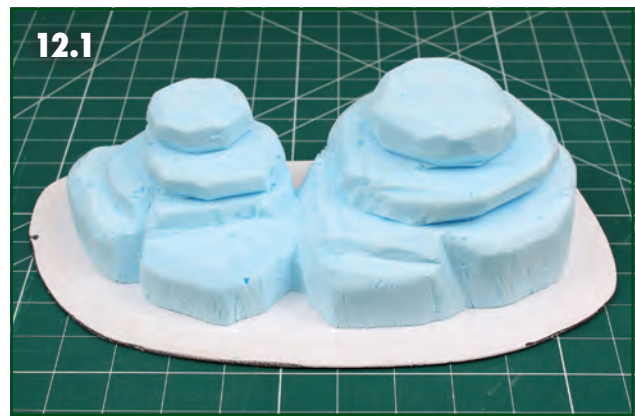
The fact that XPS foam can also be sanded and smoothed lends it to being used for smoother boulders and sedimentary stones. The sheets can be rough cut into the basic shape with a blade, using a combination of vertical and horizontal cuts to remove layers, shaping the pieces with successive cuts. Next, the features are defined by smoothing out the shape, beveling any corners and creating underhangs and crevices. The entire surface is then sanded smooth, removing any cut ridges before filler is applied to any nicks and overcuts. A thinned filler coat is applied to help smooth out the undercuts and seal the foam for painting. In this case, the sandstone look was created by basecoating the piece with burnt sienna, before overbrushing and drybrushing with progressively lighter yellow ochre. A little brown lichen was added to break it up and hide any mistakes.

After filling the gaps and overcuts, but before the sealing coat, the impression technique can be used as a further detailing stage, resulting in very realistic rockwork.

Just the start

Whilst these techniques can give great results, there's a wide range of other results that can be achieved with XPS. Its surfaces can be chipped away at with chisels and flat-headed screwdrivers, overlapping the chips to hide the tool marks, creating a jagged, pock-marked rock surface. It can be melted with a heat gun waved in broad strokes across the piece, creating sandstone-cliff-like rock structures with curves and ridge lines. You can add crater-like holes with a soldering iron to give it an old school sci-fi look. With the addition of hotwire tools, especially freehand cutters for sloping, and routers for caves, depressions, and trenches, the range of possible hill shapes and rockface designs is limitless.

If you struggle to find XPS foam, you might be able to use a spray can of expanding insulation foam. Spray blobs onto grease proof paper, letting them expand and completely set before carving. Just remember expanding foam is phenolic, so no hot tools or melting and watch the dust when sanding.





STEPPING UP YOUR ROCK GAME

It's easy enough to create a rock surface from the basic hill materials and quite realistic rockfaces can be created from XPS foam. Taking it all a step further, the materials you use to build your hills can be used as a substructure to which other materials can be attached to create even more realistic rockfaces.

Rockface Bits

Various materials can be used to create a rockface, including: tree bark, stones, or cast plaster pieces. Some trees have heavily-textured barks that make great rock surfaces. These include cork, pine, and oak bark and can be used either as entire pieces or as chips of bark. Cork tiles can also be broken and stacked to create the impression of rocky surfaces. Slate and other stones can be used too, of course. Beyond natural materials, rockfaces can be cast using specialist rock moulds.

No matter which material is used, it's important it has a good, textured surface that will look like rock when it's painted, as there's no real point creating a rockface that doesn't. Always test-paint new materials before you build your hills.

When it comes to gluing and priming, all the common materials can be treated in the same way. The key factor that determines their handling is size. Barks, stones, and casts come in various sizes. Barks can come in quite large sheets which are best cut and shaped with power tools before use, while bark chips can be used straight out of the bag. The same can be said for rock castings, with their size determined by their mould size. Stones are best suited for small cliff faces and outcrops, especially if the pieces need transporting. When it comes to barks and rocks, it's always best to clean them first, scrubbing them clean of dirt, lichens and moss, then sealing them with thinned PVA, either on or off the piece, to better prepare them for painting.

If the rockface pieces are large, such as wedges of cork bark, they can often dictate the shape of the hill, especially on smaller, scatter pieces. With larger hills or small rockface pieces, it's possible to create the substructure first and then attach the rockface and work out positioning on the fly over the larger area available. Whilst it's not easy to perfectly shape a substructure for rock pieces in advance, you can roughly shape them, keeping the areas where

rockfaces will be applied flat to aid attachment, before reshaping the substructure with bulking gloops afterwards. Finally, factor in the thickness of the rockface materials when building the substructure on the base, and always have enough base rim around the substructure so that the attached rockfaces don't extend over the base edge.

If you're working with something you can shape, dry fit the rockfaces first, tweak the substructure, and then attach on the fly. This saves trying to figure what goes where if you leave it till later.

Casting it up

Some of the best rockfaces come from casting in plaster or resin using specialist moulds (which are all originally made from real rock surfaces). The rockfaces used for the painting examples were all cast from a Woodland Scenics mould. Whilst there are plenty of commercial molds available, covering a range of different rock types, when building large hills there tends to be quite a lot of repetition of casts. Fortunately, it's quite easy to make custom molds.

Smaller rock surfaces should be cleaned first and then coated with a thin layer of petroleum jelly, before applying silicone sealant via a caulking gun. Pat the silicone down to ensure a good final texture. Silicone cures through exposure to moisture (like super glue) so it's best not to apply it too thickly. Layers can be built up, but allow them to fully cure between each application. For larger surfaces, silicone sealant can be squirted into warm soapy water or mixed with a little craft acrylic, both of which accelerate the curing so that the silicone can be worked into a putty that is no longer sticky but soft enough that it can be pressed over the rock surface and left to fully cure. Silicone sticks to silicone, so if a mould needs a rim for pouring plaster, just use the caulking gun to run a ring around the edge of the mould.

Alternatively, liquid latex can be used to create rock moulds. The rocks, big and small, are first cleaned as with silicone preparation, then the latex can be brushed on, and shortly afterwards a sheet of cheese cloth is added before layering on more latex. Latex tears easily, so the cloth adds strength to the mould. Latex doesn't stick to cured latex, so it's important to layer up the mould in a single session and then leave it overnight to fully cure.

There are hardeners and softeners that can be added to the latex but accelerants are an essential if you're laying latex on rocks outdoors.

For simpler rockface moulds, four or five sheets of kitchen foil glued together with PVA, once dry, will be stiff enough to be crinkled to create a rock texture, pinched in to create crevices, before the edges are folded up to form a rim for plaster pouring. Foil moulds only last for a handful of castings, although small holes can be patched with tape applied underneath to extend their use. The key benefit of foil moulds is that they can be easily shaped to match desired substructures, making the process of adding rockfaces to large, irregular hills much easier.

No matter what moulds are used, rockfaces are usually cast in plaster, typically industrial plasters such as Hydrocal, Merlins Magic and Crystical R; plaster of Paris is quite soft and prone to chipping. There are a couple of techniques to avoid getting air bubbles in the casting, like placing the moulds on a board, holding the board up a little and pressing a muscle massager on the side to vibrate the board and shake the air bubbles to the top of the cast. Alternatively, a mould can be soaked in a mix of water and flow aid, and any air bubbles can be brushed out while it's suspended in the water. Then, drain off the water (but don't dry the mould), before the plaster is poured in. Once cast and cured, the pieces can be demoulded and fixed in place.

Sometimes it's just quicker to scratch out any bubbles while the plaster's soft after demoulding. If you miss any, they can be quickly filled while blending the pieces into the substructure.

Fixing

Whether it's barks, stones, or casts, the challenge is to fix it to the substructure. There are four key elements to consider: placement, bonding, blending, and landscaping.

With smaller pieces applied to a substructure, placement is about where they will fit and bond whilst still appearing realistic. Bark and casts can be shaped with coping saws and pliers to fit the substructure, allowing the pieces to fit closely together on the substructure, and reducing the gaps to be blended. Pieces should be placed against flat areas and not on ridgelines if possible. Ridgelines can often be cut, sanded, or even pushed in, but if this isn't possible, cut a groove in the back of the rockface to accommodate the ridge, or ensure pieces meet at ridgelines rather than over them to avoid leaving large gaps and a minimal contact

surface for bonding. Ultimately, pieces should be placed realistically, avoiding formations that just don't seem natural. Don't forget your reference materials, the key to creating realistic pieces.

When it comes to bonding, most glues will bond most of the rockface materials to most of the substructures. The challenge is that the joined surfaces rarely meet neatly and the glue needs to be able to immediately hold the piece in place whilst other pieces are added. Bulky glues like hot glues, contact adhesives, silicone sealants, and acrylic caulking are great at bridging small gaps and holding the pieces in place. For larger gaps, a bulking gloop can be used, applied to the pieces and pressed into the surface.

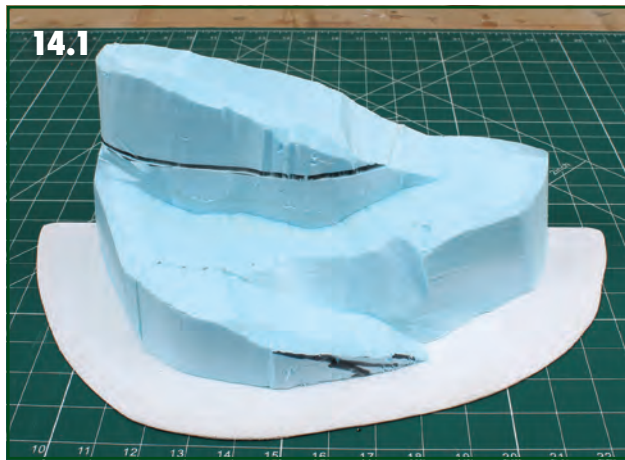
Cast rockfaces that lean backwards can have large gaps at the bottom thanks to the tilt. Breaking the back ridgeline on the substructure or rubbing the cast over coarse sandpaper can help reduce the gap and the blending needed to hide it.

Once bonded, the gaps between the rockfaces, the substructure, and the base need to be blended. These gaps can be filled with filler or a bulking gloop but air-drying clay (like DAS) can also be used. The benefit of using clay is that it's a sturdy putty that rocks can be pressed into, creating a rock texture to help with the blending process. In the case of large gaps, particularly at the top edges, slivers of foam or PVA-soaked paper can be pushed in to roughly fill the gaps before they're covered over. Any rockfaces meeting the base will need to be blended in, so remember to factor in extra space on the base when using pieces with irregular edges.

Much like the landscaping when creating the substructure, there's also a bit of shaping during the blending stage, cutting away foam to bring platforms level with casts, or carving the foam to make realistic crevices where you have gaps between rockface pieces. Fillers and bulking gloops can also be used to create a naturally flowing join at the top of rockfaces, building up mounds where there would be rockfalls, creating the talus and scree slopes to be coated with aggregates.

Once your rockfaces are placed, bonded, blended, and landscaped, it's simply a matter of texturing, painting, and adding your grasswork.





PUTTING IT ALL TOGETHER

Creating realistic hills and rock pieces involves little more than creating a realistic substructure shape along with its rockfaces before painting and flocking it. Everything you need to do this has already been covered in this chapter and those before it. The key is putting them together to create a realistic piece.

For the substructure to be functional there has to be some compromise to its shape, but by ensuring any regular shapes or lines are altered or broken, and any indicators of manufacture are no longer visible, you can maintain realism. The shape should be believable. Although a lot of weird things happen in nature, a piece still needs to feel right, so reference material is really going to help.



Although the substructure for this example was carved from XPS foam with a hotwire cutter, it's possible to use cheaper materials. It was created by separating the piece into three parts and creating the slopes before reassembling them with a focus on breaking up any regularities with the paths and plateaus, whilst keeping the cliff wall flat for attaching the cast rockfaces (14.1).

A functional, playable slope must be no steeper than 30° from the horizontal. Any steeper than this and models will fall. This doesn't mean slopes can't be steeper but you might want to include heavy aggregates, rocks, and greenwork garnish to make it very difficult to place models in certain areas. Alternatively, rocks can be glued down and blended in with a bulking gloop to create steps on steep slopes, improving model placement.



The rockface casts were attached to the substructure towards the end of the casting process (14.2). The demoulded casts were dry fitted against the shaped substructure, and then broken with hands and pliers before the casts had fully hardened. Then they were attached with a bulking gloop of stucco and tissue, easily bonding them and bridging any gaps between the substructure and cast surfaces. This gloop was also used to blend the casts with each other and with the substructure at the same time (14.3). Once set, filler was used to smooth out playable surfaces and aggregates were added, especially as fallen rocks at the bottom of crevices, before being sealed with thinned PVA (14.4).



The rockfaces and larger rocks were painted white and, once dry, a mid-grey wash was applied. Next, the earth colour was laid down, a mid-to-dark brown with a slight green tint to give it an organic feel, a dark grey added to desaturate it and then darkened with a touch of black. This mix was laid heavily on the flat, earth areas up to the edge of the rockfaces and then immediately afterwards, the edges were feathered with a clean, damp brush and dragged down into the crevices to start the weathering process.

Once dry, the rockfaces were detailed. First, the surfaces were broken up with wetworked burnt sienna and raw umber to shade the broad surfaces. Then the rocks were weathered; a wash of sap green mixed with a touch of raw umber was applied broadly near the bottom of the rocks and in any areas rainfall would run down. More raw umber was added to the mix focusing on where the ground meets the rocks and more narrowly in the crevices. This was repeated with more raw umber until it resembled damp earth, which was applied to the top edges where they met the ground and any ledges that would catch eroded dirt. Finally, a touch



of black was added to darken it and the wash was applied into all the deep recesses and cracks as shading. Repeated layering of acrylic washes can result in a slightly glossy finish, just like a glaze and in this case, this effect was used to reinforce the damp feel of the crevices.

When replicating natural weathering, focus on where topsoil would be washed away, and on damp areas where algae, lichen, and moss would grow. Remember that any surfaces covered in dirt that slope downwards towards a rockface will weather it brown a little, regardless of nearby crevices. Anywhere close to the ground, or in shadow, will be the last areas to dry after rainfall. For application, divide your piece into light, mid- and heavy weathering areas, apply thinly over the entire area, then a little heavier over the mid- and heavy areas and finally, heavier in the heavy area, blending and feathering each as they are applied. This will create a naturally blended look. The key to a realistic look is multiple, subtle layers to avoid any harsh, noticeable transitions.

Next, the damp feel of this example piece was reinforced through the grassworking stage with a limited selection of core hobby products: marsh tufts, two types of dark clump foliage, a damp earth flock, and a rough, damp ground mix of drab, green, fine foam, static grass, and flock. First, the flock was laid down, sprinkled on dry on the ground to meet

the rockface edges whilst avoiding the pathways, and left to be fixed later. After that, large clump foliage and tufts were placed to hide mistakes, breaking up regular lines and in recesses to reinforce the damp feel, then all fixed in place with thinned PVA applied with a large syringe.

A few small, seafoam trees were added – placed next to and level in height with the rockface so that they were protected from accidental damage – along with small branches placed in recesses to reinforce the lush feel of the area. Finally, the smaller clump and ground mix was applied, blending the flock with the clump foliage and tufts along with the rockfaces. This was applied lightly in exposed areas and more heavily near the bottom of rockfaces and damp areas. This helped elevate the piece from 'just a hill' to a realistic landscape, as well as tying it in with the wooded pieces in the set. Finally, the groundwork was sealed in place with thinned PVA, layered on with a pipette and left to dry.

It's actually quite easy to create realistic, functional pieces. Just imagine that there are little patches of functional space, surrounded by a sea of realism. With the areas defined, keep them simple, level enough and clean, and then go to town on the rest to distract from them.

ALWAYS REMEMBER...

No matter what type of hill you want to make or what materials you have to make it with, as long as you remember that its primary purpose is as a playable piece, your realism will evolve and strengthen with practice.

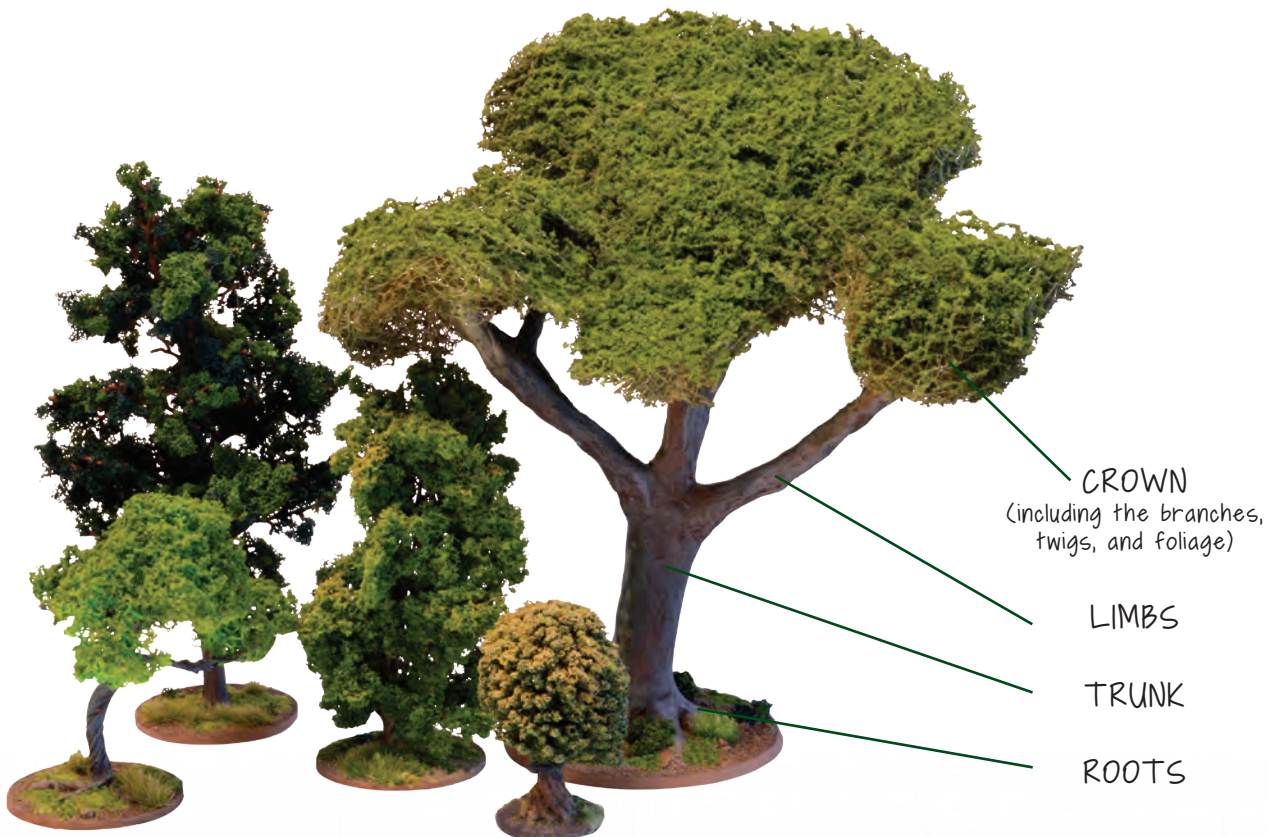
TREES & HEDGES

BUILDING THE BIG GREENERY



So far we've presented techniques for building rolling hills, rock piles, and verdant fields. Now it's time to take things vertically and create some very natural features – trees – and their sculpted cousins – hedges.

This section will cover the important elements of substructures and coatings for hedges, bushes, and trees. We'll also show that whilst pre-made trees might be the easiest to incorporate into your collection, bespoke trees are actually quite easy to create, too!



CROWN
(including the branches, twigs, and foliage)

LIMBS

TRUNK

ROOTS

THE RIGHT SORT OF TREES...

There are so many options for putting trees on your wargaming table, it can be tough to decide where to begin. Cheap, durable, commercially available trees are an easy way to make large areas of woodland quickly and, with a little work, their appearance can be taken to a higher standard. Scratch-built trees can be easy and relatively cheap (although not as durable) and are a good way to add different species not typically found in commercial ranges. Feature trees can take a lot of time and effort but allow you to include highly detailed, specific species for historically-themed locations. They're good as individual elements on feature builds, but an entire table's worth would be an incredible effort. Take your time when planning out your tree and forest requirements, it will pay off in the long-run.

THE ANATOMY OF A TREE

So that we're clear on the terminology, let's quickly run through the different parts of a tree before we start construction:

Roots – These should be modelled to suit the base size, but if you need open space on a woodland piece, don't make them.

Trunk – The part of the tree that is at eye-level with models on the tabletop. To ensure they match the rest of your set, trunks need to be detailed and painted to the same standard.

Limbs – The large branches that extend outwards and upwards from the trunk.

Branches – Smaller extensions from the limbs.

Twigs – Small growths from branches.

Foliage – Leaves attached to stems on twigs.

Crown – The entire leafy top section of the tree, comprising foliage, twigs, and branches. In modelling, the branches and twigs are typically too small to really worry about, so they are replaced with a substructure and given foliage to look like a crown. For bushes and hedges, the crown is the only part to worry about.

The more you can see it, the more you need to detail it, if you know your branches are going to be covered by a crown, just paint them brown.





TO BASE, OR NOT TO BASE?

A big decision when it comes to placing trees on a wargaming table is whether to base them as forest pieces, or leave them as individuals. You need to consider factors such as ease of storage, game rules about defining woodland areas, and whether or not your miniatures are allowed to enter such forests. In essence, there are three general approaches to take - fixed woodland, partial woodland, or individual trees.

Fixed woodland bases are those that incorporate fixed trees and appropriate levels of smaller flora and ground cover (such as the jungle bases above). These bases represent impassable terrain on the tabletop and can look quite realistic, but can be difficult to store safely. If your ruleset of choice allows movement through forests, your fixed woodland bases can be created with less ground cover to make room for models, or even pathways through the trees.

Partial woodland bases are those with fixed ground cover or other terrain features, like rocky outcrops, or flat bases that are simply used to define a woodland area. With this approach, you can use pins, magnets, or small bases to attach trees to the woodland base, and the trees can be removed during gameplay to allow models to move through the woods. Whilst this approach makes for easier storage between games, the realism of the piece will take a bit of a hit.

Individually-based trees are great for setting a scene on a tabletop but, depending on the ruleset, they may play no actual role in the game. They can be clumped together to create the appearance of a wooded area, and can also be dropped into areas between woodland bases to give the impression of continuous woodland.

Start your collection with individuals. It's easier to attach trees to a larger base later, if you want to change your approach, than it is rip them off a base.



IMPROVING YOUR PLASTIC TREES

Even cheap plastic trees can be improved to a tabletop standard, as with this palm tree. Mold lines can be scraped or filed off (melting them away with a candle works well if they're a soft plastic). They can be painted to look more realistic with acrylic paints mixed with a little PVA (4:1 ratio), to make the paint more flexible and avoid it cracking and flaking off if and when the plastic gets bent. This is especially important for the basecoat. And little touches, like sticking on some bunched up coconut fibre around the base of the palm fronds with latex glue, will take your plastic trees to the next level.



CHANGING SEASONS

If you are building a tree set for games set in the real world, or a setting very similar to it, you should also consider the time of year. There are two main types of trees - deciduous and evergreen. Deciduous trees go through a cycle each year where they grow new leaves in spring, and shed them in autumn. Spring foliage is typically brighter and more yellow, darkening through the summer to deep greens (depending on the tree). Autumnal leaves will be reds, oranges, yellows, and even purples as the deciduous trees go through their shedding process. In winter, these trees are simply bare, skeletal structures.

The default season for most wargaming trees is summer, since historically, most warfare occurred during the summer months when the weather was good enough to move large armies around the countryside. So now we kind of expect to see summer foliage whenever trees appear on the wargaming table. Of course, this allows greater use for our trees and forests across games and with other pieces in our collections.

If you move away from the summer look, it should be a specific choice, because you will need to match all the other vegetation on your bases. Evergreens avoid this

requirement, sort of, unless you want a winter look. It almost goes without saying that if you make one snow piece, you just know the rest have to match. The same principle applies to spring and autumn settings, because each will have a specific ground scatter which needs to be replicated across the theme.

There are some famous historical actions that have taken place in the midst of winter, such as the Battle on Snowshoes, Napoleon's retreat from Russia, and the Battle of the Bulge in World War Two. If you are a wargamer who plays a number of different historical periods, you can get quite a bit of mileage out of a Winter-themed set of trees.

If your gaming is more sci-fi or even fantasy focused, you can really set out to create a signature look for your trees and bushes. Dying clump foliage blue or purple and gluing it to tree armatures sprayed silver or gold will certainly give your tabletop an otherworldly feel.

When starting your tree collection, go green. Once you have a good number of trees and/or forest bases sorted you can start to look at other specific seasons.



HEDGES

Hedges are simply bushes or shrubs that have been cultivated by people as an alternative to fencing. From small, ornamental hedges to the infamous bocage of Normandy (France), people have been making hedges for centuries.

In wargaming, (most often in historical, rural settings) hedges are typically used to divide the gaming table, and are good features to funnel troop movement, and restrict line of sight. When it comes to providing cover, however, they're not particularly good at stopping bullets.

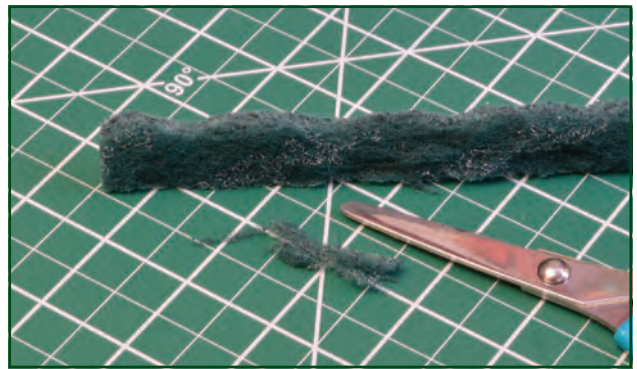
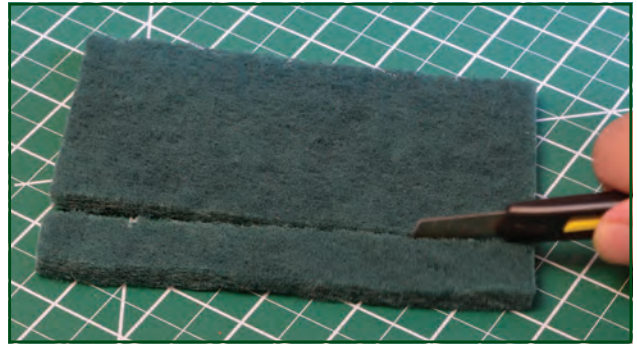
There are plenty of different substructures you can use to create your hedges, but some variation of a sponge or foam will always be your first "go to".

Scouring Pad

One of the easiest ways to create a hedge for your table starts with a scouring pad (fresh from the shop, of course). Choose the thickness of your scouring pad to suit the scale you plan to use it with. Ours is about 4-5mm thick, and so would work best for smaller scales like 10-15mm.

The first step is to trim the pad to the right size with a knife. Ours is approximately shoulder-height for a 15mm soldier. Then, attack the edges and corners with a pair of scissors to create some irregularities. Finally, spray the dark green pad with a lighter, desaturated green to accentuate the existing texture.

For very little effort (or money), you can make a great set of hedges for 15mm wargaming. They're very durable, although not really very realistic.



Sponge

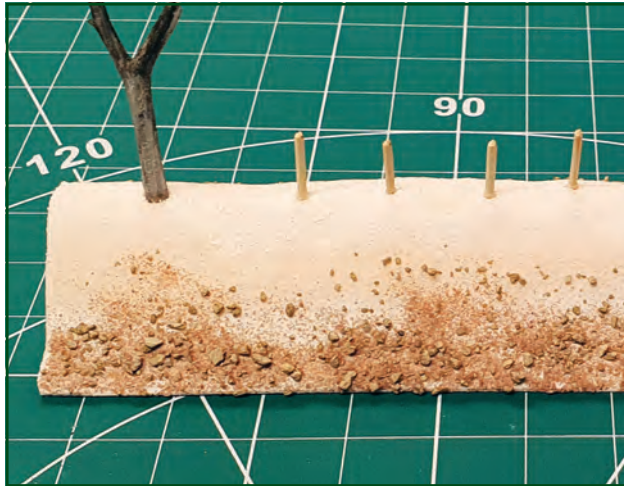
For a hedge that's a little more substantial, you can use a kitchen sponge. These can be used for regular garden hedges all the way up to hedge mazes, while topiary gardens can be carved from chunks of upholstery foam.

In much the same way as for the scouring pads, use a hobby knife to cut the sponge to the desired height and then cut into it with a pair of scissors to make it less regular in shape. If you can only get relatively short sponges, you can always "pin" two pieces together with BBQ skewers and hot glue, which was the approach taken with the hedge shown here.

Once the hedge is ready for paint, start by spraying it brown, and then spray it with a lighter, desaturated green. Finally, coat it with your spray adhesive of choice and sprinkle with flock. Finish it off with some hairspray to hold all the flock in place.

The end result for this one is certainly more realistic than the scourer hedge, but not quite as durable. Over time you might need to add some more flock to cover the inevitable bald patches.





BOCAGE (AND BUSHES)

As a broad definition, *bocage* terrain is a mixture of pastures and woodland borders found across Western Europe. In wargaming, it has a special significance because of its widespread use as field borders in the Normandy region of France, which hindered the Allied advance after the D-Day landings in 1944.

Although originally these boundaries were rock walls, over time, earth and stones from the fields built up around the edges. This raised the height of the walls and allowed trees and bushes to take root. The original walls were built along the edges of winding country lanes, and this growth of bushes and trees together with the increased height of the embankments, makes the lanes seem sunken.

On the tabletop, bocage is a modular feature and so needs to be well planned. This planning includes turns, corners, breaks in the bocage, gates and so on. The ends of each modular piece need to line up, but anything in between is fair game. An important thing to consider is the functionality of your bocage. Pieces need to be high enough to block tanks from firing over them, but they can include model placement ledges for elevated firing positions. They should also be made narrow enough that the width of the base doesn't negatively impact gameplay.

The rock wall/earthen embankment element of bocage needs a good substructure. XPS foam works well, as it can be easily shaped with a knife and sandpaper, is sturdy, and

helps to prevent warping on MDF or similar bases. It also provides a solid base for the bushes and trees mounted on it.

Although the bushes that grow on top of the embankment are usually referred to as hedgerows, they don't really see much cultivation or trimming, being left to grow wild. The easiest way to create the bushes is to use the substructure methods you'll see later in this section when building crowns for trees.

It's easy to put a simple hedge on a simple hill, but when you are tackling bocage you should treat it as a feature (and a big one at that). If you're going to do it, you might as well do it well; you're not going to be making a new version anytime soon.

For this piece of bocage, an EPVC base was cut to the desired size, then XPS foam was cut and fixed to the base with PVA glue. Once dry, the foam was rough-shaped with a knife and then sanded smooth with a sanding block before being coated and blended with filler. Mixed aggregates were used to give texture, with the larger pieces placed along the lower edges, where larger stones would typically tumble. Cocktail sticks were pushed into the foam along the top, to help secure the bushes, and a twig was added as an old tree trunk for a bit of variety.

The embankment was painted with a desaturated, dark, warm brown basecoat, before being flocked with three tones to reinforce the slopes. The flock was sprinkled lightly





on the tops of the banks to reveal the earth beneath, and heavily on bottom edges to blend with table.

The bushes have either lichen or coconut fibre as their substructures. This represents the natural variety you would find in real bocage. Some are very dense and would block Line of Sight (LOS) whilst other are more sparse and might not block LOS.

The lichen and coconut fibre bundles were sprayed first with a dark brown and then, when dry, with hairspray. While the hairspray was still tacky, the

lichen clumps were sprinkled with a dark green flock and then highlighted with an autumn flock mix. The coconut fibre bundles were sprinkled with a mid-green flock and highlighted with a yellow spring flock mix. Once the flocks were affixed to the substructures, they were given another quick burst of the hairspray to keep them in place. The final step was to attach the bushes to the cocktail sticks with hot glue.

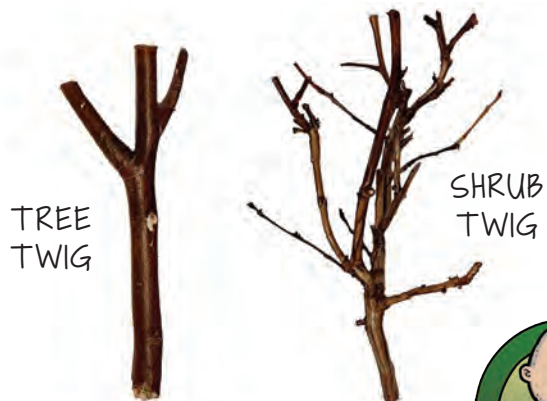
Adding cocktail sticks to your foam embankment not only helps keep your bushes from falling off but it also helps protect them from being squashed flat during gameplay and storage.



TREE TWIGS VS SHRUB TWIGS

Real twigs taken from real trees make great “trunks” for dense crowns or bushes – the amount of foliage will hide the lack of limbs and branches. Tree twigs can also be extended by wrapping around them with wires to create more limbs or branches, while pre-twisted wire branches can be glued into holes drilled in the twig.

Twigs taken from shrubs have a lot more “limbs and branches” than tree twigs and so can be used for more open canopy trees.



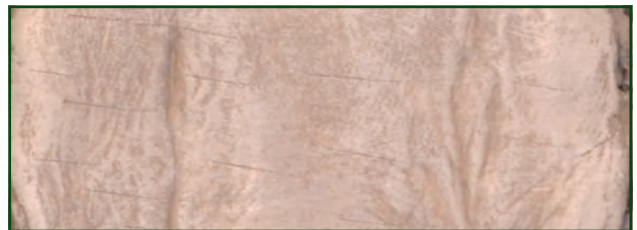
PAINTING BARK

Although there are thousands of species of trees around the globe, many of them have very similar looking bark, and so there's a fairly "standard" group of colours you can use when painting. Based on our kindergarten art education, we might think that all trees have dark- and mid-brown bark, but when we look at the most common trees around the world, most of them are actually predominantly grey.

For most of your generic wargaming trees, start with a base of a mid-brown (or dark brown if they're growing in a very damp area) and drybrush them with a mid- to light grey. Of course, trees from alien worlds and fantastic settings need not follow this "rule".

Specific Trees

If you are keen to make your trees as realistic as possible, the Internet is a great resource for finding the more common types of trees from various places around the world, like the Sweetgum (right). We've chosen six of the ones you're likely to find on most European or North American battlefields, with their colour schemes painted on surfaces sculpted from DAS modelling putty, but most of your trees will be smooth.



European Oak

Start with a mid-brown basecoat, then overbrush with a mid-brown/light grey mix. Drybrush with lighter mix (with more light grey). Then run a subtle, desaturated green wash over it all. Suits bark with vertical striations.

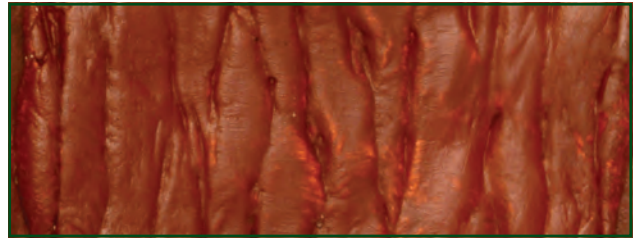
Silver Birch

Use a mid-grey with a tiny touch of desaturated green as a base, then overbrush with a light grey. Overbrush with white and then, with a very fine brush, add horizontal striations and vertical splits with a thinned, dark brown.



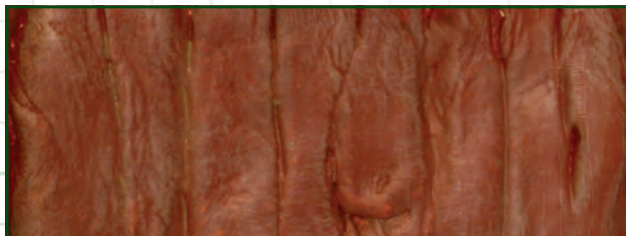
English Beech

Start with a base of light grey with a touch of warm brown, followed by a subtle wash of desaturated green. Finally add a very gentle drybrush of light grey to break up the surface. Suits smooth bark.



Pine

Start with a warm mid-brown as a base, then drybrush with a mid-brown/mid-grey mix. Finally, stipple with a light, desaturated green.



Red Maple

Start with a warm, dark brown base, and overbrush with a mid-brown/light grey mix. Finally, wash or stipple with a desaturated green to taste.



Sweetgum

Start with a base of mid-grey with a touch of warm brown and light green. Wash with a desaturated green, and then overbrush with a mid-grey.

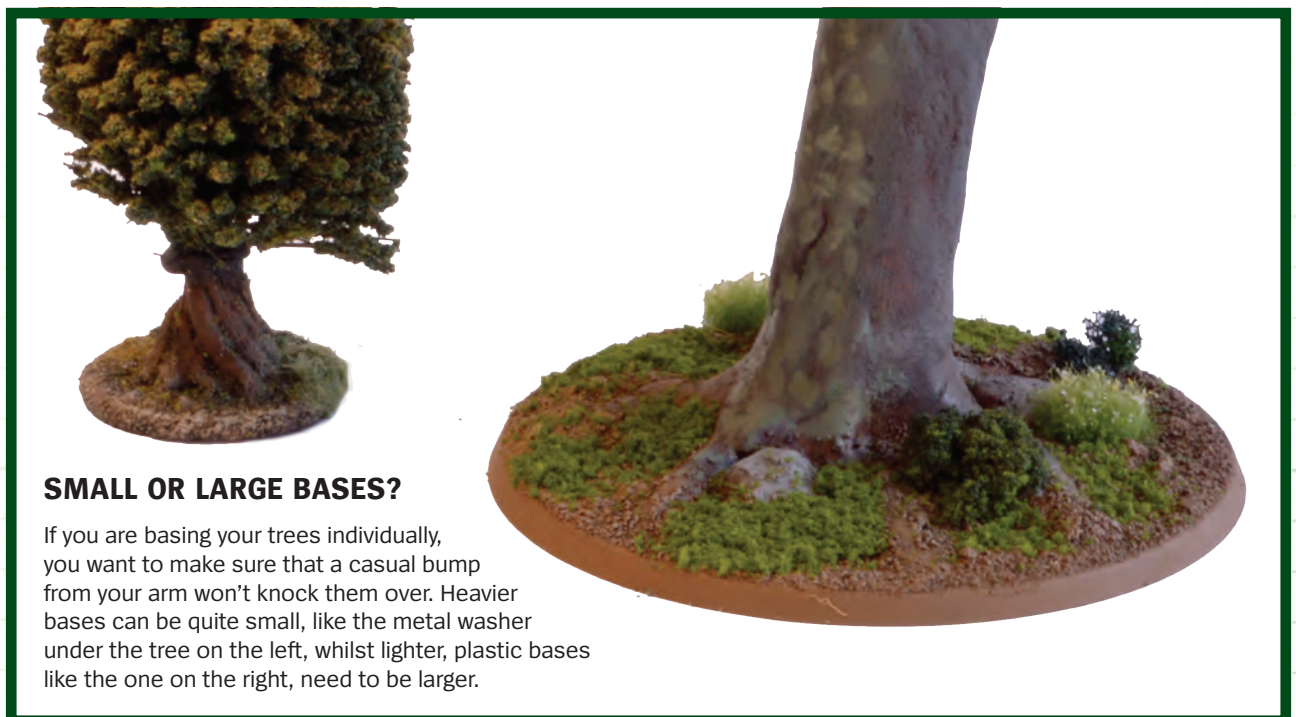
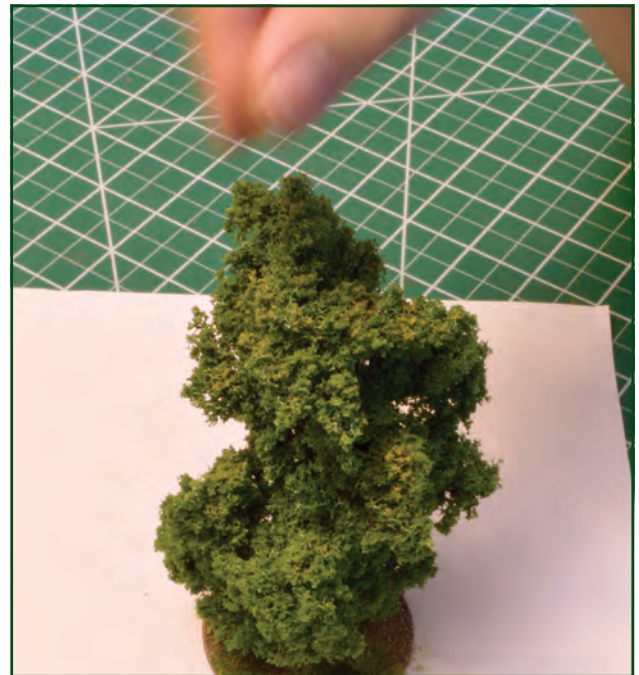


SPRUCING UP HOBBY TREES

As mentioned earlier, trees can be a bit of a pain to make yourself. However, there are quite a few ready-made trees available from different manufacturers, and we typically refer to them as “hobby trees”. Some of them are incredibly durable but lack realism, like the tree above. Others are more realistic, but aren’t quite as durable, like the one to the right. Regardless of which type you choose, they can start to look similar when you have a lot of them in your collection.

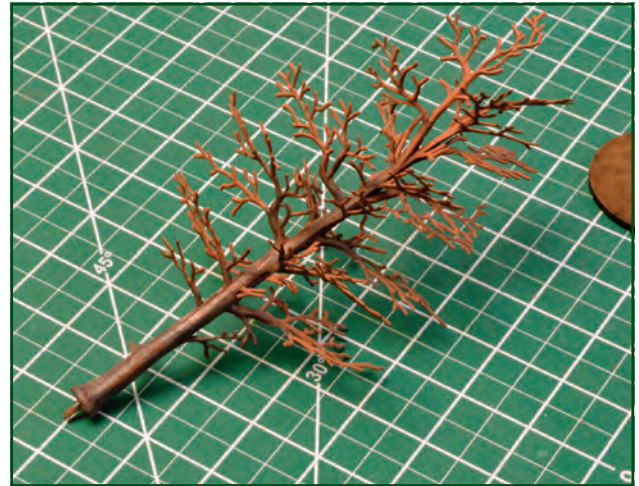
Fortunately, there are some simple things you can do to spruce them up (no pun intended) and make them your own. The foliage on most hobby trees is pretty consistent, so adding a bit of variety can help. Start by darkening the underside of the foliage with a quick spray of a darker green spray paint (or your airbrush). Then you can hit the top side with some spray adhesive and sprinkle on some lighter coloured flock to represent sunleaves. Finally, a quick drybrush of a grey on the trunk can give a great bark finish.

Leaves found at the top of trees typically are a lighter green because they contain a different sort of chlorophyll that processes direct sunlight better, hence the term sunleaves!



SMALL OR LARGE BASES?

If you are basing your trees individually, you want to make sure that a casual bump from your arm won’t knock them over. Heavier bases can be quite small, like the metal washer under the tree on the left, whilst lighter, plastic bases like the one on the right, need to be larger.



BUILDING TREES FROM KITS

Railway modelers have long known the joy of tree kits, another type of “hobby tree”. These tree kits typically include a number of pre-made tree trunks with plastic-coated wire branches and a bag or two of clump foliage.

The first step with these trees is to bend the wire branches into shapes you are more likely to see in nature. Next, paint the tree trunk and branches. Those shown here were sprayed with a mid-brown, and then washed with a dark brown before a light drybrush with a mid-grey.

The branches were then coated in Hob-E-Tac, a very sticky latex glue that stays tacky for a long time. Once it has (mostly) turned clear, you can stick on the clump foliage of your choice. Here, the darker foliage was stuck to the underside of the branches, while the lighter was stuck to the top. Finally, the tree was attached to a base.

Tree kits are definitely faster than making your own wire trees and can give you the confidence to move on to your own feature trees.



BUILDING WIRE TREES

When it comes to building your own trees, the material that gives you the most freedom, durability, and realism is twisted wire. Wire can be readily found in a lot of different products, and what you can create with it is limited only by its size and thickness (or gauge).

Twist Ties

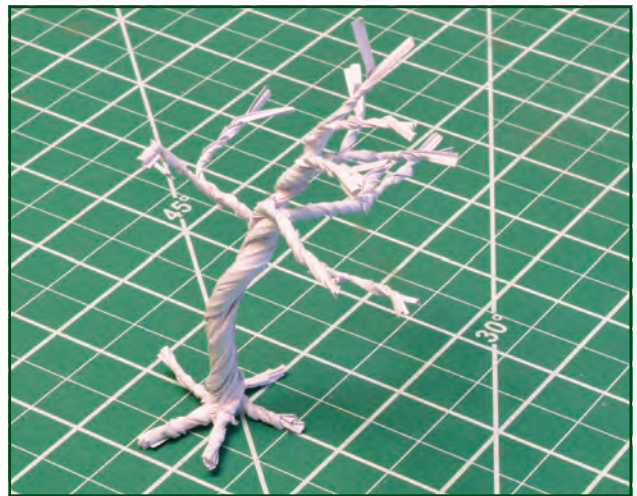
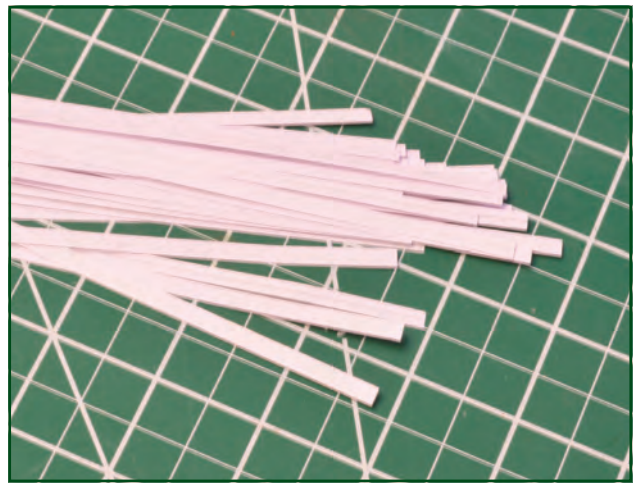
Paper-coated twist ties, used for sealing plastic bags, are incredibly inexpensive and easy to work with. Packs of these ties can usually be found at your local supermarket or purchased in bulk online.

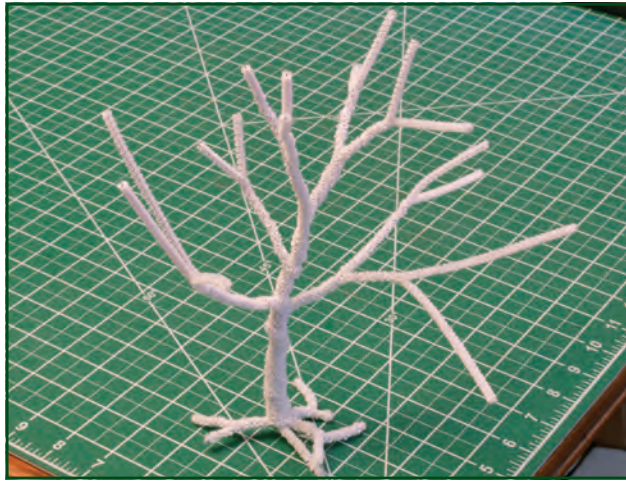
Start by grabbing a handful, maybe 20 or so, and begin twisting about 20% of the way up the bundle. Pull out a few bunches and twist them together to create some roots. Keep twisting the ties and as you work your way up the trunk you can start to separate out groups that you can then twist into branches.

Once you have twisted your final structure, you can strengthen it by painting with slightly thinned wood glue. Then attach the twisted tree to a base and texture the base.

Paint up your tree trunk, branches, and base to fit your collection and then hot glue a clump of lichen to the branches as a substructure for your crown. Finally, you can hit the lichen with a coat of spray adhesive and sprinkle your flock of choice over it. Finish with some hairspray to increase the hold.

Twist ties are great for quick trees but they are limited in their height and will be best for more wind-swept trees or for smaller scales.





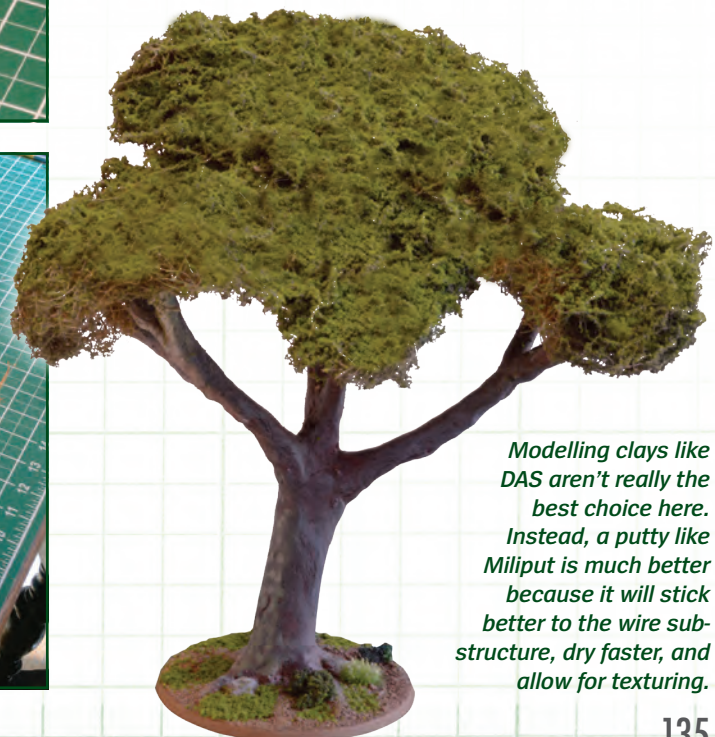
Pipe Cleaners

Found in craft stores, pipe cleaners are longer than twist ties, so can be used for taller and larger trees. Their only real downfall is that their surface isn't great for attaching anything to, so you'll need to mitigate that.

As with all wire trees, you start by grabbing a handful of pipe cleaners and start twisting. Starting at the base of the tree is always best, as it gives you a solid place to twist your roots from. As you work your way up the trunk, separate groups of the strands and twist them into branches until you are happy with the size and shape of your tree.

The easiest way to create a surface that DAS or Miliput will stick to, is to cover the tree in aluminium foil. The texture created will help the clay (or putty) adhere more easily, and it will add stability to the sometimes flimsy wire. The tree here was glued to a base before coating with DAS air-drying clay.

Once the tree was painted, a coconut fibre substructure was attached to the ends of the branches with Hob-E-Tac. It was then sprayed with browns and greens, before being hit with spray adhesive, sprinkled liberally with various shades of flock, and finished off with hairspray for extra hold. Finally, the rogue strands of coconut fibre were trimmed off to give a more natural appearance.



Modelling clays like DAS aren't really the best choice here. Instead, a putty like Miliput is much better because it will stick better to the wire substructure, dry faster, and allow for texturing.



CREATING FEATURE TREES

Often used to represent a specific type of tree that can't be purchased (or is too costly), feature trees can be relatively inexpensive to build and give you exactly the tree you are looking for. A good way to include these more labour-intensive, highly detailed trees is to add them to a feature build made for a generic tabletop. Due to the time it takes to make each one and their typical lack of durability, it is very rare to see feature trees used across an entire gaming table, although it does look amazing when they are!

Feature trees don't just allow you to make larger trees, they also provide the opportunity to build a realistic structure, from a stand of tall, thin, birch trees, for example, to a majestic, wide-spreading oak.

When building your feature trees, take a moment to consider where you'll be storing them. The fragile nature of these trees (wire trees can be bent, shrub bases snapped, and seafoam twigs destroyed when squashed) means you'll need to give some thought to protecting all that hard work.

Building the Substructure

Our feature tree isn't going to be any particular species, but something generic to demonstrate the primary techniques. The trunk, limbs, and branches are all constructed using floral wire stems - straight lengths of wire available in various gauges. Bundling and twisting these wires can very easily give you realistic shapes.

Unlike when using twist ties and pipe cleaners, the trunk needs too many wires for them to be all easily twisted together. Instead, use masking tape to tape smaller bundles of wire together, and then twist the wires together at one end to create the root structure. Bring all the bundles together and, above the tape, select one wire to wrap tightly around them all. Once they are secured at the bottom, pull out another random wire or two and wrap those in a spiral up the trunk to the point at which your first limb will jut out. This will add some good stability. At this point, start to bend the taped sections of the root structure away from each other, creating the flared look that mimics the base of a real tree.

It's always a good idea to sketch out the size and shape of the substructure and crown of your tree on a sheet of paper. As you are bundling, wrapping, and twisting you can keep a close eye on where everything should be.



Your first limb should be fairly thick, so pull aside five or six wires, and one more to wrap tightly around the lower limb to secure its position. Much like the trunk, don't twist the wires for the limbs, but rather wrap a single wire around the others to keep them together. As you work your way up the trunk, the limbs will get thinner, so be sure to take smaller bundles of wires and twist in fewer branches. As you create your branches, have the wires twisted together in opposite directions. This will make for tight twists without significant gaps between the wires. Note that, at most wargaming scales, branches are the smallest element you'll be twisting. Twigs are just not possible at these scales.

Once the limbs are wrapped, branches twisted, and everything trimmed to the right lengths, you'll notice they're all quite straight, with regular angles that aren't really representative of nature. So take some time to kink the branches into a more organic appearance.

Adding the Bark

There are three options to choose from to add bark to your feature trees, and the first step for all of them is to wrap the wires in tin foil. Work around the trunk, applying the foil in thin sheets and filling any gaps with it. If you have trouble with the foil peeling up, simply brush some PVA between the layers and give it time to dry.

With the foil applied, the three options are 1) stippling on a stucco/fine aggregate mix, 2) applying a modelling clay such as DAS, and 3) (my definite preference) using a two-part putty like Milliput. I like Milliput because it is easy to apply and texture, and it's more durable than the other two options. This was used here for this feature tree.

Begin by applying the Milliput in small blobs to the roots, limbs, and branches. The aim is not to create a thick sleeve around the limbs, but rather to fill in the gaps and smooth out the twisted texture of the wires. For the trunk, start with longer sausages of putty and, with water on your fingers, smooth it all out and blend in the places where the limbs meet the trunk.

If you look at some real trees, you'll notice the texture of their trunks doesn't really match the texture on their limbs and branches (unless they're all smooth), so if you are



Mel's Rule No. 17 - Four knuckles between base and branch makes it easier to reach inside woods.



sculpting striations into the bark of the tree, keep them confined to the trunk and the thicker parts of any root structure. Use a sculpting tool to scratch in lots of short, thin lines. As you are scratching these lines you'll see little balls of putty forming. While it's tempting to get rid of them during the sculpting process, this usually means you'll end up smoothing out areas you have already textured. Leave them to dry and simply brush them off before painting.

If you want to take things that extra step, and the species of tree you are building has a particularly textured bark, you can stipple a fine texture gloop onto the putty once it has dried. Remember the scale you are working at, though. This might be better dealt with using a painting technique.

The most important thing to remember is that this isn't just a hobby, it's your hobby, so the level of detail you choose to pursue is up to you.



Painting the Armature

When painting the trunk and limbs, you can follow any of the earlier guides. The guide used here was for European oak trees. You only need to paint highlights on the trunk, roots, and limbs - the branches will typically be obscured by the crown.

Creating the Crown

Coconut fibre was used as the substructure of the crown. This is a great material because it can be used both for airy, open crowns, as well as for closed, dense crowns. The only difference is the amount used. It is readily available from most home & garden centres (where it's sold as lining for hanging-plant baskets). Here, the fibre was first sprayed brown and, when dry, attached to the branches.

To attach the crown, one option is to use latex glue, like Hob-E-Tac, and brush it on to all of the contact points before applying the crown. Alternatively, you could use either hot glue from a small glue gun with a precision nozzle, or gel super glue. For these latter two options it's a matter of "glue as you go" so that you can carefully attach the crown one point at a time, rather than have hot glue cooling or super glue curing on points you haven't reached yet. For this example, latex glue was used because it made it possible to reposition the crown as needed.

It's important to consider how much time and effort you invested in creating the limb/branch structure. With a lovingly produced, highly detailed structure, use a fairly open crown, so that you can see the branches. If your branches are very basic or the structure somewhat chunky, go with a more dense crown that will hide those things.





Your seasonal choice will affect both the density of the crown and the detail of your branches. Summer trees have dense crowns, while spring and autumn trees have more open crowns, requiring more detailed branches. Winter trees should be made with thin gauge wire so that you can get a very detailed branch structure. Don't forget to give your winter trees a wet, droopy feel.

The detailed limb and branch structure of the example here was great for a spring look – an open crown with light foliage. The crown was sprayed with hairspray, then a desaturated, mid-green flock was sprinkled from above, after which it was hit with another coat of hairspray. A light green flock was sprinkled over the upper surfaces and it was finished off with a sealing coat of hairspray. Finally, any stray fibres were trimmed off.

If you are building a group of trees, take care when applying your sun leaves. You shouldn't find any sun leaves in the shadows.

SEE THE FOREST FOR THE TREES

As you can now see, you have a lot of options for decorating your battlefields with hedges, bushes, and trees, each with their own strengths and weaknesses. When planning out your taller greenery, you should definitely refer to the Terrain Design Triad as you strive for the right balance between Functionality, Durability, and Realism. In most cases, it should be easy to create trees and forest pieces that will be functional for your gaming, and the bulk of your decisions will place your final choices somewhere between very durable or very realistic. Whichever path you choose, you'll be able to create a wooded wonderland!



GETTING WET

PUDDLES, PONDS, POOLS, & RIVERS



Many Terrainiacs find the idea of creating water features intimidating; some avoid them completely. Working with water effects materials can seem scarily complicated but, just between us, water features are actually some of the simplest things to create.

A stylised feature could be a simple flocked base with a little water in the middle. More realistic water features can be produced with just a few tweaks to the same procedures. Whether we're talking mud, marshes, rivers, or reservoirs, the key lies in understanding how water reacts with the landscape. To learn these techniques, start with something small – make a few puddles before you go for a whole lake!



MUD AND PUDDLES

Muddy ground has been the bane of soldiers since the beginning of time. And modellers have struggled with it almost as long. The basic problem is that when you add a lot of water to earth over an uneven area, and then move lots of things across it – troops, cavalry, tanks, whatever – you end up with a multitude of ground types. This means the one-shot, stylised approach rarely looks convincing. Instead, a number of techniques must be combined to create a realistic appearance.

In wargaming, pretty much all muddy ground affects troop movement. Gameplay often requires these areas to have defined borders, to minimize disputes about whether a model is, or is not, in an area of mud. This isn't a problem with a dedicated, muddy ground scatter piece, but on a larger piece, such as a tile or board, it's worth switching the colour tones of the mud, or edging it with a different flock or tuft, to clearly delineate the muddy area.

Good Mud

Damp, dark earth is covered in the Groundwork section, but mud is a step-up in the water stakes. Its texture varies; long-sitting, heavily-saturated mud may look sloppy, whilst drier, freshly-churned mud may look like a rocky landscape. Both effects can be created by filler, using different techniques, depending on the desired result.

For sloppy, settled mud, brush on small patches of filler, drying them a little with a hairdryer as you do. Build up the effect over a few applications, before applying a final, thin layer of heavily watered-down filler to blend the separate blobs together.

For churned-up mud, scrape the dried-up bits from the edges of the filler tub, or spread out a thin layer of filler

to dry in advance, and then break it up into bits of a more desirable size, much like coarse aggregates. Adding these dried bits to slightly thinned filler at a ratio of 1:1 will produce a pretty realistic result. You can add more bits for a more churned look, along with a small amount of aggregates for realism. This mix can then be applied to the area with a spatula and cleaned up with a damp, flat-head brush before it sets.

By combining both these techniques, a very realistic effect can be achieved.

Footprints, hoofmarks, wheel and tank track marks can all be imprinted in your mud. For footprints, use feet cut from a model. A plastic tube with a bit trimmed off works well for hooves. Model wheels, tracks and even entire vehicles can be pressed into the filler, but timing is key. For your imprint to stick, the filler needs to be damp but not wet, typically when the surface of the filler stops being reflective. Make the impressions and then give a quick blast from a hairdryer to set them. If you make a mistake, it's easier to skim over it later than to try to fix it on the fly. If you just want quick and easy track marks, the end of a wet brush handle, dragged across the filler multiple times, works very well.

Finally, note that the more water-logged the ground is, or the more freshly it's been churned up, the lighter it looks, because water is more reflective than earth. The more watery you want your mud, the more white, cream, or ochre you need to add to the base colour at the painting stage. A dried, churned mud effect can be achieved by overbrushing and drybrushing with lighter versions of the base colour, whilst for a wet effect, layer on a glossy or satin Mod Podge or acrylic varnish to the desired level of saturation. This works especially well if gloss and satin are combined.

Puddle Lane!

Creating muddy ground is all well and good, but where there's wet mud, there are usually puddles to splash in, some small, some big. How these are replicated on pieces and boards depends on the size of the puddle, but don't forget scale. A few, small puddles often look more realistic than a single, large one, however finely-crafted. The appearance of a puddle also depends on how recently it's been created or disturbed, and factoring this into a build is an easy way to increase the realism of a piece.

Small puddles rarely require any special work until after the painting stage. They can be created by adding little patches of a gloss varnish, Mod Podge, or a liquid, acrylic, still water effect. Small applications may leave blobs which stand proud of the surface, but they can be blended into the surrounding ground with a damp brush after they have all been applied. Note, that all acrylic effects lose volume as they dry. Whilst small puddles don't require much prep work, it's best to place them in natural depressions or low patches on the groundwork for a more realistic result.

It's always helpful to have an unbased model to hand when laying down small puddles, so that you can check your scaling. Remember to start small; it's a lot easier to make your puddles bigger than to fill them back in!

For larger puddles that need a deeper appearance, work must begin at the groundwork stage, planning out the puddles and creating the depressions needed. These depressions don't need to be too deep - 2mm is enough for

most wargaming scales - but for them to look realistic, it's important to create them in low-lying areas, as you would find in nature. Depressions can be abraded out of foam and base materials with coarse sandpaper, wire brushes and hand rasps, and any mistakes can be easily fixed with a bit of filler. If it's not possible to create a depression this way, a layer of filler can be applied broadly across the area and then, while it's setting, press a wet fingertip into it and give it a little wiggle for a great effect. Alternatively, putties can be used to create rims to form the edges of a puddle. Blend the rims into the base and place a few larger aggregates around the area to disguise the rise of the rim above the average ground level.

For the water itself, varnishes and glues don't have the layer depth to fill a depression without multiple applications or very long drying times. Acrylic water effects and resins are much better suited to the task. If you use a syringe, you'll find it easier to avoid overfilling the depression. Any blobbing caused by the liquid's surface tension can be blended into the surrounding area by dragging at its edges with a damp brush.

With resins, you get what you see, but acrylics (and glues) shrink as they dry, so it's best to start with a little more of the water-based products than you want to end up with, so you get the result you want when it dries. Blobbing is ok in this situation!



The Colour of Water

The colour of the puddle water depends on whether the puddle has just been formed, say by rainwater runoff, creating a small type of wash out, or whether it has been sitting for a while, and whether or not it has been recently disturbed.

Washout puddles need a heavier tint of an acrylic paint. Avoid inks, since fresh puddles tend to be more opaque than translucent. This also applies to puddles in heavy rainfall settings (for theming purposes) such as monsoon season in Burma (Myanmar).

For still or standing water, darken the colour of the base at the painting stage and slightly tint the water with the same colour, or a brown ink, to create a dark, translucent puddle.

Recently disturbed puddles, especially in very muddy areas, look completely opaque, and this requires a much heavier tint of a lighter shade of the base colour - much like when painting churned mud.

To create little patches of disturbed water in a big puddle, dip the tip of a cocktail stick in your base colour paint, stick it into your tinted pour and give it a wiggle in the areas you want to look disturbed.



With the muddy groundwork done and your puddles poured, it's time to tackle the area of transition between the two.

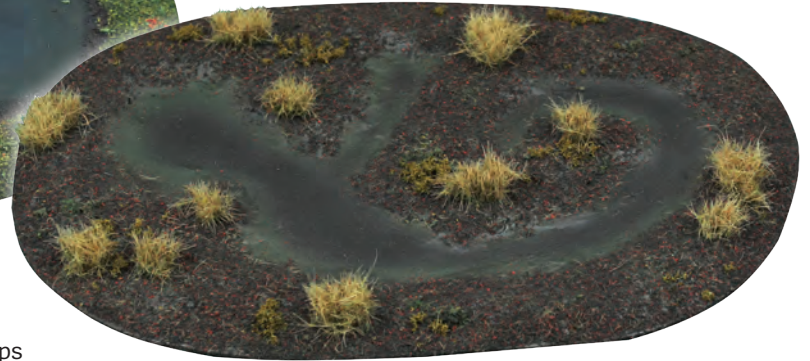
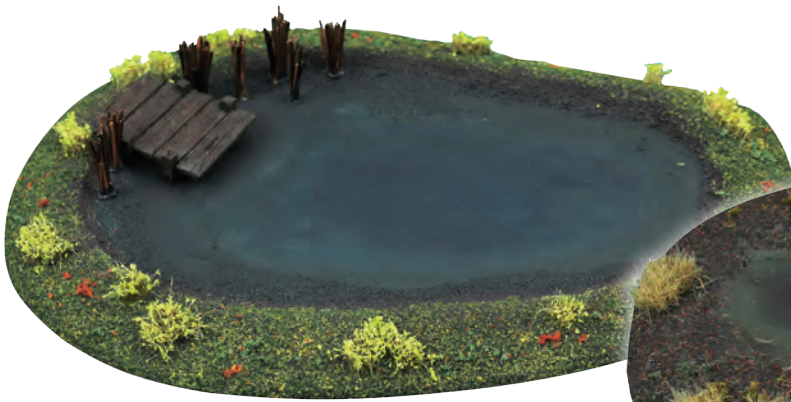
Due to scale, these techniques are only really needed for larger puddles and pools of water, but they can really increase the realism of a piece.

In nature, puddles are typically surrounded by saturated earth which has a darker, wetter-looking appearance than the drier ground further away, much like sand on a beach the closer you get to the sea. To achieve this effect, once the puddles have dried, apply a thin, dark brown, acrylic wash around the edges. The outer edge of the wash can be blended with a fine, damp brush. When the wash is dry, clean away any smudges on the puddle surfaces with a damp cloth or cotton bud, leaving it clear and reflective again. One of the benefits of the 'wash and wipe' technique is that it's great for hiding pour overspills, as well as any questionable feathering of blobs from the pour stage. This technique can also be applied more broadly when creating blasted landscapes (such as mud-filled trenches). Apply the water effects liberally to the ground, before brushing the wash broadly over the area, cleaning up the pools afterwards, and adding more wash to selected raised areas to help increase the saturated earth look.

The techniques to create realistic puddles are quite simple, provided thought is given both to tying them into the landscape around them, and to the theme setting of the piece. Keeping these factors in mind from the beginning can really help you create a realistic piece.

With mud and puddles covered, it's time to up the size stakes and look at big puddles - ponds, marshes, and pools!





STILL WATER STUFF

Reservoirs, ponds, pools, bogs, marshes, and swamps are often thought of as challenging features to create but actually, they are just larger puddles. The same principles apply, there's just a greater volume to be poured. What matters most is the profile (depth) and colour of the area being filled.

Both ponds and pools can be natural or man-made. The difference is that pools contain still water, whereas ponds – like marshes – have very slow, running water. In fact, for terrain-making purposes, marshes are just ponds containing bits of ground. They may look very different on the tabletop, but all of these water features are made using the same materials and techniques. If you can build a pond, you can build a pool, marsh, bog, or reservoir. Gameplay-wise, they all serve as impassable or difficult terrain, but they generally don't block line of sight. So the base design needs extra consideration at the planning stage, particularly if the ruleset allows for movement through water.

Are models going to be placed on your pond? Check the rules to see if they allow for movement through water, and make sure your water effects are durable enough for gameplay. There's nothing worse than having a heavy model leave an imprint in your ripples!

Keeping a Low Profile

The challenge for all these water pieces is to avoid making them look like small hillocks on the tabletop. Just as puddles require a base and a rim, so do larger areas of still water, but giving both elements as low a profile as possible is the key to creating water pieces that enhance, rather than spoil the look of a tabletop.

Still water pieces rarely have any substantial features on them. They are essentially bases covered with water effects, so there's no need for especially sturdy bases. 3mm MDF, EPVC foamboard, and even 1mm plasticard can all be used to help keep the overall profile as low as possible. Such bases may be flimsy, but sturdiness will come from adding the beveled rim for the water effects around the entirety of the base's edge. Whilst a very low-profile piece can be created by cutting into and abrading a base, it's often quicker and easier to build a rim or bank around the edge of the piece.

Rims can be created with a variety of materials – clay, putties, filler, balsa, basing materials, bulking gloops, to name a few. Whatever you use, remember that the rim only needs to be a maximum of 2-3mm high to hold water effects. Avoid the temptation to build up a large bank, and focus on keeping the overall profile of the piece as low as possible. Try to keep the edges of the rims at least 25mm

away from the base's edge so they can be given a gentle bevel and blended into the base, helping to avoid the "hillock effect".

Once you've built your pieces, it's time to consider paint and flocking schemes - the water-pour stage comes after all of that.

The primary area to consider is the area the water will be poured into - the "water base". The groundwork around it will no doubt be painted to match the other pieces in your set. Don't forget that any darkening of the surrounding ground (as with puddles) needs to be done before any flock or foliage is added, whether that's around the pool, or in the pool itself.

In choosing colours for the water base, consider first how translucent the water effects will be. Opaque water effects only require a base with a simple layer of a slightly darker version of the tint colour being used, to create the illusion of depth. For more translucent water effects, the colours of the water base become more important; not only can they be used to convey depth, but also, they need to work with any tinting of the water effects themselves, to produce an overall realistic look. For most ponds, use a blue or green base (often mixed for a more realistic effect). Depth can be conveyed by painting darker tones towards the center. Paint progressively darker colours in successively smaller areas, blending and feathering their edges as they are laid down, to increase the illusion of gradual depth. This blending and feathering works well with a blue-green mix. Use green around the edges of the water, where vegetation would be heavier, and gradually work towards dark blue for the clearer, deeper, middle of the water feature.

After painting comes the flocking stage. Think about flocking the water base itself, as well as the areas around the pond. Adding a coarse mix of green flock along with shredded lichen, small roots and even aggregates around the inside edge of a water base, can suggest shallow areas of high vegetation when using translucent water effects. This can greatly enhance the look of the piece and helps cover up any mistakes from the previous painting and pouring stages!

Now you can seal the piece as you usually would.

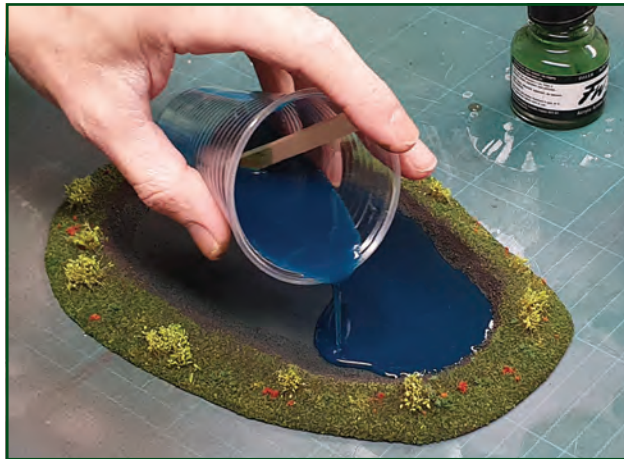
You can also add scenic elements such as reeds. These are easy to do. Just clip some bits off the bristles of a yard brush, group them together and then fix them down to wax paper with hot glue. Once dry, clean up the hot glue bases and glue to them to the water base around the rim edges.



Pouring Acrylic Water

With the piece flocked and sealed, it's time to pour the water effects. There are many ways of producing the appearance of water in the modeling world, but in general, the materials fall into two broad categories: acrylics/air-drying, or resins/epoxies. Each type has its own benefits and pitfalls.

Acrylic water effects are used most often the first time a Terrainiac attempts a water piece, mainly due to their straightforward "pour them in and let them dry" characteristics. These water effects are essentially a clear, acrylic binder, and so can be mixed with acrylic pigments, paints, and inks to produce a variety of appearances and transparencies of the water. The downside is that they are air-drying, which means they need to be poured in thin layers (commonly no more than 3-5mm thick) and they can require multiple pours to build up any depth beyond the norm for terrain making. Their air-drying nature also means they can lose volume as they dry. This can lead to cracking, especially when the rim of the piece has gentle slopes, as is typically found with marshes.



The main challenge when applying acrylic water effects (beyond leakage and overspill) is managing the bubbles. Acrylic water effects often tell you to "shake well before use", but it's better to give a good stir instead, since shaking will introduce a lot of bubbles. Pour the stuff into a cup first, and don't squirt it through the bottle nozzle. Whilst pouring doesn't create bubbles, squirting does. Never squeeze the last bit out through a nozzle either, as you'll be adding a stream of bubbles that will have to be dealt with later.



For the pouring itself, start around the edges. Pour slowly, about 10mm away from the rim edge, letting it build up until it naturally flows to meet the rim edge. Continue this process around the rim edge, stopping at any tricky bits to use a cocktail stick to drag the water effects into difficult to reach corners. You should both start and stop a pour in the middle of your pour area, to avoid rogue drips. Make sure the pour cup has stopped dripping before you pass it across the edge of the piece. Once all the edges are done and the water effects have met the entire rim, pour directly into the centre and continue until it connects with the water effects around the edges, using a cocktail stick to drag it into any uncovered areas. After the entire water base has been covered, more water effects can be poured into the centre to raise the overall water level evenly. Wait 5 minutes after the final pour and deal with any bubbles that rise to the surface by dragging them to the side with a fine, flat-headed brush, and popping them against a bank, or stippling gently and directly to disperse them. Any residue or overspills can be cleaned away with a wet brush.



Once the pour is done, you could certainly leave it there, or you could take it a step further by adding flock, foliage and flotsam as the pour dries, at various stages depending on how submerged they need to be.

Finally, the piece should be left somewhere warm for 24 hours, on a level surface and covered with something to protect it from dust; a clean, clear, plastic drawer or storage box is perfect.

Don't use heaters or lamps to speed up drying, as they may cause hot spots which increase cracking and warping. Let the piece dry gradually and evenly. Don't try to shortcut it!



Tinting the Water

The water for the pool or pond can be tinted in the same way as for puddles. Various colours may be appropriate, as described earlier, but combining a tinted and translucent layer can improve the look of a water feature, if it's done correctly. The light that forms the image of the pond in your eye started at a light source, passed through the water (a translucent filter), bounced off the base colours and passed back through the tinted filter on its way to your eye. So, when adding a tinted water effect, use the same colours you used on the water base, ensuring there are no major colour changes, just an overall darkening. Alternatively, complementary colours can be used, like a green base colour with a blue-tinted water pour, or a variable blue/green base and a mixed-tint water pour. This can be taken further by using different tints for different areas, such as a heavier green tint near the edges and a bluer tint in the centre of the water feature. Where the tints meet, simply mix them together whilst wet to blend the transition. Brown can also be used at the edges to represent muddied water (like at a drinking point for cattle) as a way of varying the final look.

All the above is for the typical "greenfield" water features, but in nature, water can take many different colours, and representing them in a terrain piece will often be a balance between realism and expectations.

Start by playing around with blue, then blue/green, then experiment with a few area effects (like different tints on the same piece). After that, simply apply the same principles to whatever colour palette you're using for the piece. Look at your reference material, then break the water into a simple scheme and pick two or three main colours from the material. Next, assess translucency of the water – how clear it is and whether that varies across the area. Use that information to create a plan of how translucent, opaque or how heavily tinted your pour needs to be. Finally, look for features such as debris, flotsam, foliage, disturbed mud, inflows, outflows and so on, and map them in the same way to create a build guide to handle whatever nature throws at you.

Nature produces pools in many different colours: mineral pinks, algae greens, washout browns and so on. Things like industrial outflows and magical water features give even more options – just follow the same principles as for the pond in a field, simply using a different colour palette.

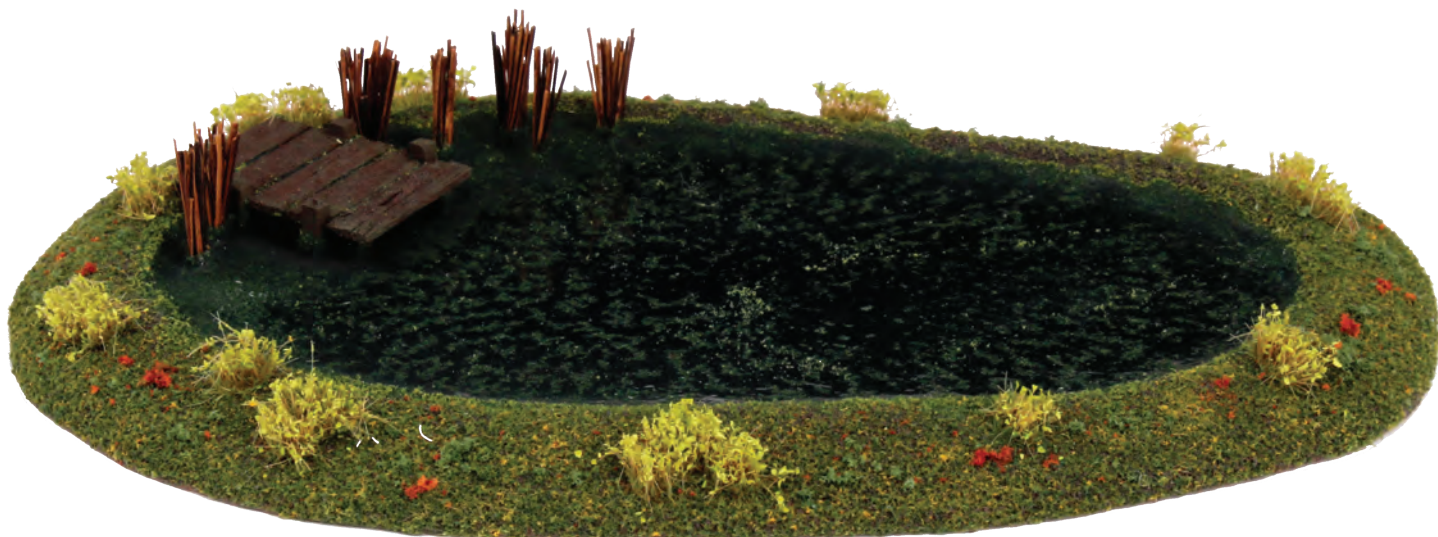
Bogs, Marshes, and Swamps

These techniques work for building the most common tabletop ponds and pools to replicate what happens when water gathers significantly in nature. However, sometimes water mixes with the earth to create bogs, marshes and swamps.

Bogs are areas of low-lying peat ground, containing a lot of dead and rotting vegetation that accumulates water. Marshes are similar but with clearer water and living vegetation. The water in both bogs and marshes may be still, but usually it is very slow-moving. Swamps are forested wetlands - simply bogs or marshes with trees in them.

No matter which you build, the construction of wetlands only differs from ponds and pools into two simple ways. First, they have ground in the middle of the water as well as around its edges. Second, they don't have set banks formed by slow water erosion, but rather a mix of banks and ground that slopes gently into the water, since the clumping of wetland can greatly slow the waterflow. The earth-to-water





ratio depends on your desired look, but a good thing to consider is that rulesets often define marshes as difficult ground rather than impassable. If this applies, ensure that earth mounds and water pools are large and flat enough for stable model placement.

When creating wetland pieces, first make a rim to contain the still water effects and then extend the earth from the rim into the centre in various places to make it more irregular. For small pieces, this is all that's needed to create good-looking, functional groundwork. If space allows, islets can be added to break up the water base. Make sure that they are prominent enough to show above the pour; if you pour in a little too much, not only will the islets be lost, but the wetland will have undesired large pools in it. The irregular ground substructure can be carved from thin foam or made with putties, while a bulking gloop can be used quite easily to landscape a wetland scatter piece, especially the gentle irregular slopes.

When using sloping banks, be aware of the creeping water phenomenon! Flock and aggregates can suck acrylics and resins up the edge through capillary action. The tiny gaps between the flock bits attract liquid into them, sucking the liquid up the bank. The best solution is to avoid flocking or texturing rim edges all together, but if you really have to, and creeping water results, let it dry and then brush over the area with a matt varnish to knock back the gloss. Simple!

Wetlands also differ from ponds and pools in terms of their colour and in the foliage that surrounds them (and sometimes appears in them). Water in marshes and bogs can vary from very dark browns and blacks, yellow- and

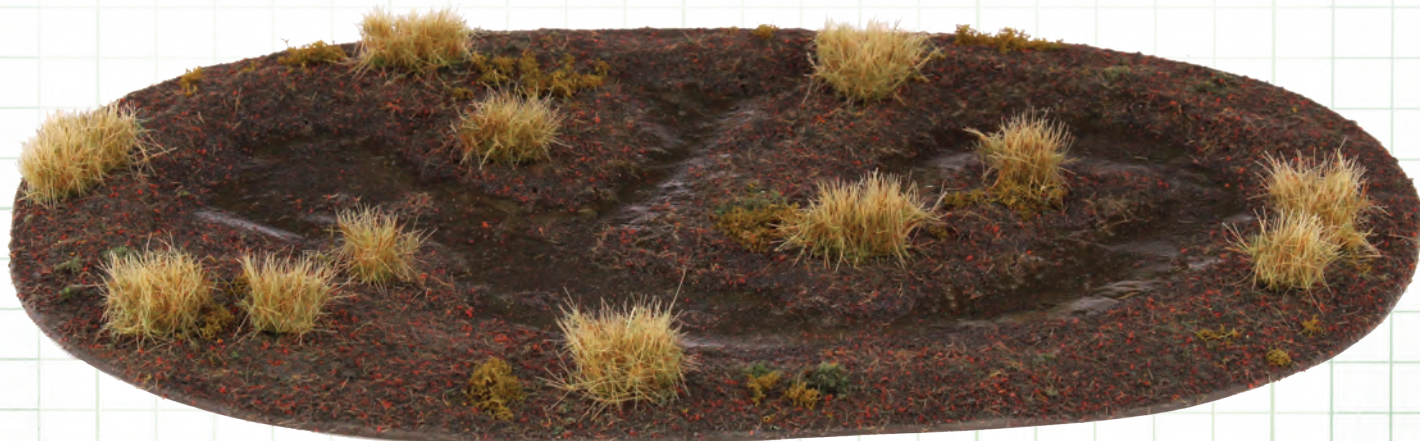
green-tinted blues, to completely clear, depending on the amount of rotting vegetation and level of stagnation. The vegetation growing around them varies from lush, low-lying grassland to dead peatland. Always check your reference material to make sure the water base and tinting colours match the landscaping of the piece.

Man-Made Water Features

The build style for man-made pools and reservoirs is obviously very different, but the core, wet work principles remain the same. The build style will be far more angular and regular; it may have pipes, outlets, and even machinery in or around it. Often, man-made water features are not sunk into the ground, but sometimes purposely raised above it.

It's often easier to raise the waterbed with some foam or foamboard and seal it with some filler, than doing multiple pours or a single deep one. Plug any gaps and joins with putty or hot glue if you're using kit pieces for your sci-fi industrial pool, to make them as watertight as possible. A quick test with water at the paint stage can save a lot of heartache at the pour stage.

The main difference at the paint stage is that man-made water features rarely leak and saturate the ground around them, so earth colours don't have to be darkened as they may be with natural features. They may, however, have a darkening around the waterline, needing a little dark wash to be applied neatly around the inside, just above the water level. Man-made features usually have uniform, flat bottoms which means there's no need to use blending and shading on the water base to give an impression of depth.





Pouring Resin Water

Resin waters differ from acrylics in that they are two-part epoxy materials, so they are not air-drying and do not lose volume due to water evaporation. These resin waters are comprised of the resin and a hardener that are usually mixed 1:1 to activate the resin's curing process. It's the complication of careful measuring and mixing of the two parts that initially puts people off using them, but it's a simple matter of just using a set of kitchen scales, a few disposable containers, and observing the following, straightforward process.

- Place a plastic cup on the scales, reset them to zero and pour the "resin" (following the manufacturer's guidelines) into the cup.
- Then pour the "hardener" into the cup (again following the manufacturer's guidelines) and stir smoothly with a lollipop/craft stick, avoiding introducing air bubbles as you go. Bubbles will form from the chemical reaction, quickly at first and then more slowly as the mixing continues, giving the resin a cloudy appearance.
- When the mix starts to clear and larger bubbles rise to the surface, pour it into a new plastic cup, scraping any sides and corners as you do, before continuing to mix in the new cup. Unmixed resin may not cure properly, leaving

sticky patches on the piece, and this method – called double-cupping – ensures any bits that weren't fully mixed in the first cup are fully mixed in the second.

- Once mixed, specialist and acrylic pigments and dyes can be added – as with acrylic waters. However, don't add more than 5% of the total volume, since this can result in the resin not curing - at best - or even smoking and melting the cup, at worst.
- Resins mix best when warmed, flowing more easily and allowing for smoother mixing. You can immerse the (unopened!) resin and hardener bottles in warm water before mixing, just make sure the bottles are dry before you open them and start pouring.

WARNING – Water and Resins don't like each other, so avoid adding water to your mix. As resins cure, the chemical reaction that occurs is exothermic, so your cup is going to get warm. This is normal, but if you're adding acrylics, use the bare minimum you need for the desired effect. Add it slowly to avoid the mix getting too hot and smoking. Always follow the manufacturer's safety guidelines – odourless is not the same as vapourless, so wear a mask if it says to do so!



The pouring process for resins is very similar to that for acrylic water effects – work around the edges before filling the volume from the centre. Resins can be poured in deeper volumes than acrylics, without requiring multiple pours, losing clarity, or developing curing issues. Products like GlassCast50 pour crystal clear up to 150mm before developing any curing issues, which means resins are much better suited to large areas and for deep pours. Bubbles can be an issue, both from the stirring and the chemical reaction. Unlike with acrylic waters, the best method to remove them is by warming the resin surface gently with a heat gun, keeping it moving at all times to soften the resin surface and pop the bubbles. Alternatively, the carbon dioxide in your breath can be used to dissolve the bubbles – just blow on the surface through a straw (taking care to avoid adding spittle to the resin surface!) Overspills can be cleaned with an alcohol wipe before the resin cures, or painted over afterwards with a layer of matt varnish.

As with acrylic waters, flocks, foliage and flotsam can be added during various stages of the curing process. For man-made features, use things like machinery, aliens, and even shopping carts, depending on your gaming genre.

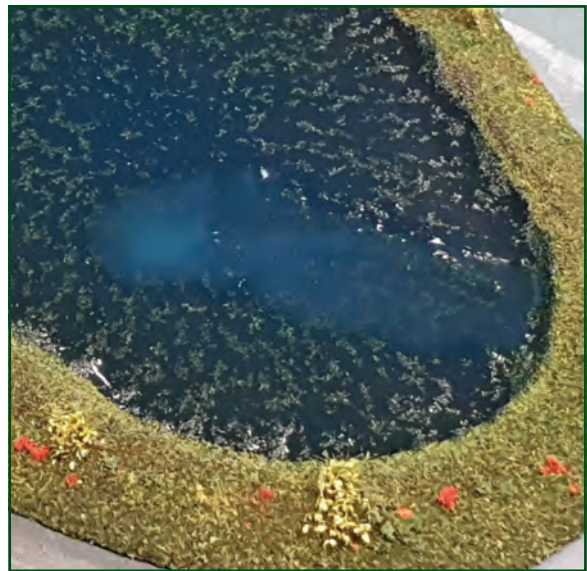
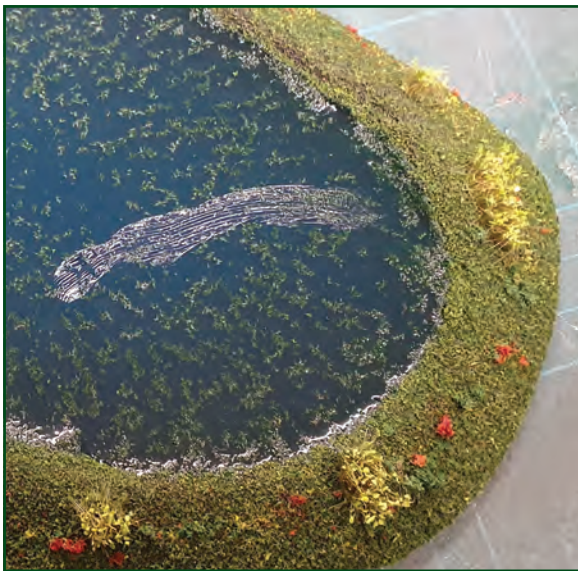
All manner of liquids can flow from industrial outlet pipes, providing great opportunities to include contamination effects and vary the appearance a little or a lot. In the case of flows from outlet pipes, the resin often needs a substructure to appear to flow from the outlet, if it's above the water level. Hot glue, cellophane, clear acrylic rod, and even string can be used, depending on the width, colour, and translucency required. If creating different coloured

outlet flows spreading contaminants into the water, pour directly at the base of the outflow and then brush the effects up and over the substructure. For more precision, use a syringe. Once poured, the edges can be wet blended, or cocktail sticks can be used to drag the colours into each other to create some interesting effects.

Other Ways to Represent Water

Acrylic waters and resins aren't the only way to model water. Over the all the years that little soldiers have been battling over tabletops, water has been represented by all manner of materials. Cloth - from simple blue fabric to faux leather - can be cut to shape and glued in place, using a spray adhesive to fix it to a base. Hard plastics - such as clear, and blue-translucent Perspex - can be shaped with a coping saw, and there is also a range of clear and tinted, water-textured plasticard sheets specifically designed for modelling water. Thick gloss varnish applied over a painted waterbed is another way to quickly produce water features. Thinned filler can be poured out in sheets and, while it dries, stippled with a flat edge to make subtle wind ripples. Textured stucco for walls and ceilings can also be used, but since they hold stipples better than filler, these, along with silicone sealant, are more suited to modelling more active water. All these, and a host of other methods, can certainly be used to create quite realistic water when combined with an effective paint scheme.





MISTAKES & FIXES

Edge Cracking - One downside of using acrylic water effects is that as the water content evaporates, it can lose volume and shrink towards its centre or deepest point. This can cause cracking in the cured water effects around the edges, especially if it's poured over the uneven banks and surfaces common to wetland builds.

If your edges do crack, remember that the acrylic material is water-activated. Simply apply about 2mm of water over the water effects, and add a few more drops of the water effect to the cracked area. The water will soften the cracked areas and the additional water effects will bulk it up. Carefully blend the water edges to avoid any obvious join lines.

The Fingerprint - Water effects are designed to look like, well, water. Even when cured, they are meant to look wet. This means, however, that it's hard to tell by looking whether the material is cured and dry, or still curing and wet. It's tempting to touch with a fingertip

to find out, but this can result in your water surface acquiring unsightly fingerprints. Use a test pour, or leave the pour pot to the side for "finger tests". If you do get an accidental fingerprint on the surface of your water, you can brush over it with more acrylic water effects (when using these) or gently heat it with a heat gun (when working with resins).

Surprise leaks - These do happen and it's better to be prepared before they start, than to have to figure out how to fix them on the fly. Have a little Blu Tack (or Fun-Tak) on hand to push over leaks. This piece-saving material can be removed, or easily hidden, later.

Sloping water - If the piece is not resting on a level surface while curing, you can end up with an uneven water level, with the water sloped towards one side. Use a spirit level to check everything before you pour. Additionally, if you are able to do your water pours on a worktable with adjustable legs, you can be quite confident about your results.



Mel's Rule No. 54 - Always stick your finger in the test pour first.



THE FASTER STUFF

Rivers are by far the largest and most complicated features commonly built for the tabletop. Stretching across the span of the table, the collective base size of a river will dwarf any large hill or house, and they require a level of planning and modularity that can be challenging. To realistically capture the appearance of moving water as it travels across a landscape, all manner of techniques and materials can be needed. So, it's easy to see why Terrainiacs might shy away from creating river sets. But when it comes down to it, river pieces are simply open-ended ponds that match up with other open-ended ponds, and realistic rivers are just still water with a bit of fancy work on top.

If you can make a pond and make a modular road, you can make a river set!

In gameplay terms, rivers are usually massive, functional features - just as they are on the battlefields of the real world. Rivers impede or block movement, and the way a river set is designed can have a dramatic effect on gameplay. Even the width of the river matters - a river section whose width is less than the standard movement distance for the given ruleset, is more flexible in game terms, than a section that requires two or more moves to cross. Of course, variation in width increases the tactical challenges, but always ensure that there is a clear way of measuring width to avoid arguments.

River crossings, such as fords, stepping stones, and bridges need careful advance planning (don't forget to consider the size of the models being used!)

Your gameplay variety will be increased if you create more pieces than are needed in any one battle. This way, you won't have to have the same three crossings, or two sets of rapids, in every set-up. If this isn't achievable, then have a few river sections with dedicated crossings such as bridges, and then include fords on other sections, leaving the players to decide if the game will use both bridges and fords for crossing, or only the bridges. Finally, due to their impact on gameplay and their size, the layout of a modular river set is very important. Although the layout is down to the players, it's important that their options allow for a "balanced" layout.

Planning is especially important if you're doing wave effects that show the direction of waterflow. Discovering, at the end of your build, that all eight of your turns only turn left, because all their waves went

the same way when you batch built them, is quite upsetting. Keep directional waves to straight sections that can be turned 180° without worry, and keep the wave effects on turns directionless... or plan very well!

The layout of your river is very important. Extra attention should be spent on the planning and paper testing phases, as a great-looking river that provides a poor gaming experience is not a great river. River sets should run from table edge to table edge and don't always have to run in a straight line. This means you can use the same planning and layout process as for roads, following the same modular system. Rivers tend to be a bit wigglier than roads as they cross the landscape, however. Using the grid system of planning, much like with roads, solves this problem. Since it's only the open ends that have to meet up, where the river wanders between those ends within the grid square has no bearing on its layout, so feel free to be creative.

Nature also has a few tricks up its sleeves that you can apply to make sure your set can be used on the tabletop, regardless of its makeup. The first (and easiest) is the use of underground river entrances and exits. In higher elevations, these are very common and allow you to have a river end in mid-table and start again elsewhere. These underground entrances and exits are simply river sections with small mounds on the end like a low cave entrance. The second trick is to use a marsh, where a river gets mixed with low-lying ground and becomes a wetland. Create a selection of marsh scatter pieces and two transition sections that go from river to marsh (and back again). This makes a marsh set that can be dropped between a set of structured river sections with as much variation as the number of scatter pieces will allow. Using marshes not only offers more variety in layout, but also adds to tactical choices.

It's perfectly fine to have a simple river set with straight straights and regular turns with nondirectional waves, that is easy to build, and lays out like a road system. The beauty of river sets is that they can always be expanded with extra pieces, and a still water river can always be upgraded later with water surface effects.

Don't forget canals, either! These are just open-ended, man-made "pools", meaning they're built to follow a regular pattern, and thus easy to modularise. They often have very slow moving water, so there are no directional waves to worry about. This makes them great for your first venture into building river sets.





Building Riverbanks

The main difference in the build process between making ponds and open-ended, modular river pieces, is that you need to make sure the ends of your river pieces match up. This starts at the base-cutting stage with clear measurements for the overall base width, including the width of the water and the two bevelled banks on either side. This is crucial when creating modular pieces that you want to mix and match. These modular edges must be cleanly cut and of the same width so that they all line up cleanly, and the bevel angle of the banks needs to match too.

Sounds a bit complicated? Nah. First, when cutting, put a bit of masking tape on your metal rule with the widths marked out, and you'll be bang on with every edge. Next, make a really short river piece, like 2" long. Bevel that, build your banks on it and, when you're happy, use it as a guide for the rest.

When building the banks at the edge of the modular pieces, it's important that 1) they meet up cleanly, 2) they don't overhang the base and stop pieces aligning, and 3) they don't stop short of the base edge, leaving visible gaps in

the bank when sections are put together. A small test piece can be used as a guide, or you can use cardboard, EPVC foamboard, or plasticard templates for a simpler approach. If your build materials can be cut or sanded, simply build with a little overhang over the edge, and after the piece is built and sealed, sand or trim the overhang flat. If banks are made from rocks, such as slate, sanding isn't an option. In this case, end the rocks 1-2mm from the edge of the base and then build over the bank edge with a putty or clay that can be sanded back to flat.

Banks aren't the only feature to be modelled on a river piece. There can be all manner of rocks, outcrops and islands, as well as crossing points such as bridges, fords and steppingstones. Creating these rocks and outcrops is a simple matter of fixing various rocks and large aggregates to the water base. Smoother rocks will look more realistic, whilst islands are just circles of riverbank with the middle filled in. Crossing points, such as steppingstones, should be modelled both to look realistic and to allow for model placement. Fords can be created by lowering the riverbanks slightly and raising the riverbed at the same point, so it appears shallower than the rest of the river piece.



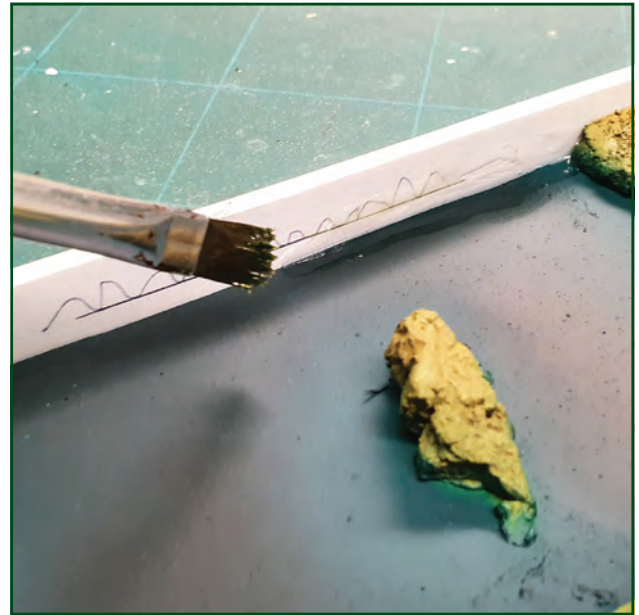
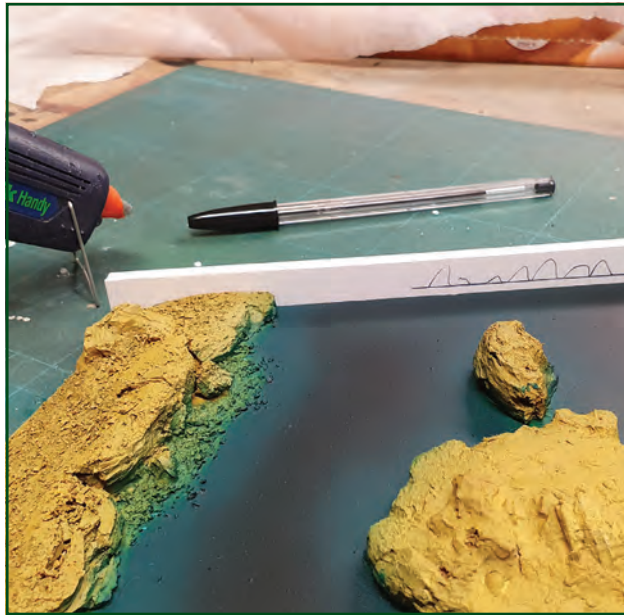
Introducing the Colours

To paint river pieces, follow the same principles and techniques used for painting pools and ponds whilst also, as when building the pieces, lining up the edges and matching the colours. Make sure that the colours of both the river bed, and of the banks all line up where they meet at the open ends of the river pieces.

Desert schemes make for quite dramatic river sets. For our sample river here, the earth is a base of desaturated ochre, applied heavily to the earth and thinly to the rocks, to create shading, before being lightened with cream colours, and drybrushed with the final highlight. The water base was painted with a cerulean blue, acrylic basecoat that had been desaturated with the ochre to harmonise the colour with the groundwork. This was painted broadly across the base before being darkened by adding black and applying it to the centre, to create depth.

The flocking stage can come either before or after your pour. For our example, as deserts are generally a hot environment, the flocking stage was a simple matter of adding some brown grass tufts, after the water effects were completely cured.



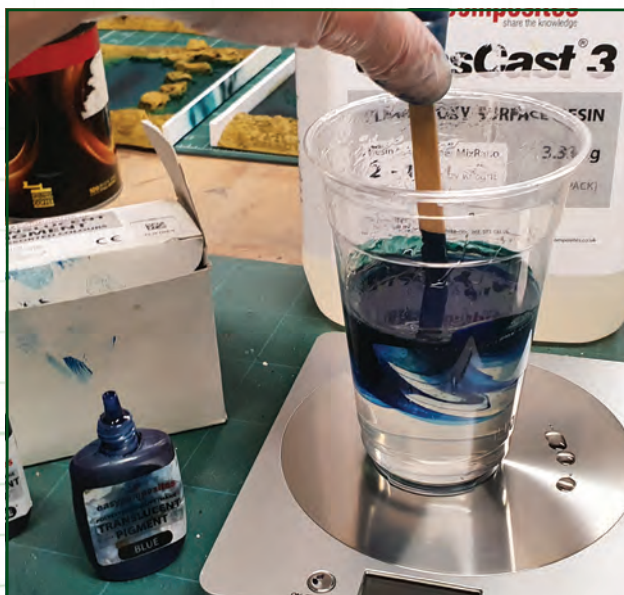


Damming the River

With your pieces painted (and possibly flocked and sealed), it's time to add the wet stuff. Depending on how the water is being modelled, this can be as simple as brushing on a layer or two of gloss varnish. For acrylic and resin river sections, however, the process requires an additional step. River sections have open ends and so won't retain the liquid while it cures. To fix this problem, we have to be busy beavers and create dams. Make sure that the ends of the river sections are smooth and flat, as any irregularities will make damming the piece quite difficult.

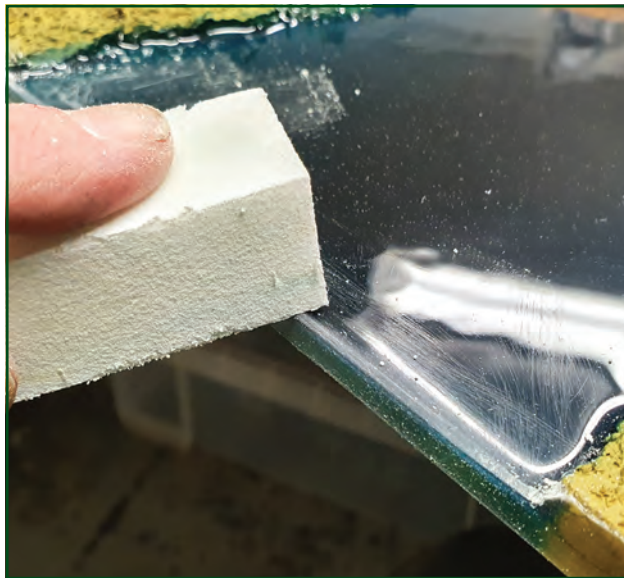
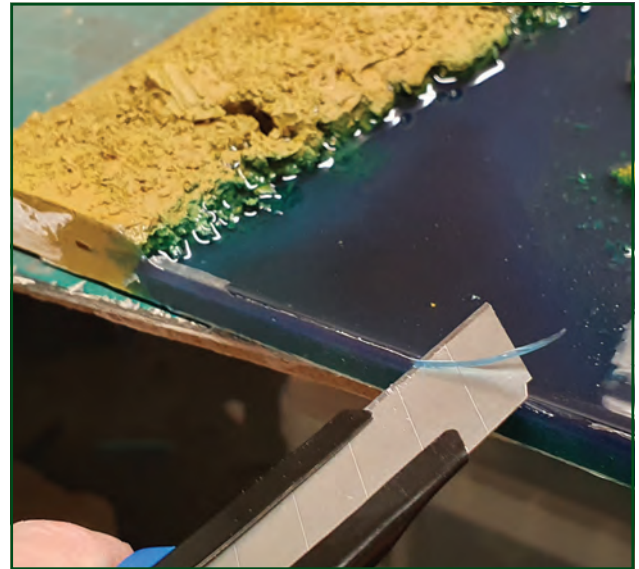
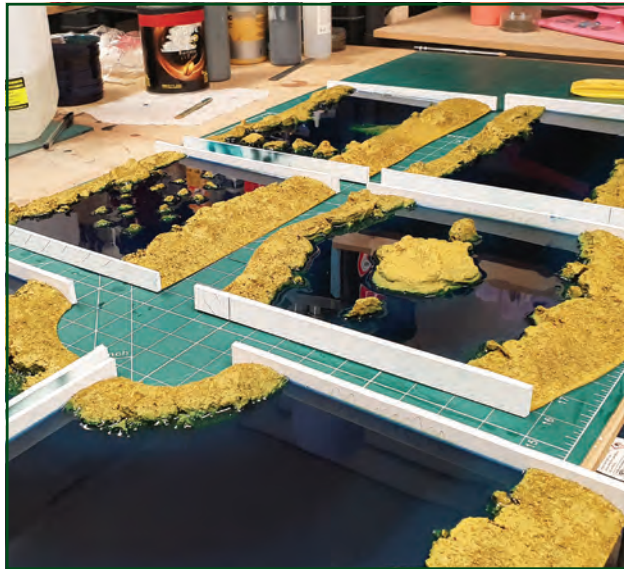
Dams are simple strips of material that are temporarily fixed across the open ends of a river section while the still water effects set, and removed afterwards. The simplest form of dam can be a strip of clear sticky tape; if it has good adhesion it will hold back any leaks for shallow pours. This type of tape can occasionally result in the need for a little cleaning up, when used with resins, but you can also use electrician's flash tape which is made of silicone and

therefore won't bond with resin. Tape is quick and easy to apply but can be prone to leaking, especially with a heavy pour. EPVC foamboard, or 1-2mm plasticard, can also be used as dams. Being plastic, this material is stronger than tape and won't bond strongly with resins, acrylics or PVA, which means the dams can be peeled away from the edges once the wet effects have set. These materials are also non-adhesive, so the challenge is to fix the dam to the side of the section strongly enough that it doesn't come away during the pour, but is still removable afterwards. It can be pinned into the banks, glued in place with PVA, braced in place, or any combination of these, to fix and hold it. Unfortunately, none of these approaches will completely prevent leaking. For a leak proof dam, a small amount of acrylic or resin should be brushed in a thin layer along the inside join line between the dam and the base, and left for a little while to start setting. Once this layer goes tacky, which normally only takes 30 minutes or so, a pour can be done without any worry of leakage. The pouring process itself follows the same approach used with pouring ponds.



Mel's Rule No. 18 - Don't damn yourself, Bose, test your damn dams!





I prefer to use plasticard for my dams, because I can cut a notch in the middle, starting at the level to which I want the water effects poured. Standardise this notch across all of your dams and you just need to pour until it starts flowing over the dam. All your water levels will match up perfectly, and you'll never have to worry about overpours. Your desk might suffer a bit, so spread a bin bag out. Blu Tack is also a lifesaver for those sneaky, surprise leaks!

When your pour is set, take care to peel the dams away gently. Avoid any sharp movements that could cause damage to the piece or the dam. Whether the dam comes away cleanly or not, the water effects will need cleaning up to remove the meniscus. When a liquid is poured into a container, fluid dynamics cause the edges to raise up slightly. This is the meniscus. It will happen with every pour that's done. With acrylics, simply take a blade along the lip and cut it smooth and level with the water. Then apply a thin layer of water to reactivate the cut surface and let it blend in with the rest of the river surface. For resins (as shown above), cut the bulk of the lip away with clippers or a blade, then sand the remaining lip flat with a file or sandpaper. Once level, clean the dust away and apply a layer of gloss varnish to fill in the abrasions and blend them into the unsanded water surface.

The piece is now ready for the tabletop, but, of course, we can always go a step further, and rivers can be taken to a whole new level with surface wave effects.

Surface Effects

Calm water looks great and is perfectly acceptable for gameplay, but your fast-water surface can be textured to create a more realistic finish. Typically waves and water effects should be added to the water surface after it has set, using a special set of acrylic water effects, although the same effects can be produced by other common products.

Acrylic water effects are typically acrylic binder with an added thickening or gel agent to give them a bit of body. They can be applied to acrylic still water, resins, varnished bases, or even painted baseboards. The bulkier gels are available as clear or with various blue-green tints (these are artists acrylic heavy gel medium with an acrylic ink added). These acrylic effects also contain a liquid bulking agent which means they don't set flat but as little bumps. Consistencies can vary from manufacturer to manufacturer, and even batch to batch, so always test your product first, as results can vary greatly.

Gel acrylic effects are well suited to creating choppy waters (E.1), but they can also be applied in small amounts to create small ripples or the wake behind a small boat. Ripples can be created by using a small palette knife or a flatheaded brush in a dabbing motion to create the ripple lines. Any peaks that are too sharp can be softened with a damp brush as the gel dries. Alternatively, adding a little acrylic still water to the acrylic heavy gels produces something between the two that works well for gentle waves and ripples.

Don't forget, the gels air dry. If you apply them too thickly, the surface will dry first and trap wet gel underneath. This can then take ages to clear. It will clear eventually, however, as long as you don't seal the waves before it does. Overall, the gels lose volume as they cure, so layer them in small amounts so they set fast, and then build them up as desired. This is preferable to putting down a single large wave and waiting ages to watch it shrink!

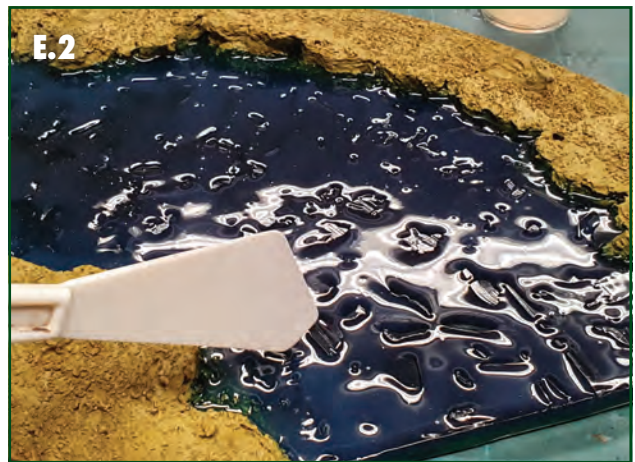
Acrylic liquid water effects are designed for creating small waves and ripples for both still and slow-moving water (E.2) and there are generally two methods of application. The first is the precision approach: draw the waves/ripples directly onto the water's surface with either with the nozzle of the bottle or a syringe. This method is good for small pieces, like ponds. For larger areas of water, the second method, or shotgun approach, is a quicker way of producing good results. Dip a spatula into the liquid effects and dab the surface repeatedly to create the waves. For an even faster, more random approach, you can stipple the surface with crumpled-up newspaper. Simply dip the crumpled newspaper in the liquid effects on a palette and then dab it on the surface until the desired effect is achieved.

Water surface effects can also be created with other materials. Liquid Mod Podge (E.3), when stippled, works well for small waves. Epoxy glues suit small, precision work as well as large waves, so can act as a good replacement for acrylic gels. Clear silicone sealant won't lose volume as it cures and can be dabbed on with a palette knife (E.4) to create quite strong effects. Resin waves don't have to be created while the first pour is curing, you can come back and apply them with a second layer.

With the surface effects applied, if using resin and silicone sealant, you can call the piece finished. But with acrylics and air-drying glues, there is a final step to take. Acrylic water effects are always vulnerable to being reactivated if they get wet. Even storage in a damp area can soften the water effects, so it's best to seal them. This can be done with a simple coat of a gloss varnish or a clear resin, depending how on durable a finish is desired. Always ensure that all materials have fully dried or cured before sealing them. Making them airtight before they've fully set is going to cause problems.

Creating realistic surface effects requires following nature: slow water can be mimicked using liquid effects and various stippling techniques, larger waves can be made with gels and silicones, and foam can be added by drybrushing a little white onto the peak of the wave, or by fixing a little cotton wool or polyfibre to the surface. Realism comes from combining these materials and techniques in a manner that replicates nature, bringing a water piece to life.

With the water sealed, your piece is complete! It may seem like a very complicated process, but it's really just a case of following a set of stages, that aren't that hard when planned out.



WATERFALLS - THE VERTICAL STUFF

If a modular river set is the crown of a tabletop terrain collection, then a waterfall is the jewel in that crown. These large, feature pieces sit on the edge of tabletops, creating a visual spectacle that draws the eye to the tabletop and down to the river that flows through the scatter terrain, setting a scene that any wargamer would want to battle over. The special nature of waterfalls is reinforced by the perceived difficulty of creating them. They are considered so difficult that they are not often attempted, making them a very rare sight on the tabletop.

The truth is, waterfalls are just a big hill with a river at the top and the bottom, and some falling water in between. The skills needed to create most of a waterfall – such as hill-making, groundwork, water work, and fast-flowing water effects – have already been covered. All that's left is learning how to make a new style of fast-flowing water: falling water.

In wargaming terrain, waterfalls primarily serve as eye-candy, sitting on a table edge or corner, providing a starting point for a river set. However, you can also incorporate functionality into waterfalls by adding rocks and ledges that allow model placement, trees and crags that provide cover, or even a hidden cave entrance behind the water for a sneaky, surprise attack. You can also include waterfalls as a part of a more functional piece like falls on the mountain base of a castle, or a sci-fi industrial overflow.

Regardless of how a waterfall is brought to the tabletop, it is essential to plan it well. Ensuring your pools, hills, and rocks don't take up too much base space, and that water can (and will) flow vertically, is essential to avoid the errors that can spoil the believability of a piece.

Seriously, winging it is not advised!



On the practical side, a waterfall needs a hill or mountain for it to fall from. Creating that hill is done in the same manner as most hills but with a few special considerations. A waterfall will almost always be a table edger piece, so the base needs a flat edge and the river “exit” needs to work with the modularity of the river set. When shaping your hill, the priority is the water. Always make sure that the first elements you shape follow what would be the natural flow of the water – working from top to bottom – creating the waterfall and then shaping the hill or rockface around it. It’s important to remember that hills with rock cladding, such as casts or cork bark, can encroach on pools and waterfalls. Having the cladding on hand whilst shaping the substructure is essential to ensure the water space isn’t reduced by the fancy rockfaces.

The waterfall shown here was created as a corner piece, with the river starting off table and flowing in at a diagonal from the table corner, taking a 45° right turn to come out in line with the grid setup of the river set. The challenge was constraining so many space-hogging elements within the 12”x12” grid.

If your waterfall base is a little bit bigger than its grid, it’s more practical to make a slightly shorter straight to use as an adaptor for the waterfall than it is to extend the base to 2 grid squares.

I used XPS foam for the substructure due to the availability of small offcuts with manufactured square corners and straight edges, taking a lot of effort out of making flat sides that would fit flush to the table edges. The blocks were stacked and fixed in place with hot glue and PVA to create a larger than needed substructure, but in the rough shape of the piece. The hot glue allowed for the foam to be shaped immediately, even while the PVA was still wet. A hotwire cutter was used to cut out the river, falls and pools, before



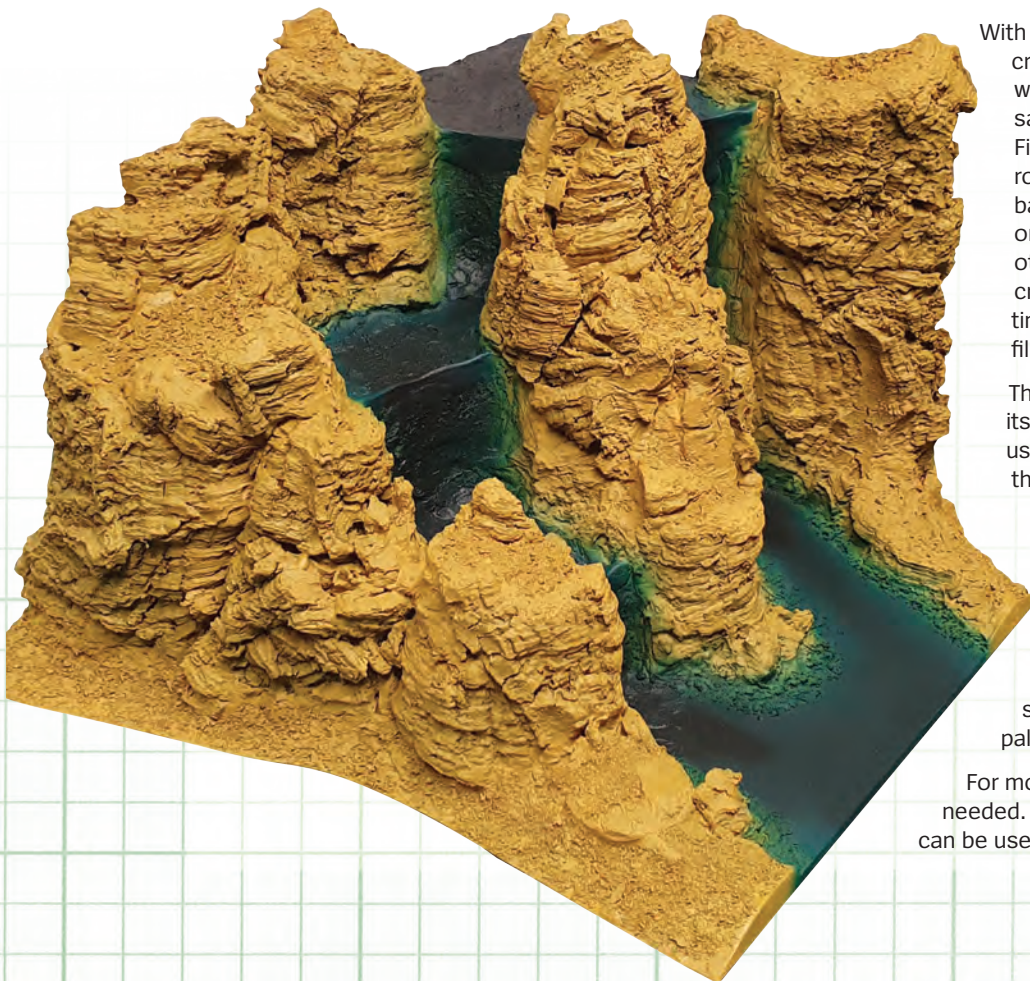
shaping the foam around them with a blade, bringing the foam substructure within the constraints of the base and its edge bevel. Once shaped, the piece was sanded to remove any sharp edges.

Whilst river pieces have open ends that need temporary dams to stop the still water effects pouring out, pools and river channels at the top of a waterfall pose a new challenge. Temporary dams won’t work, so edge lips need to be created. These are simple putty barriers that hold back the resin and provide a starting point for the top of the waterfall – they are just high enough to hold back the still water effects without appearing to rise above the water.

With the main hill and its water channels created, all that remains is to match it up with the existing river set, following the same process for modular river pieces. First, add large decorative features like rocks and trees, then landscape the banks with gloops, foam, or putties and, once dry, texture with aggregates like any other river piece. As our riverbanks were created with cork bark, I spent a lot of time cladding the waterfall with it, and filling the gaps with a bulking gloop.

The timing of the creation of the waterfall itself is determined by the materials used. Some small falls can be created at the same time as the water that flows into the top and out of the bottom, but you’ll need to use gel-like materials that will adhere to the rock surfaces. Apply the various heavy acrylic gels, silicones and DIY glues to the vertical surface of the rock face before creating vertical striations in their surfaces with a pick or palette knife.

For more complex falls, substructures are needed. Some quite sophisticated techniques can be used but there are also some simple

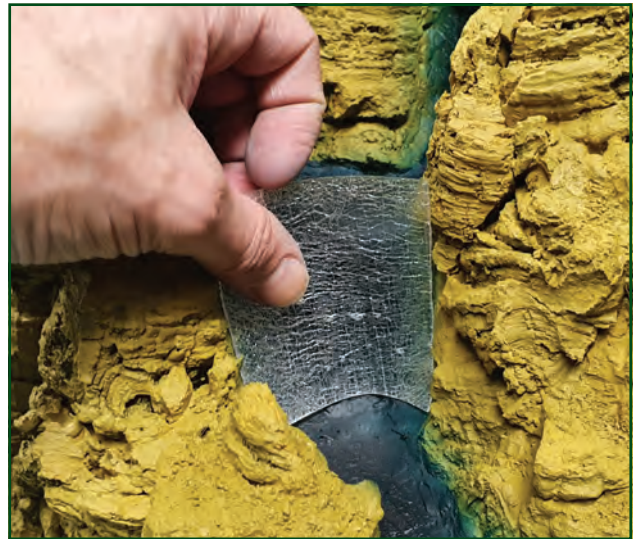
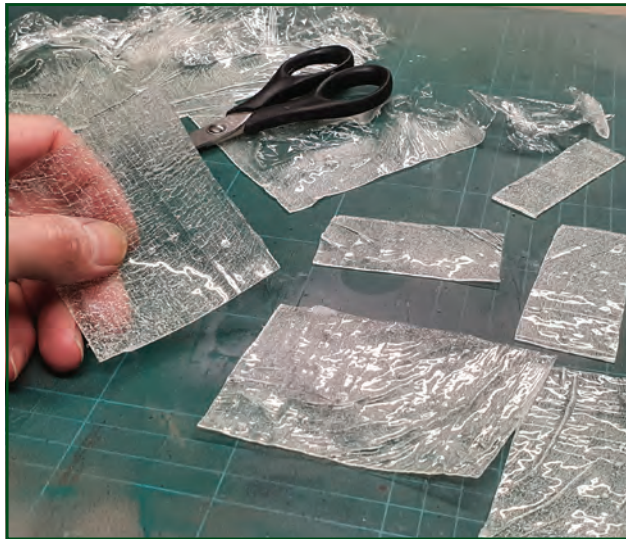




approaches. One of the simplest methods involves creating the fall out of hot glue. Lay down a lattice of vertical strips of hot glue on greaseproof paper, and before it cools, embed white polyfibre for the waterfall's spray. Once set, remove it all from the paper, trim to fit with a pair of scissors, and then fix it in place.

Of course, glues and acrylics are all fine and dandy, but you can also just use some crinkled up clingfilm and run it top to bottom as a fall. Once fixed and dressed, it can look as good as any of the other simple approaches.

Acrylic still water effects can also be used to create the falls. Apply a thin layer to a sheet of cling film that has been stretched and fixed down (left). As the still water effects dry and shrink, they create lines in the acrylic. Once fully dried, strips can be cut out of the sheet, depending on their striations, to create a very realistic, semi-transparent fall substructure that can be trimmed, fixed in place, and then dressed with polyfibre for the final stage.





A slightly more complicated technique – suited to long falls or falls that aren't directly against the rock surface – is to create clear strips of acrylic still water than can be cut, fixed into place, and then have further water effects applied to them. This is done by first spreading out some acrylic still water effects on an acetate sheet. When it's dry, cut out the desired shape with a sharp blade, before peeling the clear acrylic off the acetate and fixing it in place. Once fixed, various surface effects can be applied to the transparent

surface to create the falling water texture (left) before dressing it with polyfibre.

Once the substructures are in place, the still water effects can be poured into the top and bottom channels, blending in to the fall substructures and helping to fix them in place. After this, all that's left is to create the desired surface effects texture, as with the river pieces, but following nature's example: the further the water falls, the more turbulent and foamy it is where it hits the bottom.

ALL IT TAKES IS PRACTICE

From a simple puddle to a crashing waterfall, water features may look challenging when viewed as finished articles, but they are all built following the same principles, using the same materials and techniques. The bigger, more spectacular pieces just require more time and careful planning. So, if you can build a puddle, there's no reason why, with time and practice, you can't build a beautiful waterfall centrepiece to crown your gaming table.

WINTER HAS COME LANDSCAPES TRANSFORMED

MEL'S DEEP
THOUGHTS

It's common to use nature's changing seasons when making terrain and theming sets. Spring, summer, and autumn can all be evoked by careful choice of colour palette, and different hues of flocks and foliage. But of all the seasons, winter can have the greatest impact on how terrain is built.

Snow can be modelled as a simple weathering effect at the end of a build, perhaps representing the effects of a snow shower. But if you want to represent a heavy snow fall and/or deep winter, the impact on your build will be as dramatic as the change produced on a real landscape.



WARNING – remember that white reflects light. Boards heavy with snow can cause snow blindness effects, with boards in well-lit rooms often giving the players eye strain and headaches. It's best to break up the snow with dark patches of ground to reduce the impact, but if you have to go full whiteout, hit it with a matt varnish to reduce the glare! An alternative is to issue snow goggles to your players for realistic gameplay... but personally, I'd go with the broken ground and matt varnish!

PREPARING FOR WINTER

Snowing up a board isn't just about slapping a bit of white over it at the end of the build; even a little snowfall can affect the look of a landscape more than just making it a bit white in places. Since snow is frozen water, it soaks the ground it falls on, so ground base colours should be much darker than normal for them to look realistic.

Whilst a light scattering of snow won't affect the lay of the land, heavy snowfall can drastically change a landscape. Modelling this at the end of the build with gloops just isn't practical, and so a substructure is needed, shaped to imitate drifts that a snow effect can be layered onto. For deep snow drifts, it's best to use foam, and to treat the drift as solid ground when it comes to shaping a piece.

The flowing undulations of heavy snow across an area can be simulated with bulking gloops, which also work well for creating ridgelines and other build ups common with heavy snow fall. Air-drying clays are better suited for creating smaller build-ups. Above all, remember that snow doesn't just fall, it also gets blown about, and this can produce all sorts of interesting effects. Reference material is essential if you want a realistic look.

When it comes down to it, you need to build it up where it'd fall in clumps or drifts, don't put it where it wouldn't fall, add some wavy bits, and you're pretty much good to go!

When it comes to foliage, deciduous plants and trees lose their leaves during autumn and will be bare in the winter, whereas evergreens stay dark green throughout the year. When modelling winter pieces, always avoid lighter shades of clump and other foliage material and stick to the darker greens. Trees, other than dark green evergreens like conifers, should be bare armatures with no foliage whatsoever. Grass often survives winter and so it's fine to lay down some scatters and add tufts before adding snow

effects, but stick to mid- to dark green colours or even mid-browns to represent dying foliage. If you're building a heavy snow fall, it's best to skip the scatters and only add tufts where the snow would not have buried them.

Winter is often seen as dreary and overcast with heavy clouds, so the light is heavily desaturated, meaning that the colours are drab and lose their vibrancy. It's important to factor this in when painting; avoid bright, intense colours, darken down your usual colour selection, and ensure you desaturate all of them. Remember, this applies to everything that the overcast, diffracted light reaches – in other words, everything that's to be painted - so make this part of your prep process for painting up winter pieces.

Put a bit of dark grey in everything at the start of the painting stage and then just crack on!

Finally, use a white basecoat in areas where snow effects will be applied. This helps not only the final result, but also the placement stage.

With the pieces looking like they're set in winter but lacking the white shiny stuff, it's time for snow to fall.

SNOW IS FALLING

Whilst there are a range of snow effect products available, the most common snow techniques fall into three broad categories, each suited to different types of snowfall. When applied and combined correctly, they will produce very realistic effects without reducing a piece's functionality.

The first technique is simply to paint the snow on with a white paint. In real life, 3cm of snow will cover the ground completely, but at 28mm scale, that's only half a millimetre thick, so the depth of the snow effects isn't so important. Large areas are best created by applying a white house paint to smooth surfaces, such as sanded foam or smoothed



filler; the normal, textured ground surface doesn't look right if just painted white. For light scatters of snow, the paint can be stippled on, and buildings, walls, rocks, trees and bushes can be drybrushed downward with white artistic acrylic. Scatterings of snow can also be applied broadly as a dusting over boards and pieces with white spray primers, or an airbrush, and even flicking a scattering of paint with a toothbrush can produce good results, as long as it's not over-loaded with craft or artists acrylics.

The benefit of this technique is that it's quick, produces a good result, and because it doesn't involve PVA, there's no warping effect on the pieces or tiles it's applied to.

The next technique involves using snow scatters. These can be hobby scatters such as 1mm white static grass, plastic flecks, or ground up granules. Alternatively, fine, white, shot-blasting sand can be used to create very realistic scatterings of snow. Laid down in much the same way as grass scatters, these can be lightly spread and sealed, or built-up in-depth, layer by layer, sealing with hairspray as you go, before applying the final, bonding seal of thinned PVA.

Bicarb of soda is often recommended as a cheap snow solution and it works well on miniature bases but it absorbs the moisture in the air and yellows over time, so it needs to be well sealed. On miniature bases, superglue is used to seal it, but on terrain pieces, it needs to be sealed with a spray varnish, not watered down PVA!

Features should be drybrushed downward with undiluted PVA in much the same way as with the prior painting technique, but with the addition of a light stippling of PVA across large areas, and to break up any strong PVA edges from the drybrushing stage. Once the PVA is applied, sprinkle on the scatter as quickly as possible and leave it to dry. When it's dry, the excess can either be shaken off so that the process can be repeated, or simply left to be sealed in place. As with grass scatters, once it's on wet, don't touch it till it's dry. When combined with fine substructure work, scatters produce great results, but can involve a lot of PVA, so expansive areas of snow can have a warping effect on a piece or board, especially if you're trying to create depth to your snow effects.





The third technique, using snow gloops, is very effective for small area snow build ups, such as on roofs, rocks, bushes, trees and other features, but not so good for creating depth over large areas due to warping issues. The basic recipe for snow gloop is PVA, white acrylic, and a snow scatter in a 1:2:3 ratio, adjusting the amount of snow scatter to get a thick, sloppy consistency. This can be applied with a brush to any features that need fine build ups of snow such as bare branches, fences, or even statues. The thick consistency will hold the gloop in place and prevent it running down the side of a feature unrealistically. For an even thicker gloop, add the basic recipe to white acrylic caulking, thinning it down to a soft paste that can be applied to features with a stiff-bristled brush or a spatula. Gloops are great for small detail build ups, but applied over large areas, they can have quite severe warping effects on pieces.

When adding it to your caulk, get it to the consistency where, if you make a peak in it with a spatula, the peak takes at least 30 seconds to settle back in. If it's any thinner, it will run off the top of whatever you put it on.

These three core techniques aren't mutually exclusive. The key to producing a realistic-looking, unwarped piece that is functional for gameplay, is to apply the right technique in the right place.

The first step is to create a base layer of paint by layering, stippling, spraying and drybrushing - depending on the feature. Next, add some scatters for a little depth and a touch of realism, before using the gloops as build ups on the smaller features.

It's as simple as that to create a realistic snow effect, but winter isn't just about snow.

MISTER FROST'S TOUCH!

In winter, it's not just snowfall that changes the look of a landscape. As temperatures drop, the winter chill can do that all on its own. Unlike snowfall, which alters the shape of a landscape, a frost only affects its appearance – although the effect can be very dramatic. The colour of the ground gets lighter and glistens as the surface moisture freezes. The same effect on grass, long and short, can turn whole fields white, sometimes as far as the eye can see.

Modelling a frost effect, ultimately, comes down to paint or snow scatters, but there are a number of methods for applying both. Bare ground can be lightly drybrushed with white acrylic to which a little satin varnish has been added, to replicate the sparkle that comes with a ground frost. Alternatively, large areas can be dusted with white spray primer, or airbrushed. When using scatters, it's important to use fine snow scatter rather than the larger, particle scatter commonly used for snow fall. Fine plastic grains or white sand both work well when sprinkled over an area of bare ground. Fix them in place with hairspray, or use a matt spray varnish over thinned down PVA.

When painting your ground surface prior to frosting, remember that, whereas snowfall saturates the ground with water, making it darker, a frost freezes whatever moisture is already present, and so frosted ground can often be a little lighter than normal. Also, frost reflects a lot of light, and this too can make the ground appear lighter.

If you want to go posh, grab some satin Mod Podge. You can stipple with it, dry brush with it, throw it in with your white and even swap out your PVA for it. It does give great results!

A light frost on long grass can be replicated by using white, acrylic paint to drybrush green scatters and static grasses, after they have been laid down. Make sure that any loose scatter or flock have been shaken off, and the greenery is well sealed before attempting to drybrush it, or it's going to get messy. Alternatively, snow scatter and white static grass can be premixed with the usual green mixes, before laying them down and sealing them together to create a frosted look. A premix of snow to usual green at a 1:5 ratio will produce a light frost effect, whereas a 3:1 ratio will produce a heavy frost. Anything heavier will just look like snow. Avoid non-colour-fixed scatters as they will blend with the white scatter and you'll end up with a green frost.

You can dust the groundwork and greenery with spray paint or an airbrush, but do so directly downwards onto the piece; you don't want directional frosting and if you try to do it from every different direction, you'll end up coating it solid white!

Larger bushes and trees can be drybrushed in the same way as groundwork, assuming they are firm enough and any leaf foliage is well adhered. They can also be sprinkled with fine scatters, although it helps to apply a light drybrushing of PVA before sprinkling, to help the scatters adhere. Seal the scatters in place with hairspray or a matt spray varnish. The same applies to more solid features such as rocks, walls, and buildings, although a frost on these features can also look more glittery than ground frost. When the temperature drops below freezing, a frost can change the look of hard ground and soft grasses, but it can also make soft things go hard as water freezes.



THE YELLOW CURSE

Just as yellow snow is best avoided in the real world, so too in the modelling world. The yellowing over time of snow effects on terrain pieces can be the bane of even experienced Terrainiacs. It's easy to avoid, however, if you have a little understanding of why it happens, and use that knowledge to pick the right materials.

In most paints and caulking, the white pigment contains Titanium Dioxide. Unfortunately, when exposed to UV light, such as sunlight, or in humid conditions, it takes on a yellow hue, producing the yellow curse of snow

effects. This is compounded by certain latex-based glues, such as cheaper PVA glues, which also have a yellowish tint when dry.

When working with snow effects, always use UV-resistant, stay-white caulking, and use artistic acrylics rather than craft acrylics, as these have UV-resistant additives. Always use a good quality PVA glue, and just avoid latex-based glues completely. This might slightly increase your initial outlay on materials, but it's much less costly than having to replace your pieces six months after they've been built because they're covered in yellow snow!



MIND THE ICE!

Frost and snow can drastically alter the appearance of a landscape, but winter's effect on water can be even more dramatic. The cold can freeze everything from puddles and ponds to lakes and waterfalls. Pipes can burst, barrels and horse troughs can freeze over. Snow that melted during the day can freeze overnight into thin, clear, ice streams (and these are definitely dangerous terrain in the real world!) The same melt and refreeze process creates icicles that hang from tree branches and roof ledges. Snow that's been trampled, crushed, churned, compacted and then frozen, makes a very white type of ice - compared to the clear look of frozen water – since it consists of frozen snow.

Each of these types of ice is modelled with its own techniques and materials, although, as you gain experience, you'll find there is plenty of overlap. Ice should always be laid down before other snow and frost effects, because these can be used to blend the edges of the iced-over puddles and add to the realism.

Small, iced over puddles and refrozen, melted snow runoffs may be clear or opaque. Small, clear puddles can be created by laying down a thick, acrylic varnish, building up the puddles' depth in layers. For larger puddles, acrylic still water effects, or two-part, epoxy polyester, or acrylic resin can be laid down, brushing any raised edges flat on application. For more opaque-looking, frozen puddles, matt, acrylic varnish can be laid down for small ones, while a touch of white acrylic can be mixed in with the water effects or resin for larger ones. Whichever method you use, stipple the puddle with a touch of light grey, followed by white, to increase the realism of the frosting effect.

For larger ponds and other water features, varnish and acrylic still water can be used, but clear and opaque/frosted, plastic sheets, or toughened mobile phone screen protectors, or even Perspex can all be used instead. Toughened screen protectors and Perspex are particularly great for creating cracked ice.

If you're going to do big puddles, hollow out the ground a little to get some depth for the acrylic still water or resin. If that's not possible, it's better to go for lots of little puddles than one big one!

Moving from puddles and pools to simple iced over ground and trampled snow means moving from liquids to gloops. Gloops for icy ground can be created from a number of products, but the base for the mix should be a gloss or satin Mod Podge. Add fine snow scatter at a starting ratio of 4:1



(scatter to Mod Podge). For a crystalline effect, add some hobby ice effects. This is simply crushed and ground up glass and the amount used should be varied a little, even across a single piece, since icy ground is rarely uniform in appearance. Application is a simple matter of stippling the gloop across the area to be iced up. The best results are achieved by applying a number of stippled gloop patches, adjusting the gloop mix a little, applying more patches, then adjusting the mix some more, and repeating the process, again and again, until the area is covered. Whilst the gloop is still wet, fine snow scatters and crushed grass can be sprinkled across it to help to increase the realism with added detail and to vary the look of the ice across an area, especially if the gloop hasn't been varied during its application.

Just as puddles are best done before the icing stage, icing is best done before the snow stage, so that the snow scatter can be used to blend the edges of any icy ground.

For the muddier, churned up, frozen snow look, add a touch of your brown ground colour. Add a couple of spots of it to your gloop and give it a little mix but not too much, leave it a little uneven, and it'll help to make it look realistic.

Finally, moving up higher from the ground, we come to icicles. These are both beautiful and dangerous in the real world, and they can present some challenges in the model world. It is possible to buy moulded, clear, plastic icicles which can be snapped off their mountings and fixed in place with a little gel superglue, but this can be costly on large projects. Alternatively, you can heat clear, plastic rods so they melt enough to be stretched apart and, once they are cooled, the ends can be clipped off to create individual icicles. By far the best method is to use clear, paintable, silicone bathroom sealant. Simply take a coffee stirrer or spatula, scoop up a little sealant, dab it where you want the icicle and stretch it downwards. When applying icicles this way, make sure you don't fall into a pattern by placing the same sized icicles at regular intervals across a feature; remember to vary position and size for a more realistic look. Longer, silicone sealant icicles can have a tendency to curl up over time, but this is easily prevented with a quick coat of gloss varnish which will firm them up and prevent curling. Silicone can take a while to cure fully and so icicles should be done at the very end of a build, once all the other winter effects have been applied, and the piece has been sealed. Snow flock can easily stick to silicone icicles, ruining the effect, so always leave silicone to last.

Making a realistic-looking icy ground comes from combining these approaches, along with the other snow effect techniques, across a piece. It's just a matter of puddles and ponds first, then stipple on the icy gloop – varying it as it's applied – then add snow, and pop the icicles on last.

Of course, like all modelling projects, there are always additional steps you can take.

LEVELLING UP

There are a number of things that can be done to improve the realism of a winter piece. First and foremost is variation - taking the techniques listed previously and varying their applications, their placement, and also varying your mixes as you apply them. A little crushed glass sprinkled across snowed up, open areas that would be exposed to sunlight replicates the glistening snow that appears in nature. Alternatively, a can of satin spray can be used at the final stage in little bursts across open areas to get the same glistening effect, especially over large areas.

Different snow and ice layers can be laid on top of each other, with a frozen snow gloop being laid down before a fresh snow scatter is sprinkled over it, to replicate the look of fresh snow on top of old. Colours other than white can also be used. A touch of grey, acrylic paint in a mix can be used for snow in shadow, applied at the foot of cliff faces and underneath trees for more realistic variation. Alternatively, it can be applied across the entire piece or board to give the feel of a drab, overcast landscape. Teal and light blue acrylics can be added to snow and ice gloops for the appearance of the old ice of permafrost and glaciers, or that of reflected skylight, but these mixes should have at least a scattering of fresh white snow laid across them, in most cases, to achieve a realistic look.

It's the little details that make a scene work: small build ups of snow on fences, with icicles hanging underneath; clear, small patches under icicles to replicate how the water from melting icicles can clear away the snow underneath

them. White, acrylic filler or Das modelling clay can be used as a substructure into which the cut legs of a model are impressed, before snow scatter is applied, to create footsteps in the snow. You might even add a little yellow to a little ice gloop and apply it at the base of a wall or tree next to a guard post.

Finally, it's important to note that snow does not just fall on flat surfaces, it can stick to near anything, trees, rocks, walls and even people, leaving an entire landscape looking frosted from top to bottom after a snowstorm. This can be easily replicated across a piece or a board by using a sieve of fine snow scatter just above a piece, whilst giving little blasts of an extra-hold hairspray directed at the surface to be frosted. The hairspray traps the fine scatter as it falls, fixing it against the surface it's directed at, recreating the effects of a snowstorm. It's best to do this a little at a time, building up the frosting effect bit by bit. Leave a little time between applications to let the hair lacquer set, before applying more, as it's easy to apply but very difficult to take off. Once the frosting is done, it can be sealed in place with multiple applications of hair lacquer or a spray of matt varnish; thinned PVA should be avoided, as it will dissolve the hairspray and wash away the frosting effects.

Remember, it's not the use of advanced materials or techniques that increase the realism, it's the subtle variations that replicate those in nature. To achieve this, do your research – look at nature, get some reference photos, and develop your understanding of why things in winter behave as they do. Pay attention to details, work out how and where to model them, and then apply them to the piece. By combining these techniques, varying things, and adding the little details, it's possible to create a wealth of snow themes that look incredibly realistic.

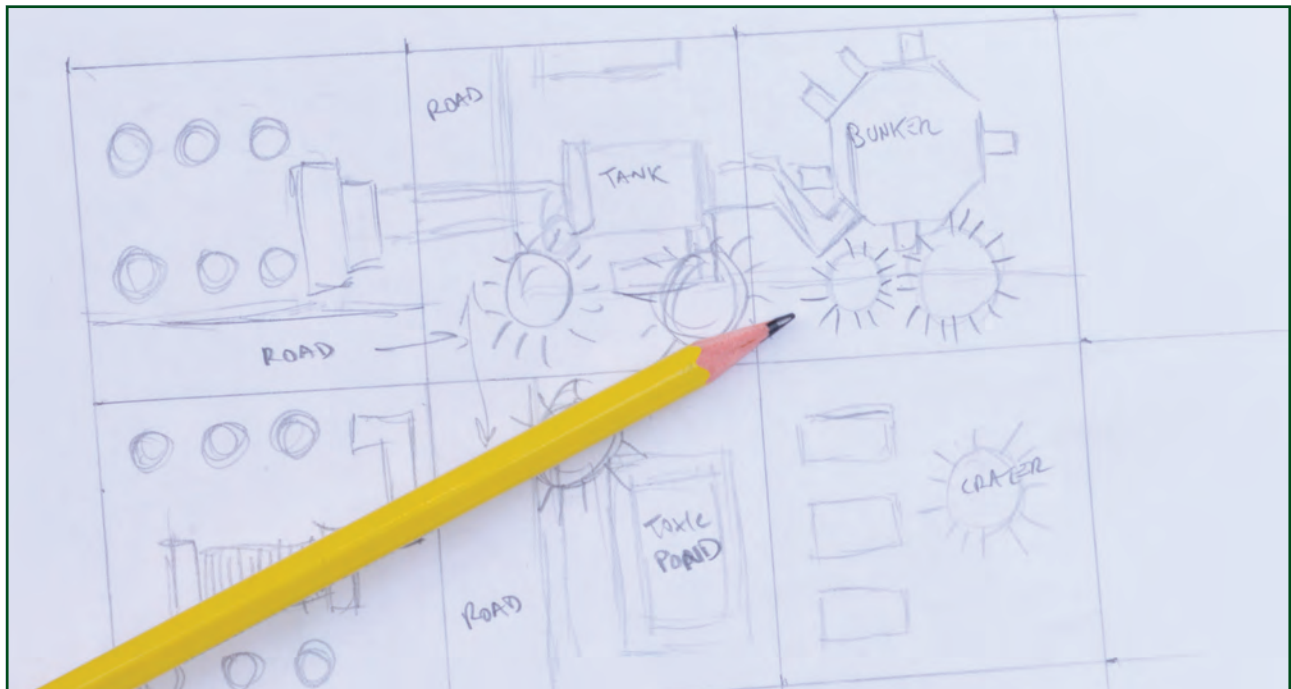


BUILDINGS AND RUINS

ACHIEVING THAT 'LIVED IN' LOOK



Up to this point, we've primarily covered "natural" terrain features – hills, forests, rivers and the like – but no matter how much nature abhors a straight line, humans love them! Now we delve into the realm of man-made structures with a look at some key approaches, new materials, and bringing together a variety of techniques to create the pieces on a battlefield that give your games a real sense of setting.



NOTHING SETS THE SCENE...

Almost all the natural elements we've dealt with so far can be used with different scales, and are independent of period or genre. The river and waterfall featured in the last chapter wouldn't have looked out of place in either a Wild West or a sci-fi setting, using any scale from 40mm to 15mm. Buildings and other man-made structures, however, are not nearly so flexible; their scale or setting will almost always be immediately apparent. You need to consider an appropriate scale for your buildings right from the start of your planning, so they'll work with your table and the types of games you'll be playing.

IT'S ALL IN THE PLANNING

Of all the terrain pieces you could make, buildings are the ones that require the most planning and forethought. Review all the rules about buildings in your game system(s). Think how your troops can interact with them, and consider the variety of uses you might put them to. Bear in mind also the sizes of games you typically play – for example, if you tend to play smaller, skirmish games, four medium-sized corner ruins might be more useful than a single, large, ruined building.

Of course you can always add more buildings to a set of terrain, but if you invest some time in proper planning, you'll get most of what you need in the first batch and keep the styling and painting similar across the set.

The Design Triad (see page 11) is going to be very helpful when planning your buildings. Which is most important to your build: Functionality, Durability, or Realism?

Functionality

Your favorite game system might deal with buildings in a very basic or abstract manner, or it might be incredibly involved. Either way, you'll want to take note of how it deals with such issues as line of sight, fire positions, movement, and access points. Additionally, if you are creating or working with a modular system you'll want to pay attention to how things change when you rotate one or two elements by 90° or 180°.

Key questions to ask yourself are:

- How functional are the buildings going to be in your game?
- Should your buildings be open (ruins, for example, or with removable roofs), or closed (complete buildings with fixed roofs)?
- Do the buildings need to accommodate an entire standard squad, or only a handful of models?

Research and planning are going to be key. Sketches will be very helpful, and for big builds you might want to build a few cardboard mockups first.

In my opinion, for wargamers who play at home, functionality is always going to be the most important consideration in planning your builds.



This landscape could be found in thousands of places around the globe and at any point in history, but the concrete bunker places it in mid-20th Century Normandy.

Durability

Having considered functionality, you need to decide how durable the pieces have to be. If you'll be keeping your pieces at home in your own storage, then you can choose from a variety of materials, but if you are creating buildings for a club or a tournament, the choice of materials is more important. Anytime other people will be packing things away (particularly if they're doing it quickly) there's an increased chance for damage. You can reduce the risk of damage by building your pieces on bases, keeping their exteriors simple, and choosing more sturdy materials (although this may make your builds more expensive).



XPS foam and laser-cut MDF are more sturdy than EPS foam and foamboard. So, if you're making buildings for a club, then plan to use these as your go-to materials.

Realism

When you get down to the build, the most fun part is creating the right look and feel. Whilst the basic substructure of many buildings might be exactly the same, a farmhouse in northern France will look very different to a farmhouse in southern Pennsylvania. Researching a particular period, or creating your own aesthetic for a genre setting can be very satisfying.

Bear in mind, however, how increased realism can sometimes reduce durability. If you want to add a fragile element, such as a seafoam tree on the base of a ruined house, put it in a sheltered place - close to a wall or corner - to protect it. Colour schemes are a great way to suggest a particular setting, without impacting the durability - a Tudor-style building typically has whitewashed daub, and dark brown or black timbering. Paint the daub in red, however, and you immediately give it a fantasy feel.

ABSTRACT SCALING

Absolute scaling is where every dimension and item is scaled identically, but wargames often use abstract scaling, where some dimensions are scaled differently from others. To get more buildings on the tabletop, we might use buildings that are smaller than they would be in real life. But if you build the windows and doors to the same scale as your models, the building as a whole will look properly scaled



WOODEN SHACK

One of the simplest and perhaps the most common building piece is a wooden shack. Built around the world for centuries, wooden shacks are still being constructed today. With a little effort you can produce a timeless look that is independent of setting, or you can make something very specific to a time and place, just by changing the cladding or roofing material, and the way you paint it.

The use of a base can also give your wooden shack a clear sense of location (as well as giving the build more strength), especially if you match the groundwork and grasswork to your existing terrain sets. But for a piece to be used in many different settings, you can avoid using a base altogether, like we've done with this one.

If you have a small terrain collection but love to play games from a lot of different historical periods then consider making your shack(s) as generic as possible. If your gaming is more focused, however, then you might want to add some defining details to evoke a specific time and/or place, like a moonshiner's hideout or Dark Age peasant hut.



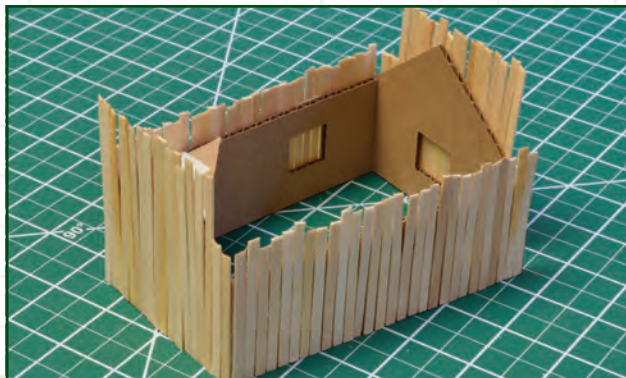
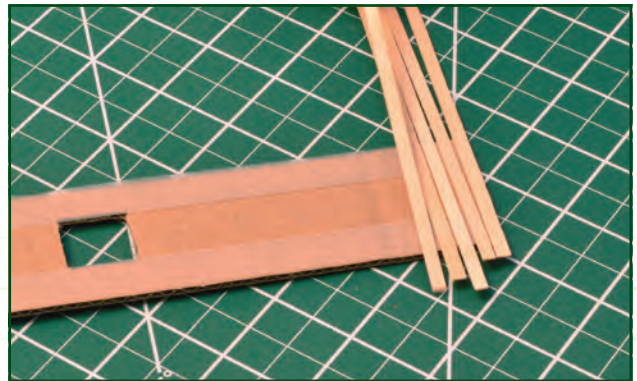
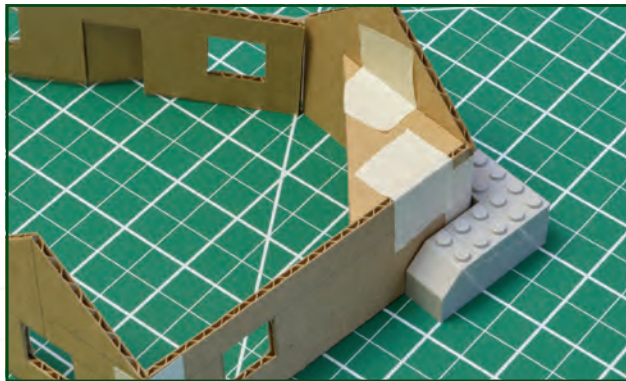
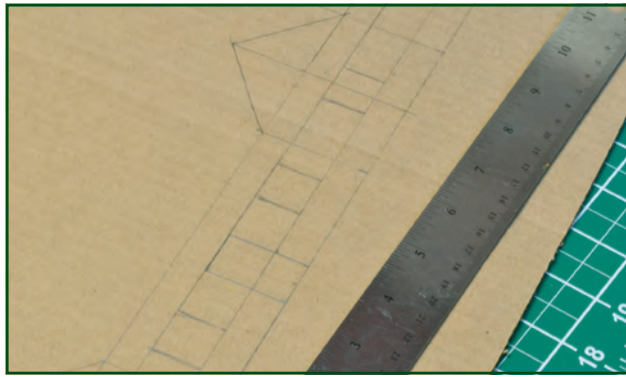
The Structure

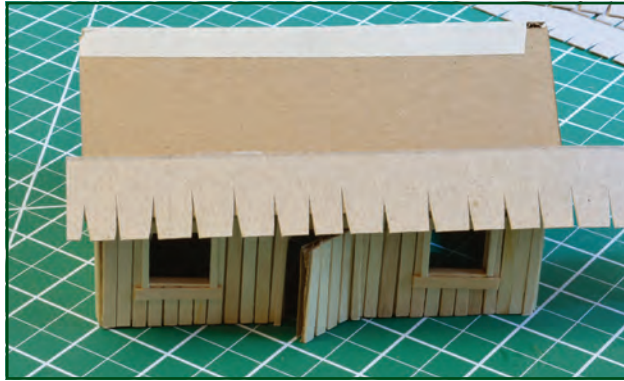
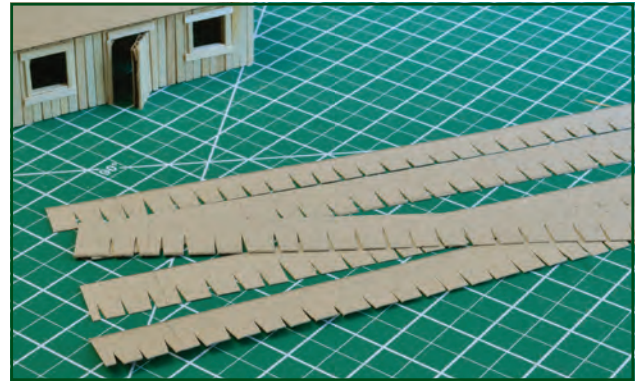
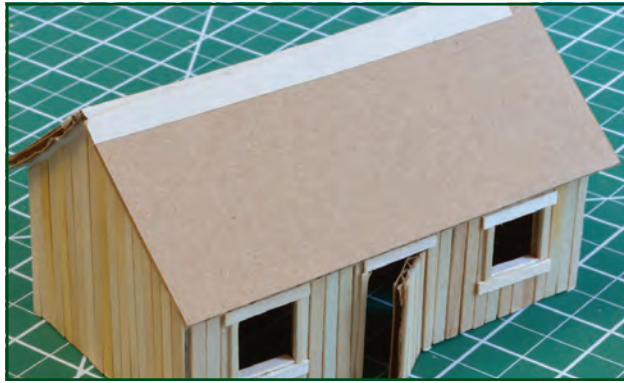
Cardboard boxes are everywhere, and that makes them an incredibly cost-effective material for building structures. Although they generally have what looks like a straight, factory edge, it's safer to draw your plans a little way in from the cardboard edge, so that you have control over all the edges.

When drawing the locations of doors and windows, make sure you have a miniature handy, so you can check your scaling against it, making sure the door isn't too short, or the windows too high. Carefully cut the walls from the cardboard with a sharp hobby knife.

It's possible to cut out the wall sections as one single, continuous piece, then simply fold at the end of each wall section, and only apply glue at one corner. However, this will result in one sharp corner, and three slightly more rounded ones. If you cut out each wall separately, you can ensure there's a consistent look to all the corners.

There are a couple of different ways to ensure that the walls meet at 90°, such as using a right-angled triangle cut from cardboard, or the classic LEGO angle brace.





Cladding and Roofing

There are quite a few different materials that you can use for the cladding (or weatherboards) of your wooden shack. The example here uses wooden coffee stirrers.

Whilst you could take a few extra from your local coffee shop each time you grab a coffee, bear in mind that they are very cheap to buy online by the thousand, and 1,000 will last you a LONG time.

Use PVA glue (or even double-sided tape) to apply the coffee stirrers to the walls. Trim the coffee stirrers with a hobby knife, after they've been fixed in place, to line up with the edges of the walls, windows, and doors. Then carefully cut some stirrers to create the window- and door-frames.

With the walls assembled, attach a base for the roof, cut from a cardboard box and sized to include eaves (overhangs) on all sides. Breakfast cereal boxes are ideal for roof shingles – whether cut and applied individually (which gives you a lot of flexibility and a little more realism), or in strips (which speeds things up a bit). Glue down the lowest run of shingles first, then layer the next strip on top, and so on until the roof is covered.

The toughest part of putting shingles on your roof is making sure each layer overlaps the previous one - just like in real life! Keeping your shingles a uniform width will really help.

Painting

When wooden structures are exposed to the elements, they can age pretty rapidly. Cycles of rain and sun can start to turn fresh timber grey in a matter of weeks. This shack, however, has been standing out in the desert for a while, with lots of sun but very little moisture.

To achieve this sun-bleached look, start with a mid-brown basecoat, followed by a heavy drybrush with a mid-brown/yellow ochre mix. Finally, give it light drybrush with a pale grey to pick out the edges and grain of the wooden planks and shingles. To emphasise the pale appearance, you can glaze the lower parts of the wooden planks with a thinned dark brown.

URBAN RUIN

It's hard to say which is more common - the wooden shack or the urban ruin. Certainly, semi-collapsed or destroyed city or town buildings feature in all wargaming periods from World War II to gothic science fiction. As with the wooden shack, your ruins can be made either to be usable across all of those periods, or you can give them very period- or genre-specific details.

The ruin here could be used in a number of different games, thanks to its fairly generic colour scheme and a lack of the kind of detailing that might fix it in space and time, such as signage and/or any technological elements.

This urban ruin makes extensive use of 5mm foamboard, but could also be built using 10mm XPS foam for a more chunky, solid appearance.

The material you choose will depend on a variety of factors, such as availability, level of realism required, and durability needed. Work out these things during the planning phase.

Foamboard Construction

As with all buildings (both model and real world) planning is critical. Sketch out your thoughts, check your heights and widths, and then transfer your plans to the foamboard. Remember the old carpentry advice: "measure twice, cut

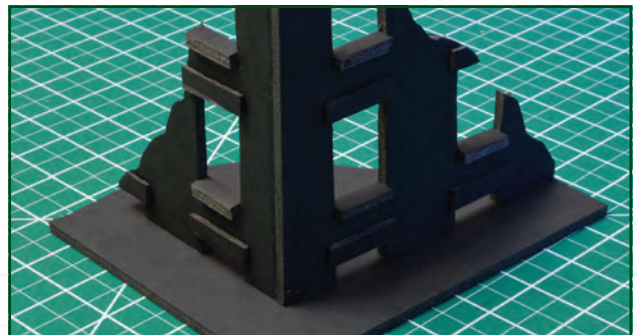
once." When cutting foamboard it's important that your hobby knife has a sharp blade – it's very easy to tear the edges of the foamboard.

PVA glue is perfect for gluing together foamboard pieces, and dressmakers' pins are great for holding your pieces together while the glue dries, preventing any slippage at the joins. Whilst ruins can be made without bases, they'll be more durable with them, and a base also gives greater opportunities to add extra detail. This piece has a square-cut corner to allow for a concrete footpath around the exterior of the building, while still including a lot of rubble in the interior.

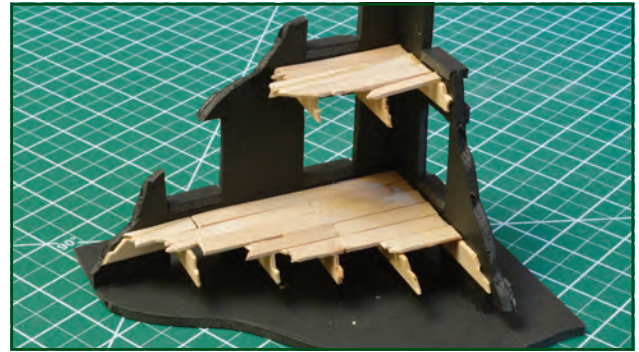
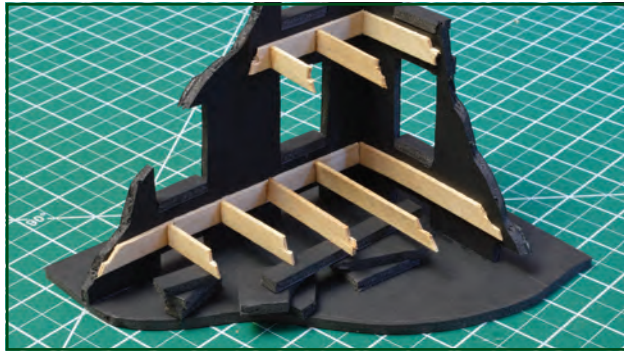
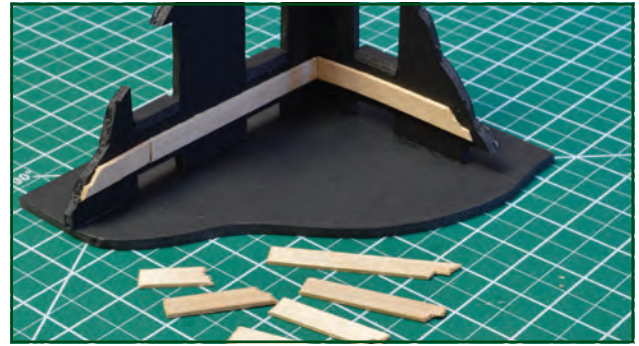
To add interest to the exterior of your ruin, glue some foamboard lintels and sills to the windows, and columns to the walls. At the corners, cut the column pieces with a 45° bevel so that when they are applied, there is no foam showing.

For a more pre-fab, utilitarian look, just leave extra details these off.

Once all your detail elements are glued in place, you can create battle damage by carving chunks off the edges of the foamboard with a sharp hobby knife. You can also cut in some damage from small arms fire – bullet holes work across all periods, whilst acid damage is going to be very sci-fi specific.



Mel's Rule No. 31 - There's no mistake that can't be fixed with battle damage.



Interior Structure and Details

When creating a ruin, try to include elements that will really sell the idea that the ruin is a result of some kind of bombardment. As in this urban ruin, remember that you can include destroyed flooring on the different levels; broken and splintered floorboards are a classic trope for ruins.

The sticks from ice blocks (popsicles in the U.S.) are great for creating joists and floorboards, but sometimes their grain isn't particularly prominent. Scraping the sticks with a sturdy wire brush first will help bring out that grain.

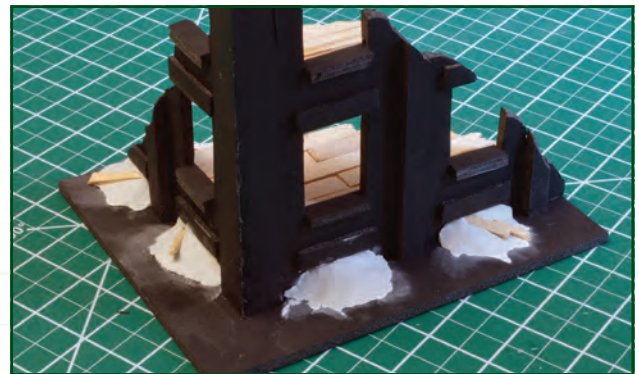
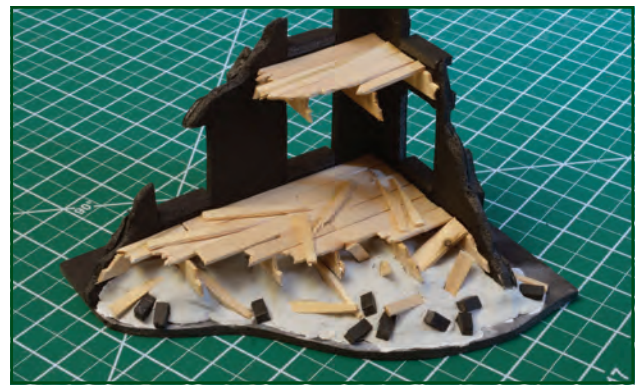
If you're not familiar with terms like joists and headers, try a quick Internet search of these terms (or even "building terminology") to get a basic understanding and plenty of ideas about how to put your floors together. There are lots of different ways to do it!

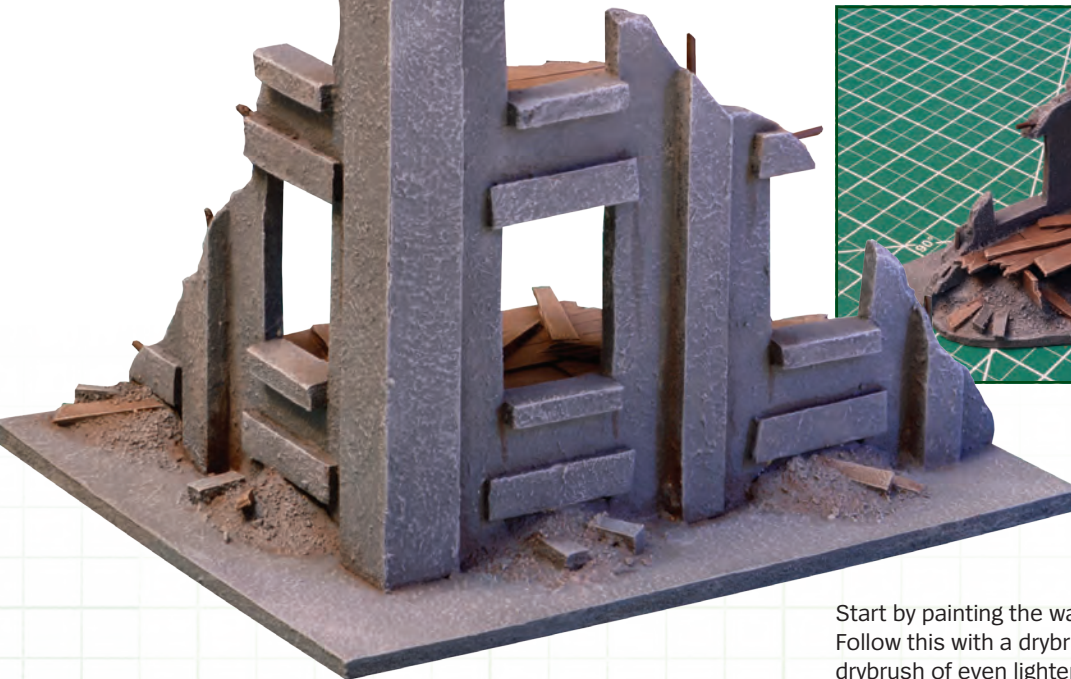
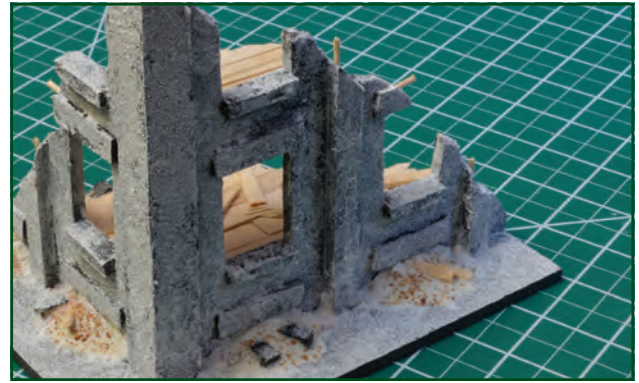


After gluing in the headers, cut some joists to appropriate lengths for the profile of your base and glue them in place. Super glue will fix them in place quickly, but PVA will give you a more permanent bond, although the joists will need to be supported while the glue cures. Once the joists are dry, you can glue the floorboards. Lay them out in a staggered pattern for a more realistic appearance.

This ruin has a basement, which would no doubt be filled with bricks, chunks of concrete, broken floorboards and other debris. Use DAS modelling clay to create a mound of small debris, and make sure you have some spill out of any basement windows. Splintered ice block sticks and brick-sized chunks of foamboard can be pushed into the clay before it dries. Finally, apply a textured gloop around the larger chunks of debris, to represent the materials that were pulverised by the bombardment that created the ruin in the first place.

Whenever I make ruins, I think about all the fun I could have had as an architectural model maker. Although I'm not sure the clients would have appreciated the destruction of their buildings as much as I would.





Texture and Paint

The final step before painting is the addition of a concrete texture. This was done by stippling on a coat of filler with a sturdy brush. Not only should you stipple the flat card surfaces on the outside, but also all of the foam surfaces along the edge. This will create the impression of concrete where it should be, as well as helping to disguise any joins. You can even push some cocktail sticks into the foam at appropriate points, and clip them short to look like rebar (the steel reinforcing found in modern concrete).

The stippled filler coat is brilliant for any surface you want to give a concrete texture. For a very fine result, keep the filler light and your stippling tight.

Start by painting the walls and rubble pile with a mid-grey. Follow this with a drybrush of light grey, and then a light drybrush of even lighter grey. In the example here, the floorboards (both whole and splintered) were basecoated with a dark brown, and then drybrushed with a mid-brown.

The next step is to use some washes to tie everything together and add some more depth. Use a brown shotgun wash at the base of the exterior walls, around the "columns", and over the rubble piles. Adding this colour to the shadows of the grey walls and floor gives an extra level of realism to the piece. Thin streaks of a black wash on the walls gives the impression of a grimy city, while streaks of a thinned orange/brown wash suggest rust running from the rebar pieces and any bullet holes.

Finally, with the lightest grey you have, give everything a very light drybrush to produce the look of a very dusty and war-torn ruin.



HISTORICAL ROUNDHOUSE

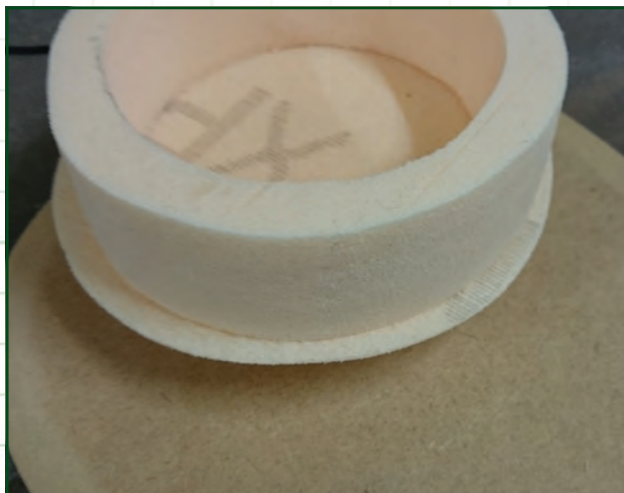
For millennia, Bronze and Iron Age people built roundhouses all across Europe. These buildings were often made of stone, but were sometimes also made of wattle-and-daub panels set between thick posts. They ranged from 5m (16') to 15m (50') in diameter, and their most striking feature was the conical thatched roof. This very distinctive look has meant they have made their way into many fantasy settings, which makes them a great thing to build for the early historical and fantasy gamer.

Archaeologists have known about roundhouses for centuries, and the oldest ones they've been able to dig up in the UK date back to 3,500 BC!

Building

To get started, cut out the three main elements of the piece: the walls and roof from XPS foam using a hot wire cutter, as well as a base from 6mm (1/4") MDF. The hot wire cutter may create small lines and irregularities which you can sand out with a sanding block on the exterior, and with the careful use of sandpaper on the interior. Whilst sanding the roof, give it a slight rounding towards the eaves to represent the thatching 'drooping' over the edges of the stone wall. Then you can start sketching in the stonework.

If you aren't planning to use the interior, this is a good time to glue the roof to the wall.



Texturing and Balsa

Stacking individually-cut stones or bricks is one way to create a very detailed and realistic wall texture, but it can take an incredibly long time, and although you don't need to be a stone mason to achieve the look, by the time you've finished you might wish you were.

One (simpler) alternative is to carve the stone (or brick) texture directly into the surface of the XPS foam with a knife point or sculpting tool. This doesn't take anywhere near as long as making individual stones, but it can create V-shaped channels which doesn't look particularly realistic.

Another (MUCH simpler) alternative is to draw the pattern of stacked stones or bricks onto the XPS with a ballpoint pen. The rounded shape of the ballpoint creates a U-shaped channel which mimics a mortar line very well on bricks, and gives a rounded feel to stacked stones. You can start drawing in the largest stones at the lowest course, and slowly work your way up the wall. To break up some of the lines, add in some larger stones that might be two courses tall, but remember to regularly overlap the stones, as in a real stone wall.

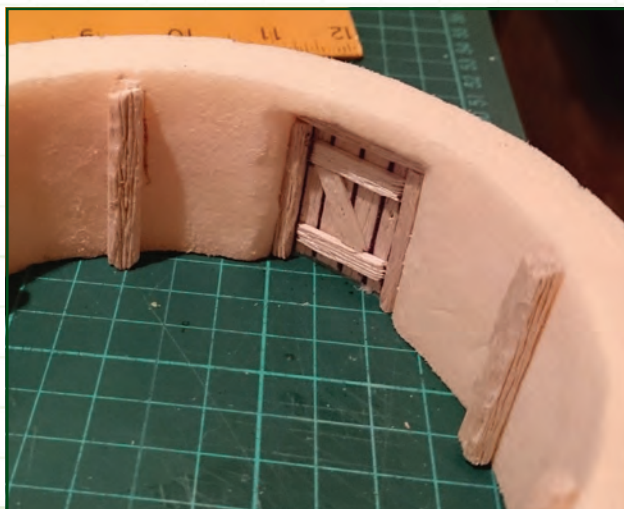
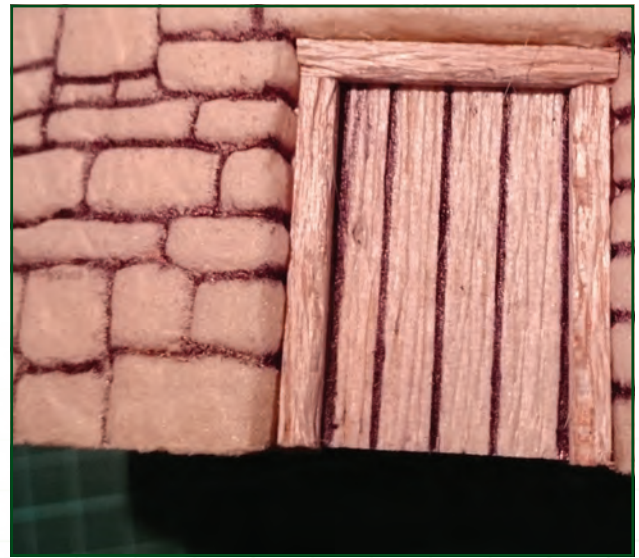
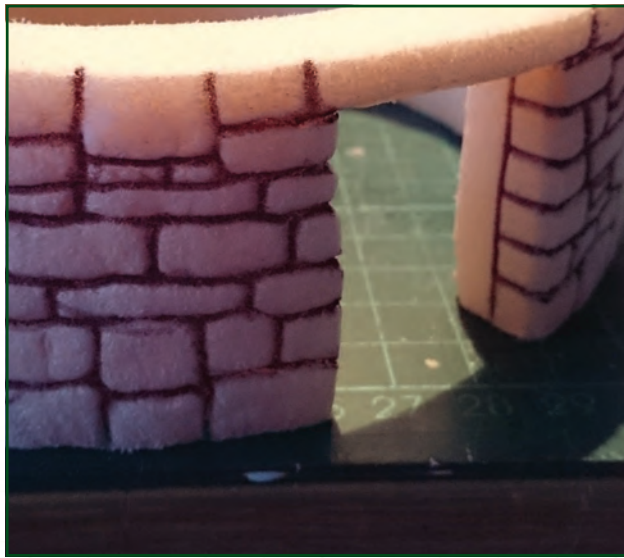
Whilst you don't have to be a stone mason or bricklayer to draw your stones on a foam wall, it can help to know some of the standards and terminology – a course is a single row of stones or bricks, for example. A quick Internet search for bricklaying basics will be fine!

One effective method to add a realistic texture to the XPS stones themselves, is to take a nicely textured real stone and press it against the surface of the foam. This will add some irregularities to the stones which can be accentuated by drybrushing.

The penultimate stage of the build is the addition of the wooden elements. The door can be all sorts of sizes, but in an early building like this roundhouse, the chances are that it was quite low, maybe 5' tall, so that the inhabitants had to duck to enter. Again, your ballpoint pen will come in handy to draw the door's different wooden planks onto a piece of balsawood.

Inside the roundhouse, you can add rough-hewn balsawood pillars around the walls to represent the tree trunks that were driven into the ground to anchor the walls (concrete foundations weren't a thing in Bronze Age Europe).

The final stage is to add some detail and groundwork to the base. As well as the small patches of rocks and texture, there's a tree stump which we can assume is used to cut firewood for those cold, winter nights.





Painting and Finishing

The exterior of the roundhouse was given a basecoat of a dark grey, whilst the roundhouse interior and base were base coated in a mid-brown, and the roof in a dark brown.

Drybrushing is a great technique to use in this case, not only because it picks up texture and details, but for areas that are a little more flat (like the stones), it can leave a grainy texture too. In the model shown here, the base, roof, and balsawood elements were drybrushed with a lighter brown, followed by a bone colour. The stone walls were drybrushed with a couple of lighter shades of grey.

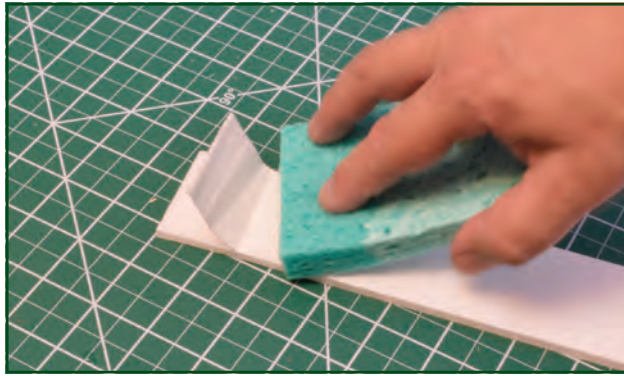
Remember to drybrush across "the grain". If you've been a little heavy handed, you might accidentally drybrush some light grey paint into the lines between the stones. Not to worry. Let it dry completely, then mix a wash of the darker grey and carefully paint it back into the gaps. A little variety in the shadows will be fine.

After the painting comes the application of grasswork to the base. Glue the flock down first, as it's easier to slap the PVA glue around and get it right up into the corners against the walls and around any larger rocks on the base.

Once the first layer of flock is firmly in place, the clump foliage and other, smaller bits of scenic materials (like flowers and vines) can be layed down. You can use PVA glue or even Hob-E-Tac for a really good hold. At this stage you could decide which side of the roundhouse wouldn't get any sunlight, and add a very thinned wash of a desaturated green around the lower courses of stone.

Finally, you can flock the roof with a mix of fine brown flock and a lighter brown static grass to give it a bit more of a textured appearance. While it isn't a completely realistic representation of a thatched roof, it's definitely quick to achieve and will look the part on the gaming table.



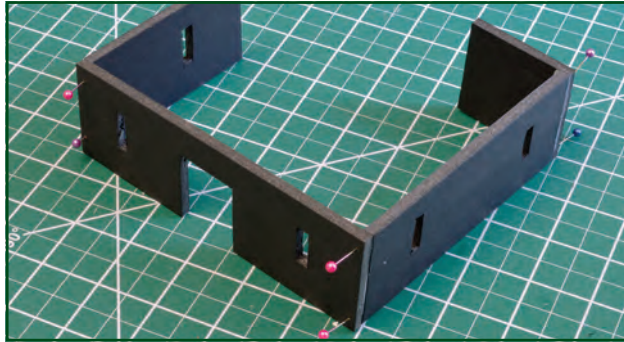


FANTASY RUINED INN

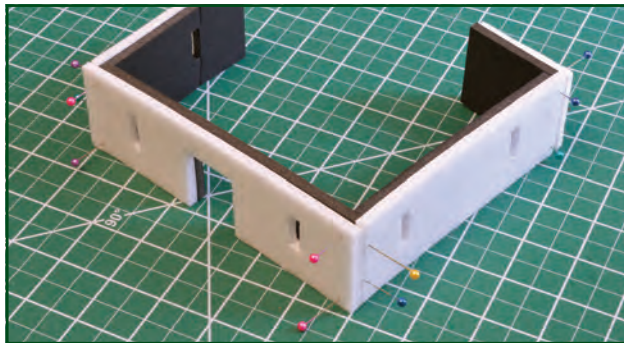
I wanted to bring together a number of the techniques used in this section, for a feature “fantasy” build, and as I’ve always loved the idea of Mordheim (a ruined fantasy city from Warhammer’s past) I knew it had to be an inn that has definitely seen better days. I wanted a neglected, dilapidated inn whose owners’ lack of maintenance had been compounded by some fire and subsequent rain damage. So - lots of damp and rotting thatch, moss-covered stones, and grimy walls.

Laying the Foundations

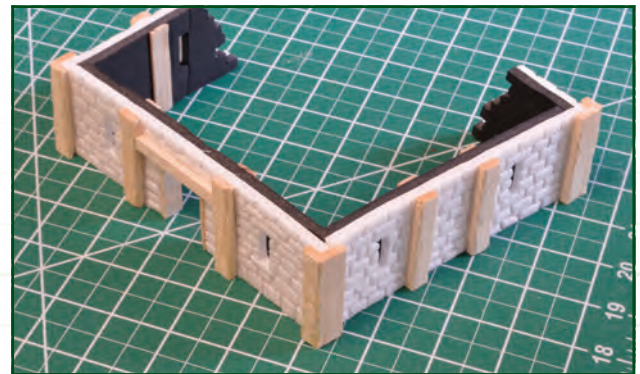
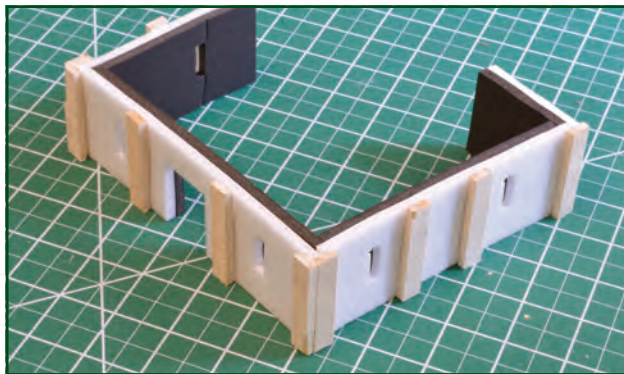
One great thing about foamboard, apart from it being easy to work with, is that you can remove the outer layer of paper, by soaking it in water and carefully peeling it off, to expose the foam underneath. For this build, I removed the paper from one side of a sheet of 5mm white foamboard, and glued the other side to a sheet of 5mm black foamboard for additional strength. This was cut to shape and glued together to form the ground floor walls of the inn. In a town like Mordheim (or on the roads running through the dangerous forests of the Empire) the windows are more like arrow slits - for better defensive opportunities.



Thick posts of balsawood were glued to the exterior walls in a regular pattern, and matched on the interior walls, to give the impression the inn is built on very sturdy foundations. The exterior walls were then textured (with a ballpoint pen) to look like stone blocks, the collapsed wall ends were cut out, and then the walls were glued to the 6mm MDF base.



As with the urban ruin, the floorboards and wooden debris were made from ice block sticks, scraped with a wire brush before being glued down. DAS modelling clay was used as the substructure of the debris pile, to which were added some stone blocks (cut from XPS foam) and loads of splintered wood – since there will be several floors above this one, the debris pile could be pretty substantial. Sand and grit were also glued in place for smaller debris and texture.





Painting the Foundations

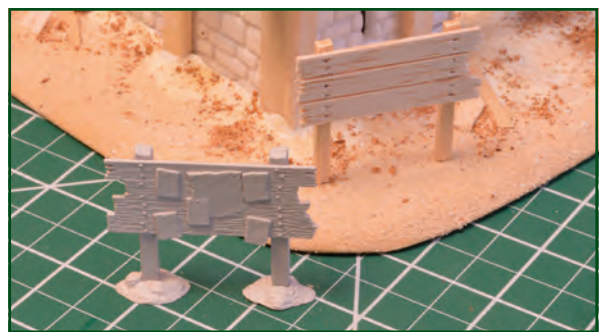
The entire ground floor and base were given a basecoat of a dark brown, thinned in random areas to add variety. Knowing that the inn receives regular rainfall means that the ground probably never dries out entirely, so the earth will always have a darker look to it.

The stone walls, wooden posts, floor boards and chunky debris were given a mid-grey drybrush for a weathered appearance, whilst the interior walls of the inn's common room were painted with a desaturated red – a suitably atmospheric colour that gives some visual interest.

Patches of the flooring, along with the centre of each “panel” of stone work were drybrushed with a light grey, in preparation for the final weathering stages.

Not everyone has an airbrush, but I definitely recommend picking up a cheap set (airbrush and compressor) to use for terrain building. Not only can you lay down basecoats of colours not available in spray cans, but you can do some great weathering work with them.

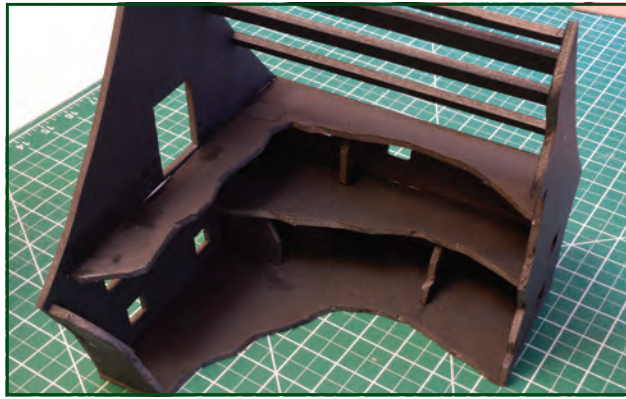
To create the effect of the ruined corner having been destroyed by fire, the ragged wall edges and areas of debris were airbrushed with black, before receiving a final drybrush of light grey. The lower parts of the exterior wall were washed with a light, desaturated green to look like moss, mold or lichen growing in the damp areas away from the sun.



SET DRESSING

Sometimes it's easier or faster to use some pre-made items to help set the scene - like the barrels and crates (Mantic Games) or sleeping bags (WizKids) above. Other times it might be just as easy to build a piece of “set dressing” yourself to match your own style, like the bounty board (pre-made from WizKids). There's no “right or wrong” way to do it, just whatever works best for you and your build.

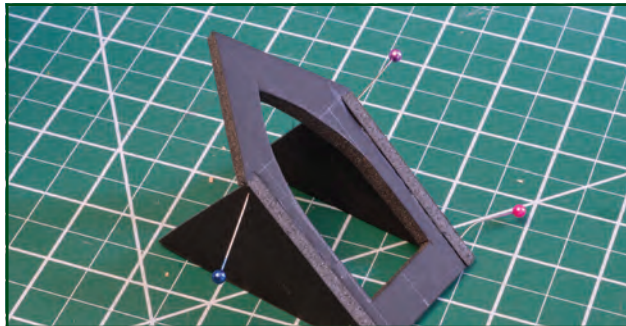




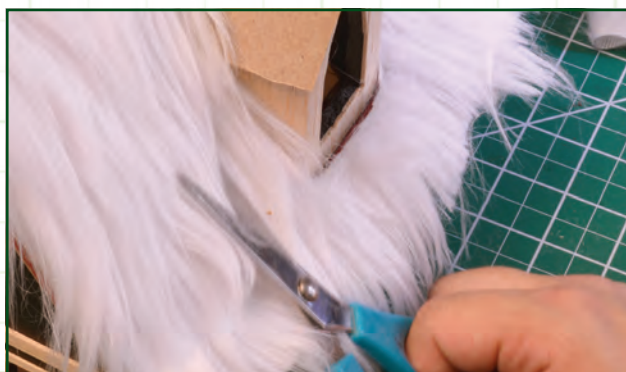
Building the Upper Floors

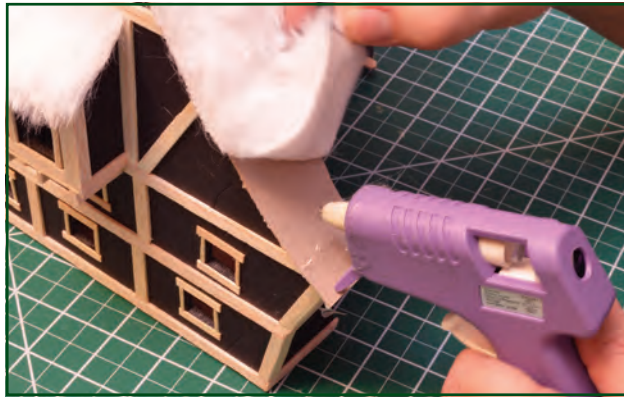
The look and feel of many fantasy buildings is based on late medieval architecture, but exaggerated quite a bit. The central roof beam is often taller than in reality, the overhang wider, and (if you are daring enough) there are often a lot of complex additions. This inn not only has the common room on the ground floor, but rooms for guests on the upper floors.

The attic of this building is enormous and rather than fill it with more guest rooms, I decided it would have been the home of some nefarious cult leader, a place where unsuspecting travelers could be lured, captured, and sacrificed to dark gods.



Whilst most miniatures will never need to climb to the upper floors during a game, it's important for a consistent look and feel that they have the space to do so. The overall construction was from 5mm foamboard and, although there was a general plan, elements were tweaked as floors and walls were dryfitted. Complex elements such as staircases and chimneys were assumed to have been originally built in the corner that burned down. Dormer windows and oriels (the windows that stick out from upper floors) add extra character and can also provide sniping positions for models armed with bows or crossbows.





Thin balsawood strips were used to create the timbering on the exterior. Balsawood is very easy to cut into varying lengths and adheres incredibly well to the foamboard with a thin layer of PVA. The flooring was made in the same way as the ground floor, with enough overhang to hide the foamboard substructure.

Thatching your Roof

There are a number of different ways to create the appearance of a straw-thatched roof: scraping texture into foam, scraping texture into clay, and even bundling brush bristles into bundles and gluing them onto a substructure (although that sounds pretty time-consuming).

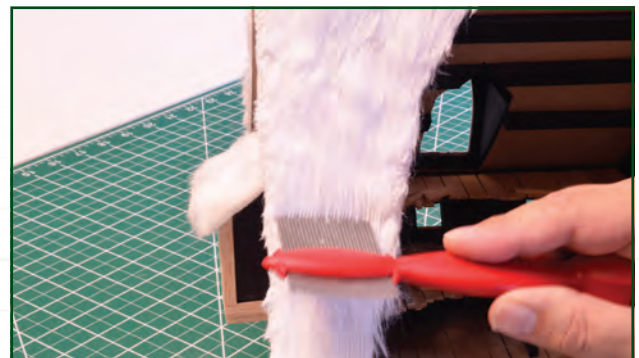
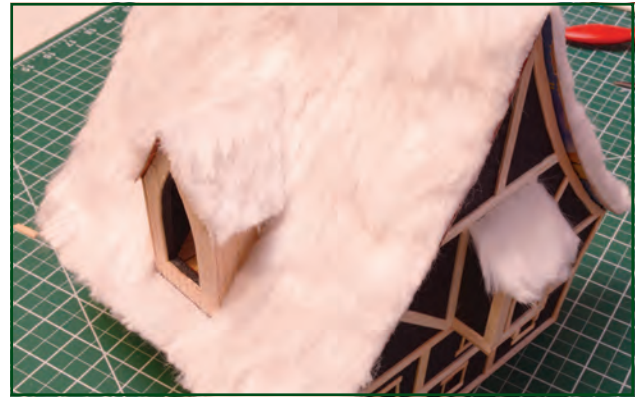
One of the more popular ways to go about it is to use faux fur – AKA teddy bear fur – combed and glued in such a way to give the impression of the volume and texture of an actual thatched roof.

The first thing to do is to create the substructure of the roof. The thin cardboard of a cereal box is ideal, since it can be bent to match the curves of the walls/eaves. It is important to get your faux fur sheeting cut as close to the roof shape as possible at this early stage, so use the cardboard substructure as a template to trace round.

When you are buying your teddy bear fur, it's a good idea to get it by visiting a physical store, if you can. Faux fur comes in a number of different lengths, and you can't get a clear idea of how long it might be when shopping online. Not to worry, you can give it a haircut if you need to.

Once the faux fur has been cut out and checked against the roof substructure for fit, it can be trimmed (if the individual strands happen to be too long) and combed to reduce the amount of fur you have to deal with. Then you need to glue it down. Hot glue is perfect for this, as it will bond well to both the underside of the fur and the cardboard roof substructure. When the glue is set, comb the fur again. Whilst you could use any sort of comb, the best kind is known as a "nit comb", used for combing nits (head lice in the U.S.) out of hair, because the teeth are very close together and give a more realistic texture. (It's the ultimate "fine-toothed comb".)

The next stage is perhaps the messiest, but is also the most important. Paint the fur with thinned PVA glue (1:1 ratio of water to PVA). Make sure the glue goes all the way through to the roof substructure, and all of the fur receives some of the thinned PVA. With the fur soaked in glue, comb it with the nit comb again, to give the fur the texture and feel of bundles of thatch. As you comb, some of the water/glue mix will drip out, so do it over old newspaper or something that can be easily cleaned up. Once the glue has dried completely, tidy up the edges with a pair of scissors.





Painting the Ruined Inn

Sometimes large structures can seem very daunting to paint. Much like any project, however, it's just a matter of breaking things down into stages. The upper floors here were addressed either as part of the exterior walls, or the thatched roof, or the interior. Basecoating was applied to these three sections as follows: the interior was sprayed with black, the roof with a mid-grey, and the exterior with an off-white.

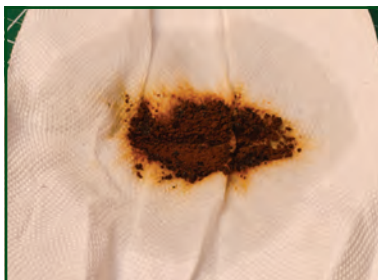
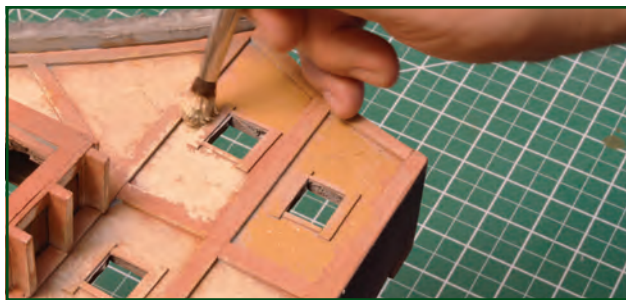
The exterior surface was then washed with a mid-brown, to give some colour to the shadows on the daubed panels. Texture was added to the panels, using a stippling technique with a sturdy round brush for the base colours and highlights. The timbering was washed with a dark brown/grey mix, designed to bring out the grain of the timber and give it a weathered feel. More weathering was added with grey and green washes splashed and streaked along the lower edges of the panels.

The thatched roof was washed with a desaturated green to give it a feel of creeping rot and decay, and then, once that was dry, the thatching was drybrushed with a light grey.

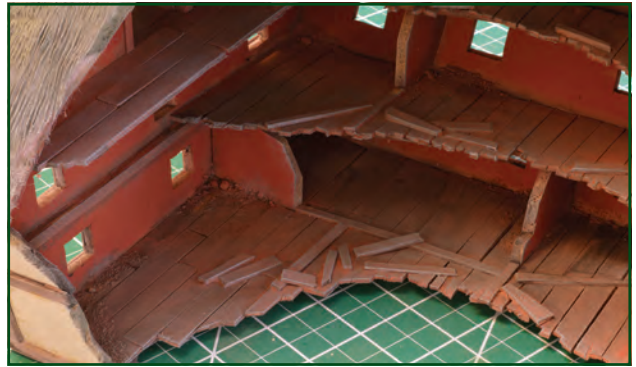
The interior was painted to match the ground floor common room, with the floorboards receiving a couple of grey drybrushes to accentuate the weathering of this previously unexposed wood.

Although the inn as a whole survived the fire, it was not without damage. To show the effects of the flames, smoke, and soot, black paint was airbrushed around the windows, the edges of the floors, and piles of rubble on the ground.

Finally, the grasswork was added to the base and some scenic products were used to give extra volume, like the brambles sprouting from the rubble and the ivy climbing up the outside of the ruins.



You can use wet teabags, coffee grounds, or instant coffee wrapped in paper towel (like I've done here) to stain some printer paper that gives you a color just perfect for old or weathered parchment. 'Wanted' posters and pages from newspapers are great for adding that ramshackle look just perfect for post-apocalyptic sci-fi AND fantasy!



BUILDINGS



SCI-FI INDUSTRIAL CITY

Urban warfare has long been a brutal thing. Streets and buildings provide lots of effective cover, and the result is grim, close quarters combat. Buildings, more than any other terrain feature, are the things that evoke the time period or genre setting for our wargaming, so it makes sense that many science fiction games take place in a futuristic urban setting.

When planning your sci-fi urban table, consider what may be the key, or strategic objectives. What are your soldiers going to be fighting over? It could be the hab blocks or city parks, but often it will be the industrial areas rich in valuable resources like fuel or technology.

When you are working out what structures you want in your urban terrain set, you'll find lots of useful cover in the industrial areas. Start with those first and you can always add more residential and leisure areas later.

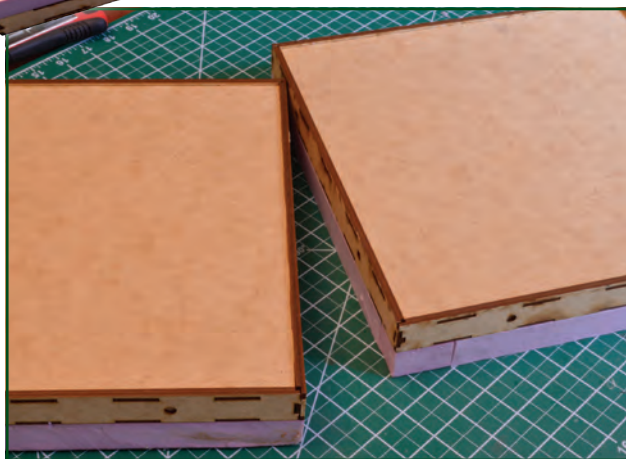
Working with Modular Urban Tiles

Modern or Sci-Fi cities are best adapted to modular tiles as you can easily apply "the grid" to them. Repetition and consistency of measurements are key, and breaking from the grid must be deliberate and will create a feature.

The two tiles shown here will be part of a larger set, initially creating a 3'x2' board for *Warhammer 40,000: Kill Team* games, so it's important to present the parameters up front:

- All tiles to be built on these sturdy MDF boxes
- 25mm (1") XPS foam to be used on the surface
- Half to two-thirds of tiles will include a 3.5" road on one or two sides
- Any pipework connections to be at the edge centre (6")

At this point you could also layout the specifics of paint schemes and other material choices, such as the 150-grit sandpaper used for the roads, for example.



Building a Blockhouse

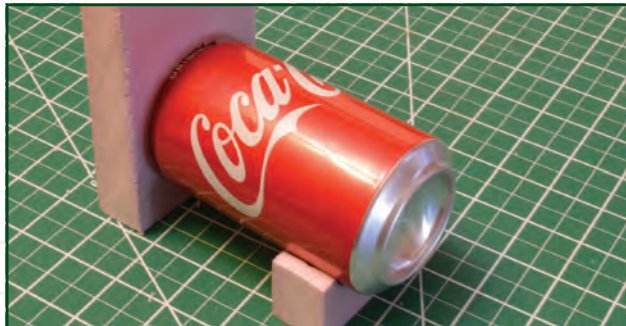
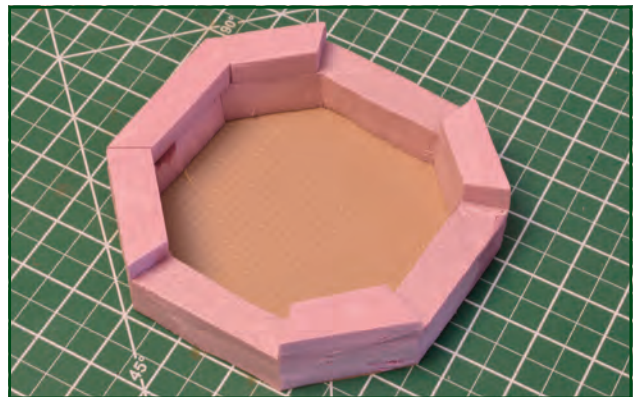
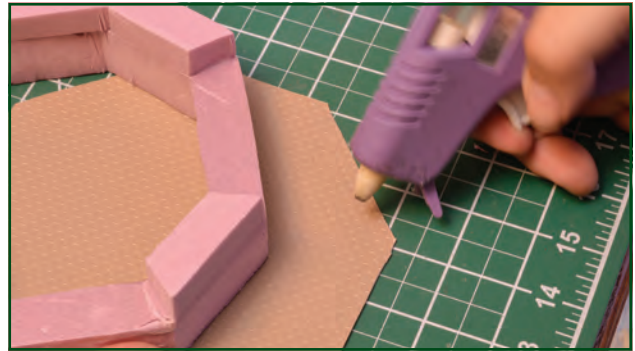
To give the impression of layers of poured concrete, bunkers or blockhouses are best constructed from XPS foam, but in a pinch, layers of foamboard can also be used. This blockhouse was cut from a layer of 25mm (1") foam, and the spacers between the vision slits were cut from a 10mm thick sheet.

To help the industrial feel, the building was lined with sections of sheet styrene, including one with a diamond-plate pattern for the floor. Whilst PVA could have been used to attach the styrene to the XPS foam, hot glue was the final choice.

Sometimes you are faced with a choice of two apparently equal options, but sometimes it turns out there's a clear winner. In this case hot glue not only dried faster, but it created a more permanent bond on a piece that might see a lot of use. The only downside is that you can't apply hot glue without a hot glue gun!



After some filler was used to cover gaps and smooth out some rough areas, a top and buttresses for the blockhouse were cut from 25mm foam. Note: the blockhouse was not attached to the tile just yet!

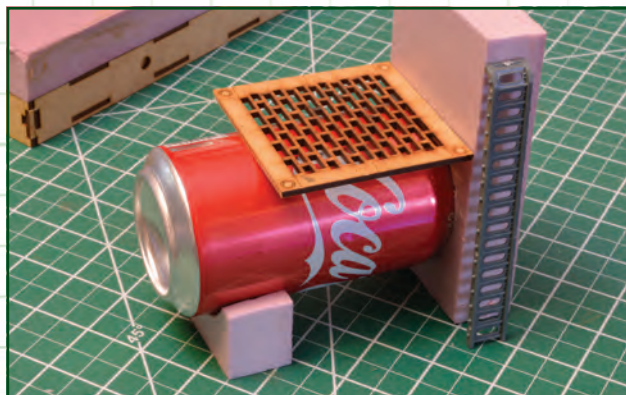


Assembling a Storage Tank

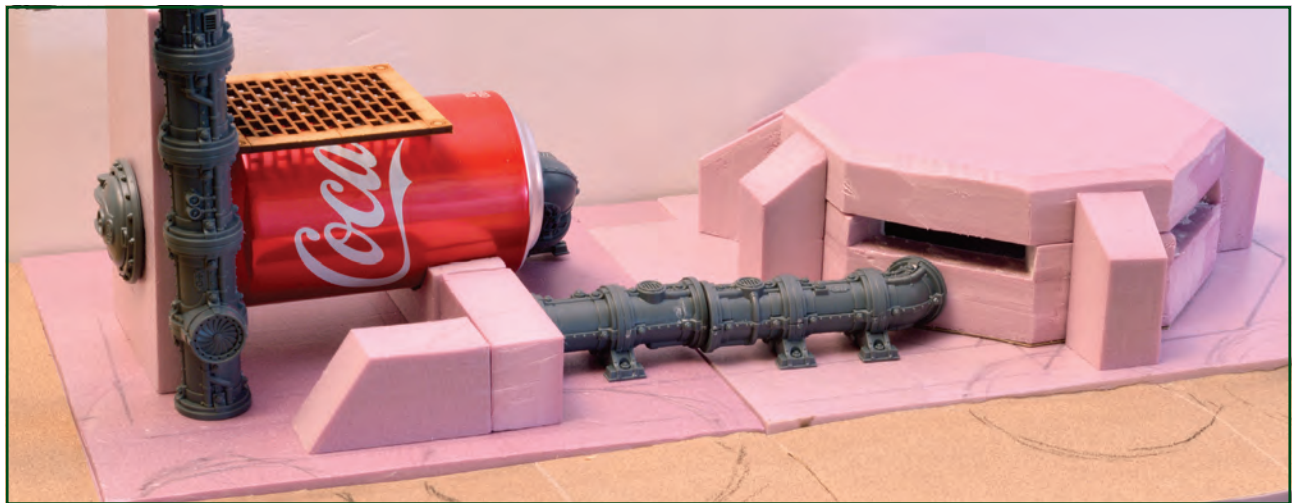
Whilst there are many excellent plastic kits that you can use to make industrial elements like storage tanks and the like, it's always a lot of fun to "reuse" something that will also do a great job. Make sure they're thoroughly washed and dried before you start gluing them down, though!

The concrete blockhouse and several low walls were already planned for the tiles, so it made sense that the drink can would be embedded in or resting on concrete structures. These were carefully cut from 25mm XPS foam and the can was then hot glued into place.

Sometimes as you are building, a little bit of inspiration can strike. Keep an eye out for those moments so that you can follow your muse, as long as it doesn't derail you completely. On this build I wanted to make sure this storage tank wasn't simply a large, line-of-sight blocking piece of terrain.



The storage tank was given a bit of additional use by incorporating two elements from the bits box. The laser-cut MDF panel would make a great observation/sniper platform and the ladder would be the way models could access it. These elements were not glued down to make it easier for painting them later on.



Dry-fitting, gluing, and battle damage

When you are building modular pieces, dry-fitting and scale checking is very important. There's no point in defining the parameters for a modular set, if you don't stick to them. The best idea is to lay out all your elements, slide them around, and adjust arrangements until they fit perfectly. Once you have them in the right spot, trace around them carefully so that you know where they are going to be glued.

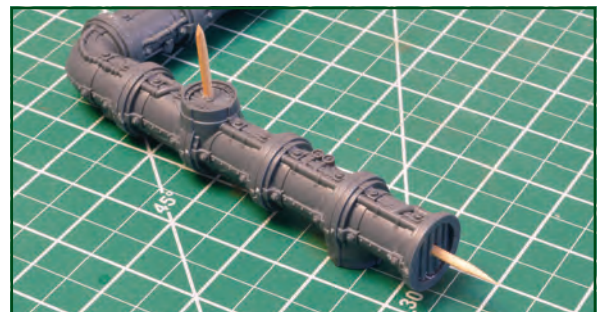
Only after you've defined where everything needs to go, should you start gluing things down. PVA is going to be best for gluing XPS to XPS, and hot glue for any plastic to XPS bonds. Give all the glues the time they need to dry properly before applying the battle damage.



This is the point where it's really important to have patience. Seeing it all come together and then wanting to race ahead to the craters and so on can be really exciting. Stop. Glue everything down at the end of your session, so the glue time has plenty of time to dry before you resume work.

At this stage, all of the "concrete" elements were given a little bit of a trim along the edges, replacing any sharp edges with a slight bevel. This made it less likely that the texture filler, to be applied later, would be accidentally knocked off.

The craters were initially cut out with a snap-off knife, then some areas were dug out a little deeper with the sharp end of a sculpting tool, and irregular chunks were cut from the concrete walls.



Stability on Vertical Elements

The vertical pipe on this build needed some additional securing to withstand the rigors of gameplay. I simply drilled into the two connection points and glued in BBQ skewers that would help to keep everything in place. The pipes are from Games Workshop's Thermic Plasma Conduits set.

Building up the Texture

The next steps might seem a bit tricky as there's a bit of crossover between the build stage and the texturing stage. Just keep thinking in terms of those two distinct stages, and all will be well.

The final part of the building stage was the addition of some DAS modeling clay to build up the edges of the craters, and while that was drying, the filler texture was stippled onto all the concrete structures, including the slab on which the buildings and pipes were built.

As the DAS was drying, some larger stones (representing chunks of concrete) were pushed into the clay and glued into place. Once the DAS was dry, the rest of the groundwork could be completed, starting with the application of the larger grit and working through to the finer sand spread around the craters and into the corners of the walls.

Any area like this will have a lot of tiny boots tramping all over it, so it is important to make sure you apply that final sealing coat of PVA to keep everything in place.

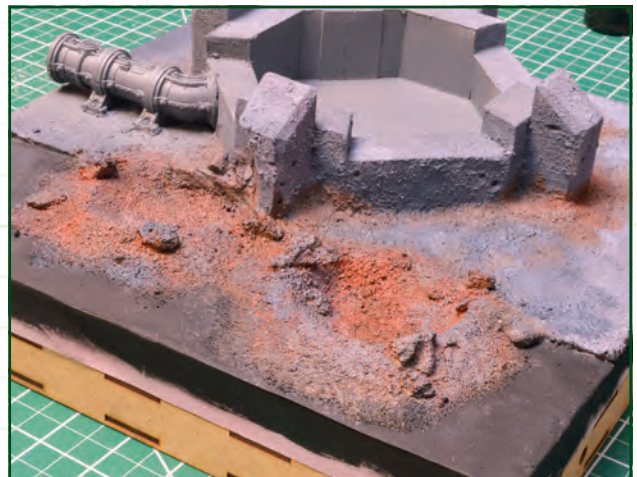
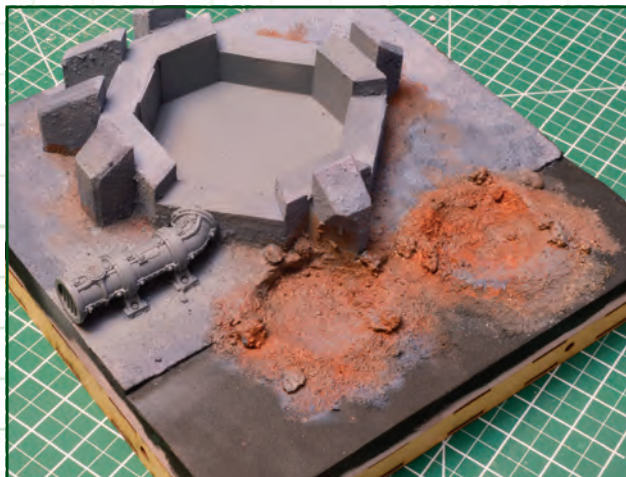
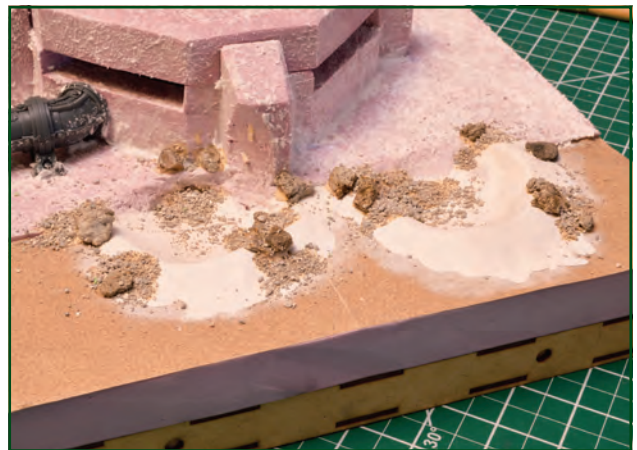
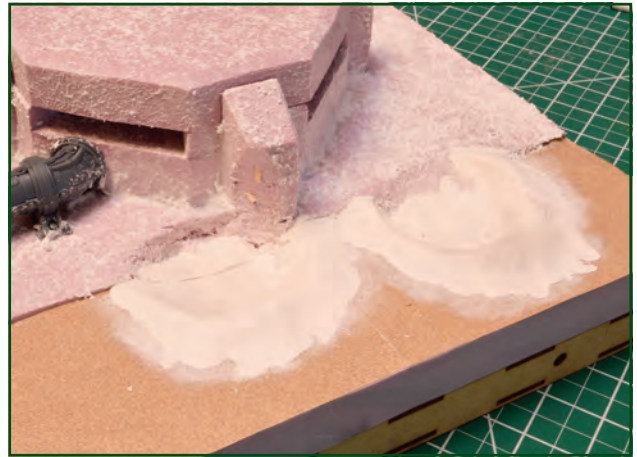
Painting the Basecoats

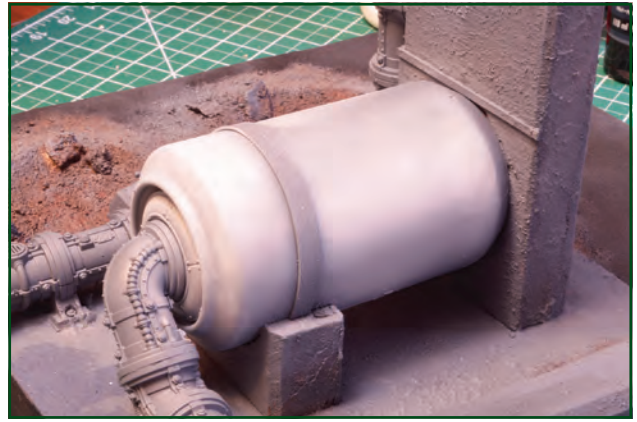
Putting basecoats down in a nice, solid fashion is the key to a great foundation for the rest of your painting. When you are working with a piece that includes the chaos of destruction as well, you can really have some fun in starting with a loose style.

First, the road was painted black, and then the concrete painted grey. The foam surfaces were covered first with acrylic paints, and then the other surfaces (inside the blockhouse, the pipes, and the storage tank) were sprayed with a mid-grey spray paint, both for speed and to maintain a smooth surface.

Next, the craters were painted with a mid-brown, and then patches of grey and brown were painted randomly around them. The aim was to give everything a rough and chaotic look, so a mix of these two colours was then stippled around the base of the walls, where wind-blown debris would gather, as well as over parts of the craters. At this stage, everything looks a bit rough and ready, but it will all be tied together by the drybrushing which comes next.

Next time you are out for walk, take a moment or two to notice the variety of colours that make up everything you see. The concrete path you walk on will have a different tone from block to block, and a painted brick wall will look different from different angles. Replicating this in your terrain building will add loads of realism!



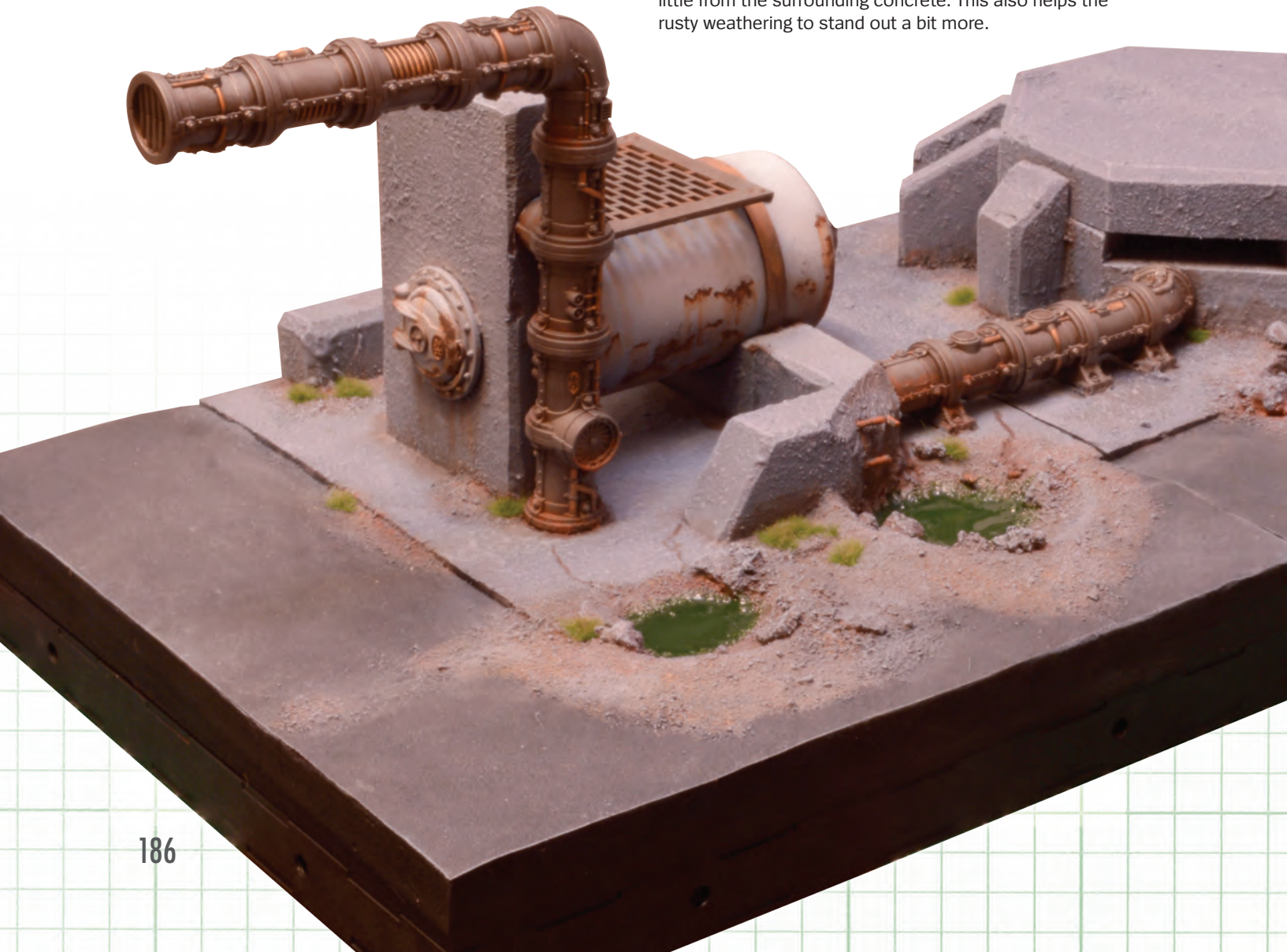


Bringing out the Textures

It is amazing how much a quick drybrush can tie everything together. All of the elements (road, concrete, and craters) were given a drybrush of a light grey to really pick out the texture and provide more depth. Whilst each area has its own colour and texture, the drybrushing ties them all together well.

The pipes and other metal pieces were given a basecoat of a dark bronze, and then drybrushed with a gun metal, to pick out the textures and surface details on them. To add some visual interest, certain parts were painted with a bright, brassy colour.

The storage tank (and the hatch on the other side of the wall) was sprayed with an off-white, to help it stand out a little from the surrounding concrete. This also helps the rusty weathering to stand out a bit more.





DETAILED WEATHERING - RUST

Most painting is done with water-based paints and products, but occasionally, you'll get better results if you use some oil-based paints. This storage tank was first given some dark brown patches, using a sponge, to suggest areas where the paint might have suffered damage and been scraped off. After that, the piece was given a coat of a spray varnish to protect it from the next set of products.

When the varnish was dry, some oil-based, rust-coloured pigments were applied to the scuffed areas with an old paintbrush, and left to sit for a few minutes. Then, using a brush dipped in white spirits (mineral spirits), the rust pigment was dragged downwards, to create the effect of streaking rust.



Adding the Final Details

With the final painting and drybrushing done, the final details could be added - some weathering, grasswork, and puddles. In addition to the detailed rust streaks on the storage tank, some other rain streaks and rust stains were added, mostly around the corners of the walls, and running down from battle damage and exposed rebar. Rather than use the oil-based products described above, thinned acrylics were painted on in several layers to give the impression of a buildup of weathering.

As the piece was very desaturated - all browns and greys - some bright green tufts were used to give a little "pop" to the tiles. Once glued down, these were given a quick drybrush of a bone colour to knock back the saturation.

Finally, the craters were given the "muddy puddles" treatment. Several thin layers of Realistic Water mixed with a green ink were applied, making sure to brush the edges of the meniscus to pull the surface out into the sand texture.

Everything we've learned over the course of this book, from uses of different materials and techniques to specific planning decisions and detailed methods, has been applied to each of the feature builds for these chapters. If something you are planning to build seems daunting, know that all you need to do is take your time, break it down into smaller chunks, and then... crack on!

THE SKY'S THE LIMIT!

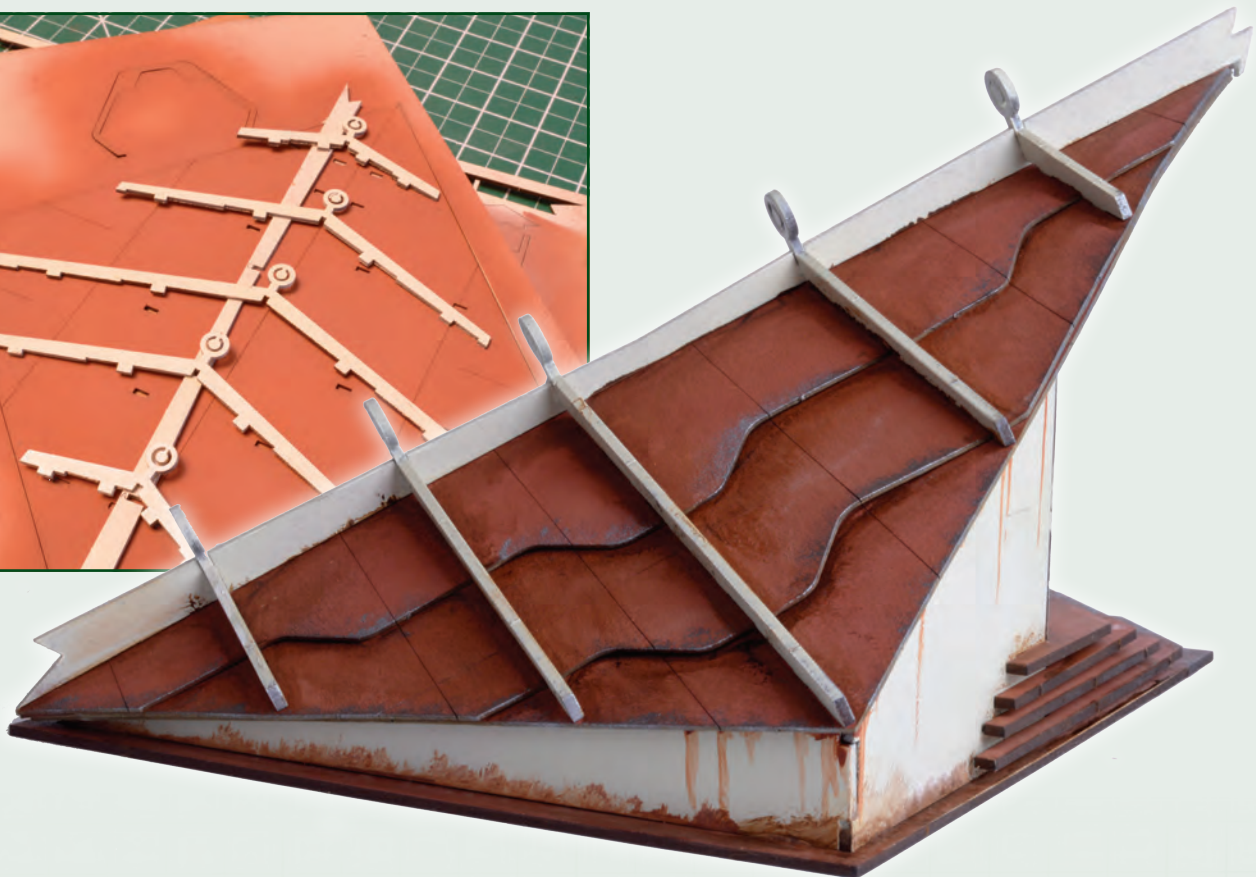
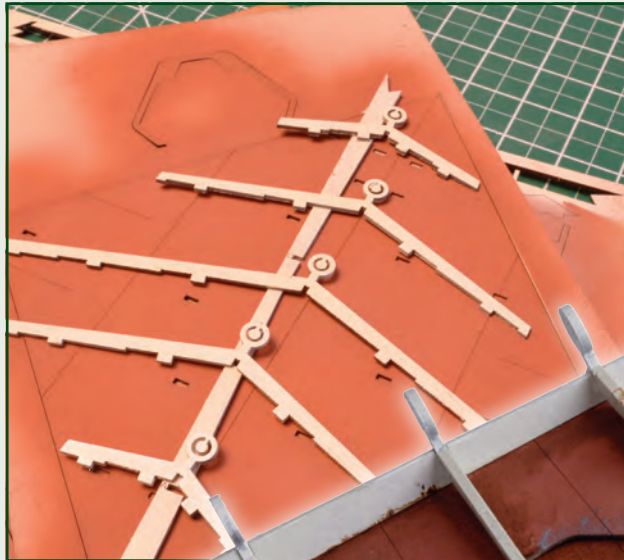
When creating your buildings, the regular limitations still apply - purpose, materials, costs, build space, transport, storage - but otherwise your imagination can take you to the most wonderful civilizations and societies, whether they're from history, the creation of someone else, or from the depths of your own creativity. As Terrainiacs, we regularly explore amazing worlds. Give your creativity the space to build something awesome and the sky's the limit!

WORKING WITH KITS

MDF, PLASTIC, AND CARDBOARD

MEL'S DEEP THOUGHTS

Commercially available building kits are a great way to get high-detail, large features on the tabletop relatively quickly, helping you to bridge the gap between basic scenic work and more involved buildings work. Kits often allow a small collection of buildings to be made, but for maximum usability and cost benefit, it's a good idea to combine them with other scratchbuilt buildings to expand your number of pieces and increase your level of detail.



KITS CAN GET YOU STARTED

If you're short of time, building kits can be great. But they can also stand out on the tabletop as obvious kits - especially if you use them without any customisation. You can enhance pre-made buildings and make them more unique by adding scratch-built pieces and bits from other kits. An effective approach with flat kits made from MDF or cardboard, is to add some texture or curves.

Bases are an excellent way to increase the size of the piece, bumping up the footprint of the kit and allowing you to add other elements and features. Putting your building kits on bases also makes it much easier to tie them into pre-existing collections and settings.

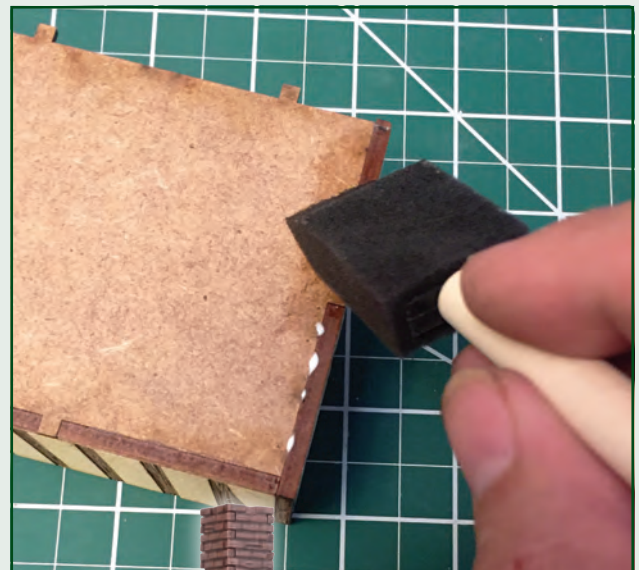
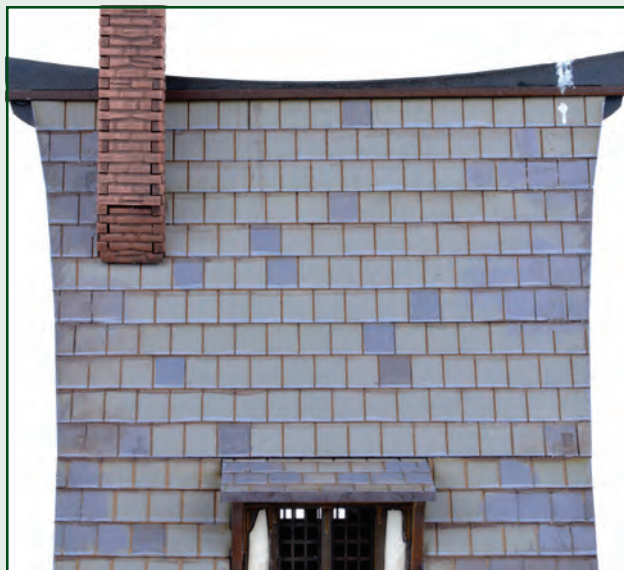
As Terrainiacs, we pride ourselves on being able to do it all from scratch, but it doesn't always have to be that way. Commercially available kits typically provide some substantial benefit like saving time, being more durable, creating a consistent look, or sometimes all of the above. Whenever you get the opportunity, take a look at these kits and think about how they might make your life easier.

MDF TERRAIN

MDF is one of the most commonly used materials in commercially available kits. Terrain manufacturers have pushed the limits of the technology to create kits that range from ancients to grimdark science fiction. Regardless of the manufacturer, there are a few common approaches to be taken when constructing MDF kits:

- Wipe any laser-burn residue off the MDF sheets with a damp cloth. The residue can soak through paint and affect the colour. This is particularly noticeable with light colours and on pieces to be snowed up.
- Dry fit the pieces before applying any glue.
- During construction, to avoid PVA blobbing along the joins, wipe them with a damp, fine-bristled brush or sponge.
- Use clamps, rubber bands, or even magnets whilst your assembled kit dries.

Due to the nature of the material, MDF kits are typically very flat with sharp angles. The addition of rounded features such as barrels, pipes, and round chimneys can dramatically increase realism.



Unprimed Kits

Almost all MDF kits come in “raw” form, where nothing has been done to the sheets of MDF before they go into the laser cutter. Raw MDF can absorb an incredible amount of water and, therefore, thinned acrylic paint. Before you apply any basecoat, it’s a great idea to seal the MDF; use spray primer, hair spray, PVA glue, Mod Podge, or a matt varnish.

Colour primers, with colour-matched acrylics, are great for spraying individual sheets before construction. Painted sheets can be also drybrushed, detailed, and washed before assembly. Elements of the example on the opposite page were sprayed with Fur Brown (from The Army Painter), and a bone-coloured spray, before they were assembled and detailed.

Some manufacturers add extra layers of material to create depth, and you can increase the effect by exaggerating the shading and the highlights, much like on the example building. By using a mix of washing and stippling techniques, the roof has been given a distinctive, textured appearance.

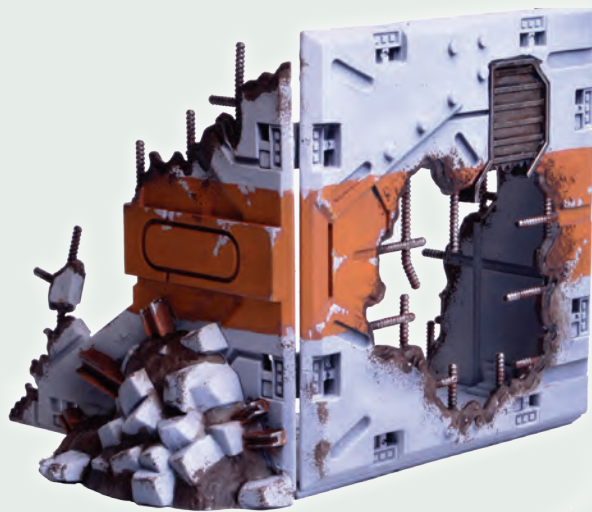
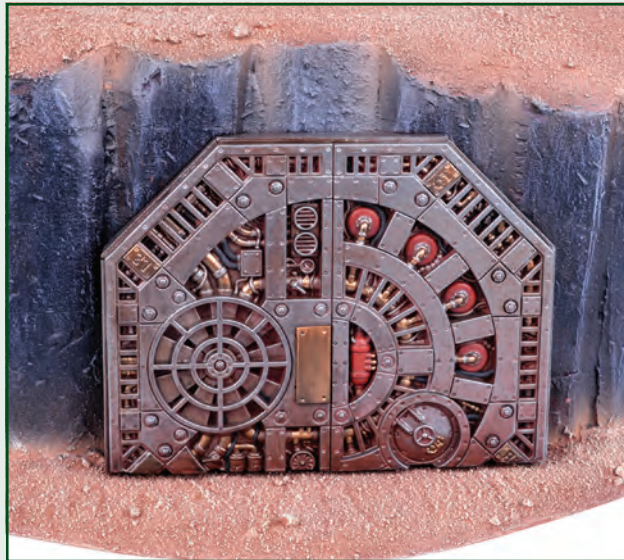
Pre-Primed Kits

There are a couple of MDF terrain manufacturers who supply kits ready-primed in a particular set of colours. These kits are designed for gamers who want something they can assemble and use straight away, and these are great for that. However, they also provide an opportunity to spend the time saved on priming, to add a greater level of realism.

For instance, you could:

- Fill in the gaps around the tabs used for assembly. This will give a smoother look across detailed surfaces.
- Paint shadows and highlights to give a more three-dimensional look to some of the flatter surfaces.
- Add weathering and other details. Things like layers of dirt, creeping vines, cracked plaster, and other debris will help create a “real world” feel.

Put these kits on a base and add details to match the setting to create some wonderful feature pieces in your collection.



PLASTIC TERRAIN

There is a growing number of plastic terrain kits available, too, not only for fantasy and sci-fi settings but also for historical gaming. Plastic kits, on the whole, are very detailed and therefore can save an incredible amount of time on a build. Of course, this time-saving comes at a price. Making large, intact structures can be expensive, and it is sometimes better to look at ways to integrate the detailing into your large scratchbuilds.

The detailed surfaces of plastic terrain kits means that they can be painted up very quickly. It's best to use spray primers and, depending on the colour scheme you've chosen, zenithal priming can be very effective (priming with a dark colour first, then priming from overhead with a lighter colour). Softer plastics sometimes react strangely with spray primer and become tacky, so it's best to brush prime them first.

Pre-wash plastics in soapy water and rinse thoroughly to remove any remaining release agent (used to help eject the plastic from its mould) and avoid it messing up the priming/paint stage.

Once you've primed the kit, it's best to use drybrushing and/or washes to bring out as much detail as possible. These are both quick techniques, and shouldn't take much time at all.

Combining plastic with other materials

Sometimes you might want to add a doorway to a cliff face, or show the way out of a dungeon through a burial mound. With so many plastic kit options available, it's quite easy to blend things together. Just remember:

- Plastic glue is obviously best for gluing polystyrene pieces together, but gel superglues are the best for gluing them to most other materials, except foam. A latex glue, thick PVA, or hot glue creates the best adhesion between plastic and foam.
- Plastic pieces should be spray primed before the build stage, if you plan to combine them with foam or other materials that it's not safe to use aerosols on.
- Recycled plastics are a great resource for creating additional details, but flexible bottles and other "bendy" plastics need internal support to help prevent the material from flexing, causing the paint to flake off the finished piece. Alternatively, you can reduce the risk of flaking by using these materials in more protected areas of your build, where they are less likely to be subject to any bending, twisting, or impact. This was the approach with the straws/pipes in the example above.

As with fully scratchbuilt pieces, planning is key. Time spent thinking things through before you start building is never wasted, and may save you a lot of heartache and complicated fixes later.

CARDBOARD TERRAIN

One other type of commercially available kit is cardboard terrain. These kits are definitely designed to add some 'cheap and cheerful' scenery to your tabletop. Manufacturers like Battle Systems produce a wide variety of slot together kits that are essentially, sturdy, punch-out, cardboard pieces, printed with very detailed artwork. At arms' length, they can look like incredibly detailed builds, but they're actually very easy to assemble. In many ways they are similar to MDF kits, although not as sturdy or durable. They are, however, cheaper and easier to turn into a finished piece.

Here are a few suggestions to get the most out of your cardboard terrain:

- Use coloured Sharpies to colour the white edges of the cardboard, disguising the nature of their construction.
- Run some thin super glue along the edges to give a tougher edge that will hold up to more use.
- Add some smaller bits (plastic or wood, depending on the genre) to help break up the flat panels and give larger panels more rigidity.
- Accentuate the depths and highlights on the printed art with some weathering and washes.
- Adding bases to your pieces will both improve durability, and help tie them in with the rest of your collection.

Cardboard terrain pieces are the easiest to combine with each other. Take your sci-fi bits and glue them to post-apocalyptic pieces for a grungy, shanty town look!



FINAL THOUGHTS

When Mel and I first discussed putting together a book about building terrain, we brainstormed at least a dozen different ways that we could present a lot of varied information. For hours we threw around ideas, explored formats, and wrestled with the best ways to present it all. In the end we decided on a format that is, in our minds at least, very efficient.

In this book, Mel unloads his decades of knowledge about building wargaming terrain, from the first steps – planning – through the informational foundations – materials and techniques – and then on to the practical applications. Each chapter builds on the lessons learned in the previous chapters without going over the same old ground every step of the way (there are some exceptions, of course, but not too many). Mel has covered all of the essential information (as it “says on the tin”) and when you embark on your larger projects, you’ll be incredibly confident you can find your way, with everything you need to know in these pages.

It has been a long road to get to this final form, this *Terrain Essentials* book you are holding, a road filled with obstacles and detours, but we’re so very grateful for the patience and kind words of all of our wonderful Kickstarter supporters who made this journey possible – the glorious Terrainiacs who have been here from the beginning. We’re very proud of this tome and we hope it will be everything you expected and more.

Thank you all!

– Dave Taylor, Publisher
Dave Taylor Miniatures



TERRAINIACS' ROLL OF HONOUR

THANK YOU TO EVERYONE WHO SUPPORTED US



In March and April of 2019, Mel Bose and Dave Taylor ran a Kickstarter campaign to help fund the creation of this very book - Terrain Essentials. They figured they would have some support, and that the project would be funded. They were not quite prepared by the amazing support they received, with over 5,000 Terrainiacs stepping up to make it all a reality. It is these supporters (and more) who are listed here.

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David Higgins	David Wood	Devon "KillyHurts" Montoya
David Hillyard	David Wright	Dewey C. Haines
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David "Dead Dave" Johnson	Davy Flament	DGS Games
David Jordan	Davy Rijsmus	Dicemaster

Dídac Ribatallada Soriano
Diego "Son of the 7th" Flores
Diego Martín Gómez
diegom
Dillon Thompson
Dino Nowak
Dino V.
Dion (Aetheriac) Sayles
Dionne Clark
Dionysus Birnbaum
Dirk Beijaard
Dirk Ignatzek
Dirtypenguin
DJ Blake
DM TrevWar
DMcPhed
DMG Designs
Dobrag Starslayer
Doc Schott
Doc Wiseman
Doc_Plutonium
DocR@ven
Doctor Perils
Dom B.
Dominic Longoria
Dominic Mora
Dominik Wulf
Domus
Don Avis
Don Bleeker
Don Christianson
Don Fritz
Don Mac Intyre
Don Penney
Donald Gaither
Donald J. Lane
Donald Wendt
Donut Lover
Doomsdave Morris
Doomzombie
Dorian Baldwin
Dorr Perkins Dearborn
Doug B.
Doug Chapman
Doug Entwistle
Doug Pickard
Doug Sundseth
Doug Ummel
Dougie B.
Douglas A. Ashbaugh
Douglas Hamilton
Douglas Webster
Douglas Wilson

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Dragonpaulz
Drake Coker
DrakoTrogdor
Dreamofneverwaspaints
Drew Amo
Drew Cox
Drew Hyatt
Drew Peterson
Drew Thayer
DreyXik
Dries Bierens
Drill
Drofkcah
Drogo Knotwise
Dru M.
Dru Staltman
DT
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Duderson
Dun Wanna
Duncan Allen
Duncan Jardine
Duncan Mellonie
Duncan P.
Duncan Petrie
DustClaw
Dustin Lowers
Dustin Storey
Dusty Neal
Dustyn Jensen
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Dylan Brooks
Dylan Cole
Dylan Devine
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E. Dave
E. J. Reynolds
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Eamon Duffy

Eamon Linger
Eamonn Patton
Earwaen
ECJ
Ed
Ed Blaauw
Ed Bonthron
Ed Hamacek
Ed Kearns
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Eirik Lundahl
Eivind Pagander Tysnes
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El Sobrino
El_Portus
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Elias Roos
Elizabeth Hodgson
EllenJ - John Lipman
EllTee
ElPolloDiablo
Elpotof
Elrond de Gravenesse
ELRS
Emanuele D'Agostino
Emil Sjödin
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Emil's Sudenpeliluola
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Eric Harris	Evan Miller	Fran Mendoza
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Eric D. Meixner	EW Huff	Frank "Ivellos" Canapino
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Ericksson	Farnir	Fraser Hepburn
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Erik Boling	Fatty Miniatures	fred fred
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Erik Oerlemans	Ferret Lottery	Fredrik G. Larsson
Erik Petersen	FigJam	Fredrik Torp
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Ermodifica53	Fiz	Furry G.
Erwin	Flatland Hillbilly	G. N. Bickley esq.
Erwin "skydiver" Goossens	Fletch	G. Hagk
Estarriol	Flintlock Jack	G. Lancia
Estevao M. Alves Correa Filho (The Painting Frog Blog).	Flipsided564	G. Poulton
ET1000	Flor	Gabitzu
Ethan Deal	Florian Fernandez	Gabriel Trigo Antunez
Ethan Heywood	Florian Fourniaud	Gabriel Harris
Ethan Leggett	Florian Letz	Gabriel Herrin
Etter	Florian Wyss	Gabriel Merin
Euan Smith	Florian "DaFlo" Zarkov	Gabriel Soriano
Eugen Bacic	Flossie	Gaby B.
Evan A.	Flt. Lt. Philip Richardson 59 Sqn.	Gaddafi

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GameCraft Miniatures
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Gareth "G_Man_007" Green
Gareth Humphrey
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Gareth Q. Barrett
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Garnet Doyle
Garrett Chapin
Garrett Gatzemeyer
Garth L. Thomas
Gary Barber
Gary Bazett
Gary "HopelessChatter" Cook
Gary R. Criss Jr.
Gary Hite
Gary Hodges
Gary Krieger
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Gavin Beardsmore
Gavin Bethea
Gavin Cliffe (PlutoniumOD)
Gavin Garza
Gavin Moorcroft
Gavin & Keon Riddle
Gavin Shanks
Gaz de Radcliffe
Gaz Walsh
Ged Trias
Geek84
GeekTinker
Gene Baker
Generic Eric
Genestealer Josh
Gentle Fury
Geoff Andrews
Geoff Barrall
Geoff Hummel
Geoff Light
Geoffrey Ayton
Geoffrey Kilar

Geoffrey Moxley
Geoffrey Wing
Geoffroy Sir
Georg "The Great Pumpkin" Eyerman
Georg Malter
George & Lonnie (Texas Terrainiacs)
George A. Raife, The Space
Men With Guns Podcast
George Anderson
George Antonakos
George Atkins
George Bratton
George Breslin
George Gaspar
George Kiernan
George M. Casper
George R. Paulishak
George Sea
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Gerald Leung
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GermanGrump
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GH Trace Webster III
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Gianni Rossi
Gianpiero Mas Nicovani
Gigantic Fungus
Gil Ocampo
Gilby
Gillies Sim
Ginge HB
Giulio "ingcaz" Cazzoli
Gjalder Gjalarton
Gkaragkounis Matthaios
glanz90
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Glen Moises Campey
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Glenn McLeod
Glenn Pergande
Glenn Stark
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Goats
Golden Poppy
GoldenGoblin
Gonzalo Herrera

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Grimbou

Grither	Harry Beans	Hugh Wilson
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Groovynatureguy	Hartmut Stoevers	Hugues "Zug" Valat.
GrumpyGuyGaming	Harvey Howell	Hunter
Grunt slayer	Harvey Lopez (aka Thrillos)	Hunter Blackmon
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Guillotine	Heather Blandford	Iain S. McPherson
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Hal Mangold	Heywood Jablome	Ian Morris
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hallixx	Hipster Devil	Ian Porter
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Hamwrangler	Hobby Bunker Schriesheim	Ian Schlientz
HanabiCraft	Hobby Man	Ian Sherrington
handis69	Hobby Painting Brussels	Ian Smith
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Hank Padilla	Holger Surray	icarusundone
Hannibal l'Hector	Hopeless Hirenfield	Idilio Santos
Hanno Lippert	Hopper Crain	Ignacio Assaf
Hans Betterman	Hotrodoj	Ignis-Fatuous
Hans Hansen (HL)	Howard	Ignominus Pjosk
Hans Johansson	Howard Andrews (@Minileed)	Igor
Hans Lemke	Howard Dalzell	Igor Fernandez
Hans Petter Farstad	Howard Gibson	Ilmari
Hans Winterfeldt	Howard Hagan	ImCrawford
Hans-Henning Wenkel (aka Nestor Pumilio)	Howard Tee	Imredave
Hans-Thomas S. Hoffmann	Howard Wood	Incognita
Harbour	Hpstorian	Indra Geerts
Harley Picurro	Hudson Adams	Indy
Harpoon	Huge Miniatures	Infinity idiots i2DG
Harri Ylinen	Hugh Cringle	Inge de Goeij
	Hugh Dartington	Ingemar Holmkvist

Ingvald Arne Meland
Innykin
Insaan "Primebeef" Solorzano
Irchard Pirate
Ironclad
Ironheart Artisans
Irrumatio Reeves
Isla "The GC" Evans
ismilealot
Istvan Nemeth
itsacoyote
Ivan Kimák
Ivan Olariaga
Ivar K
Ivar van Rijn
Ivor Evans
iWillieG
iZubi
J
J-KON
J. Archer
J. Brian Pitts
J. Coppel
J. Cosme
J. Elliott Coleman
J. Frisk
J. K. Lassen
J. Le Rossignol
J. L. Longshore
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J. Majere
J. Maki
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J. Miles Reidy
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J.Sly
J.Ziebold
J4n Vinther Christensen
Ja Warlock
Jaakko Tusa

Jace Charron
Jacek K
Jack Cresswell
Jack Crundwell
Jack Garley
Jack Holbrook
Jack Hunter
Jack "Jerk" Jeck
Jack McCrary
Jack Rayner (Shaggy Wargaming)
Jack State
Jack "Shinlocke" Sweek
Jack Tivers
Jackson Brantley
Jackson Miller
Jackson Randall
Jacob B.F.
Jacob Branh
Jacob E Bliss
Jacob Foster
Jacob Jensen
Jacob Jørvang
Jacob Kessler
Jacob Kooi
Jacob Olander
Jacob Webster
Jacob Wilks
Jacob Woods
Jacques "Blackjack" Montaron
In Memory Of Jade Tinnerman
Jaden Evanson
Jaguar_Flemmard
Jaguthin
Jahmaia Williams
Jaime Herazo
Jaison Kane Koss
Jake Cook
Jake J. Gilhespy
Jake Leeman
Jake Puinno
Jake Reich
Jake Schneider
Jake T.
Jake Tilton
Jake Waltier
Jakub
Jam Ibanez
James Aldridge
James Barton
James Beauchesne
James Bowie Wilson
James M Brown
James Bruce

James Bunnett
James D. Cheney
James Cleland
James Conway
James Csupak
James Culbertson
James Cutts
James Davies
James T. DeLazzari
James Droegemueller
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James Glore
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James W. Hupp
James Isted
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James Leggett
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James Rocks
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Janus Holzmann	Jason Edward James Zapasnik	Jens Alsted Hansen
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Jared Sharen	Javed Mirza	Jens Persson
Jared Wagoner	Javithor	Jens Vedel Andersen
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Jase Duncum	Jay DeLeonardis	Jeremy Boileau
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Jason Donaghey	JDC	Jeremy Leveque
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Jesse Busch
Jesse Ervin - The Remembrancers'
Retreat Podcast
Jesse Goldstein
Jesse Hammil
Jesse Hurricane Conte
Jesse Jackson
Jesse Lowe
Jesse Vela
Jez Hunt - Ancestor Leathercrafts
JH
JHS
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Jim Underwood
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Jimbot
Jimi Tubman
Jimmy Cunningham - Kimo Krafts
Jimmy Edwards
Jimmy Negro
Jimmy Palm
Jimmy1080
Jinterz
JMD
JN
Joachim
Joachim Svela
Joakim Björklund
Joakim Fong
Joakim Strom
Jock MacGregor
Joe "Coot59" Ward
Joe Bailey

Joe Baird
Joe Bilton
Joe Blake
Joe Coleman
Joe creating a beach
Joe Firman
Joe Galego
Joe Gekko
Joe Giglio
Joe Holland
Joe Kelso
Joe Kirkus
Joe Koltas
Joe Levering
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Joe Pimentel
Joe Von Moltke
Joel Eddy
Joel Hall
Joel Lorente Aragues
Joel Marco
Joel Moon
Joel D. Rohne
Joel Shull
Joerg G.
Joern Schneider
Joey Mordecae Dimmock
Joey Von Otto
Johan "aniron" Arnehed
Johan Driessen
Johan MŠŠttŠ
Johan Nilsson
Johan Nilsson
Johan O.
Johan Olsson
Johan Vaneecke
Johannes Laboranovits
Johannes Venter
John Barnes
John Bates
John Beeson
John Bethel
John Bindas
John L. Blakemore
John Bonsai
John Bowers
John "Doc" Brader
John "Voivod" Buitelaar
John C. Byram
John Chadwick
John Christensen
John Ciaramella Jr.
John Cmar

John D'Aquino
John Daniels
John Daye
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John Doorenbos
John Duffield
John Emmett
John Erjavec V
John Ferris aka "DmliGloing"
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John Foster
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John Mayo
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John McShane
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John Niland
John Norton
John Payne
John Pelosi
John Pilkington
John Pitman
John Poitras
John Porter
John Potts
John Power Jr.
John Quarrell
John Rees

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John "Quartermaine" Robertson	Jon Stynes	Jose Tejedor
John Robich	Jon Tarry	Jose A Vasqu
John Rock	Jon "CAVBOSS" Walker	Josef Lenz
John Rogers	Jon Webb	Josef Ochmann
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John & Orion Saint-Buzon	Jonas Gennerich	Joseph "Omertron" Omer
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John "evernevermore" Scheib	Jonas Schiött	Joseph Boeke
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John Szelagowski	Jonathan Kenning	Josh Aitken
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JohnJack	Jono Winfield	Josh Pruitt
Johnny Atomic	Joop Wendigo Wagemaker	Josh Riggins
Johnny Cooper (Long Term Follower)	Joost	Josh Riley
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Joltron	Jordan Driedger	Josh Street
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JT Vaughn
JTA
JTA2
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K.D. Truong
Kacper Dlugosz
Kai
Kai Cursons
Kai McGregor
Kai "Avera" Ralfs
Kai Seidel
Kain2805
Kakita Michael
Kalin "Jenx" Kadiev
Kalman "DrGorgomel" Horvath
Kalrin Gaelieth
Kamil Pawlowski
Kane McDonald
Kane Miles
Kane Tucker
Kaoslave
Kara Roncin & James Wheeler
Kara Rosser
Karamiel
Karen J. Grant
Karen M Rhodes
Karl P. Andre Jr.
Karl Benisch
Karl Cassidy
Karl Downing
Karl Goodloe
Karl Hedstrom
Karl Murphy
Karl Pomerleau
Karl Thysoe Bjerre
Karol "Grot Orderly" Klimecki
Karol "Hirtus" Kwiatkowski
Kary Realm Master K Williams
Kash
Kass
Kat Swift
Kate Tollefson
Kathrin Fischer
Kathryn Hart
kauholz
Kawai
Keegan Evans (Mitrokhin)
Keegan Klemm
Keely Iverson
Keith Baggott
Keith Banks
Keith Bartlett

Keith R. Callow
Keith Conley
Keith Emi
Keith D. Hatch
Keith R Hershey Jr
Keith Jenkins
Keith Miles
Keith Nolan
Keith Pepin
Keith Spoores
Keith & Jacob Tan (SG)
Kelhendros
Kelley D.
Kelly "TheKollector" McCullough
Kelly Titus
Ken "Tail End Charlie" Cole
Ken Boone
Ken Chapman
Ken Hogren
Ken Miller
Ken Pearce
Ken Perry
Kenneth F. Allwine II
Kenneth Bartels
Kenneth Day
Kenneth Eldridge
Kenneth Micallef
Kenneth G. Smith
Kenny Beecher
Kenny "The Yeti" Cowan
Kenny Wildman
Kensboro
Kent Miller
Kent Fairman Wilson
Keopsy
Kerry Rivers
Kev Casey
Kev Hooper
Kev Powell
Kevin "Mr.Fluffeh"
Kevin Alexander
Kevin Barrett
Kevin Beal
Kevin Burns
Kevin Callahan
of Dungeons and Daiquiris
Kevin Carter
Kevin Cole
Kevin Coleson
Kevin Connolly
Kevin Devalck
Kevin Donald Brum
Kevin Fox
Kevin Furness

Kevin Genson
Kevin Gilbert
Kevin W. Gregory
Kevin Hermida
Kevin D. Hinds
Kevin J. Jenkins
Kevin K.
Kevin D. Kyrouac
Kevin Moore
Kevin & Joseph Phillips
Kevin Rapley -
The Immersive World Crafter
Kevin Ross
Kevin S.
Kevin Scully
Kevin Stonebanks
Kevin A Swartz, MD
Kevin Wilson
Kieran Walker
Kiko Villasenor
killakatz
Killer Spade 00
Killimore Evols
Kimberly Turriff
King Bluewolf
King Merit, Master of Minions
Kirk Haugen
KIXANO
Klaus Schächner
Koen
Koen De Smedt
Koen WINDELS
Kolja "Flashhawk" Geldmacher
Komoda
Konstantinos Lamp
Kraig McCarthy
Krazer
Kris Dawson
Kris Kerr
Kris Leysen
Kris R.
Kris Rader
Kristian Mueller
Kristian Magnus Pettersen
Kristian Wasilewski
Kristin Fiebelkorn
Kristleifur Porsteinsson
Kristof De Boeck
Kryptovidicus
Krystal K.
Krystian Kaczmarek
krzechu
Krzysztof Nalewajka
Kurt M. Criscione

Kurt Hoover
Kurt Zdanio
Kurtis Primm
Kylan Day
Kyle Bentley
Kyle Cameron
Kyle Crosser & Tom Radziszewski
Kyle Gibson
Kyle Guthridge
Kyle Kinghorn
Kyle Saritelli
Kyle D. Scott
Kyle Thompson
Kyle Toth
Kyle Wooten
Kyrellification
L. Sabia Byrne
L. W. Wood
Lamain
Lancaster
Lance Cohill
Lance Kidwell
Lang Jones
LargeGeek
Larry Curtiss
Larry Irish
Larry Kenney
Larry Vance
Lars
Lars Gottlieb
Lars Högborg
Lars "Doom of the Eldar" Madsen
Larsolle
Larzach
Lasse Badsberg-Hansen
LastSword Miniatures
Laughingboy BoW
Laurent Duputel
LauriL
Lawrence Alman
Lawrence F.
Lawrence Loy
Layandor
Layth AL-Najjar
Lazy Lich
Le com'
Lee B. Y.
Lee Brady
Lee Cook
Lee Costello
Lee Gale
Lee Johnson
Lee Langston

Lee Moran
Lee W. Jones
Lee Woodford
Leftenant Benedikt
Legendary Scenery - Paul Scrivner
Leif Drace
Leifur Kaldal
Leland Prestridge Jr.
Léo Galtier
Leo the Lion Kapiri
Leon Thonhauser
Leopold Goldimire
Leopold Zetterman
Leoric de Gatineau
Leslie Beilby-Tipping
Letang Cedric
Lewis Cole
Lewis Frasch
Lexi
Liam Colmer
Liam D.
Liam Evers
Liam Mottram
Liam O'Sh
Liam Phillips
Liam Thompson
Lihmeth
Limey El'Jonson
Lina Witzner
Lincoln
Lincoln Tidwell
Lindsay F. Webster
Linus Rovik Hauge
Linus Hesslo
Lionel Villemagne
Little Dave
Liz Birchall
LJB - France
Lloyd
Lloyd Lewis
Lloyd M
Lloyd Smith
Lo
Locky
Logan Anderson
Loke BattleMats
Lon A. Porter, Jr.
Lon Weiss - BrigadeGames.com
loophole
Lord B. Jenkins
Lord Chaplin
Lord Garrett Bunzel
Lord Humungous

Lord Skurai
Lorenzo "Baffo" Aretini
Lorenzo F.
Louis Britton
Louis Downs
Louis K. Barrera
Louis Mainville
Louis Pomaret
lovelyChap
Low Roller 1-1
Lowie
lowlylowlycook
Luc Odorico
Luc Teunen
Lucas Hogg
Lucas Schroeder
Lucifer
Lucifer War Machine
luckydog
Ludvig
Lue
luferox
Luis Bermudez
Luis C.
Luis Cordova
Luis Manuel "Manu" Martin Guerra
Lukasz Strojnowski
Luke
Luke and Jack Lowe
Luke Dixon
Luke Henry
Luke J. Baker
Luke Kellett
Luke Marre
Luke Nyland
Luke Sanby
Luke Snell
Luke Stevens
Luke Toomey
Luke Wetterlind
Luke Wood
Lyle Lowery
m
M-L. Schaefer
M. Beauchamp
M. Bishop
M. C. Womack
M. Czekay
M. Holyome
M. Huettel
M. J. Wheelden
M. Kevin Chau
M. Lammers

M. Leick
M. Levaggi
M. M. van de Sluis (A.K.A Eternal-
frost78)
M. McKeighen
M. ROGERS
M. Swann
M. Travis White
M. Whitehead
M3Studios
Maarten Schniedewind
Maarten van der Linden and Andreas
Kolliakos
MaBo
Mac - Game Rustlers
Mac McCartney
Macadams
Macedonczyk
Maciej Baranski
Maciej Bielski
Macvayss
Madison Blair
MadMan_6424
MadmanChris
Madphil
Mads Anton Madsen
Mads de Vries Laursen
Maggie Kulzer
Magnus Eriksson, Utopiaztudioz
Maikel - CCGwinkel.nl - Tegelaers
majkel
Major Landmark
MAK
MakerlabGR
Mal Junor
Malachy Vivian aza
Malcolm Aslin
Malcolm Smith
Malcolm Tuck
Manfred Andraschko
Manfred Laner
Manning Richards
Manticore
Manu Gonzalez
Manuel Vilela Partida
Manuel Zambrano
Marc @ The Game Doctors
MARC Christophe
Marc Gimenez
Marc Griffiths
Marc Hutsebaut
Marc Landry
Marc Mueller
Marc S.

Marc Schuehle
Marc-André Lacombe
Marcel Kern
Marcel Koonings
Marcio Chammas
Marco Radici
Marcos Colón
Marcos Gabarda
Marcus Anderson
Marcus Elfstadius
Marcus F.
Marcus Fallen
Marcus Hatchell
Marcus Hemmeter
Marcus I.
Marcus Schwarzer
marcuslamb
Marie-Claude Rolland
Marijan Cucek
marinara_mix
Mario
Mario Figge
Mario Laflamme
Mario Padron
Mario T.A.G
Marios Hadjieleftheriou
Marisol Henriquez
Marius Fröhlich
Mark Anderson
Mark Andrews
Mark B.
Mark Balkham-Smith
Mark Bell
Mark A. Bishop
Mark Burton
Mark Cahill
Mark Caple
Mark Carper
Mark Cole & Family
Mark Cousins
Mark Cunningham
Mark D.
Mark Dwerlkotte
Mark E.
Mark & Oscar Eccleston
Mark Embleton
Mark Evans
Mark L. Evans
Mark "Fitts" Fittock
Mark Galliar
Mark "the Bard" Gunter
Mark Haly
Mark W. Haviland

Mark "Marcuscolennious" Henry	Martijn Nicasie	Matt B.
Mark Hunter	Martin	Matt Barber
Mark Hyde	Martin "Leadmountain" Armstrong	Matt Barrett
Mark II	Martin Bagley	Matt Bean
Mark Jacobs	Martin Blystad	Matt Benney
Mark Johnson	Martin Byrne	Matt Beresford
Mark Koscielniak	Martin Cannon	Matt Brown
Mark Luchini	Martin Coker	Matt Bruner
Mark "Chief" Lurz	Martin Dahl	Matt Burke
Mark Mchugh	Martin Ellermeier	Matt Carleton
Mark McKenzie	Martin F.	Matt Caron
Mark Metzner	Martin Fletcher	Matt Conacher
Mark Miller	Martin Paul Hogseth Funke & Christian Amundsen	Matt Downer
Mark Mills	Martin Hansen	Matt Early
Mark Moffatt	Martin Hirche	Matt Edgar
Mark P. Morris	Martin Hogan	Matt Gibbons
Mark J. Muir.	Martin Justesen	Matt Gilbert
Mark Ogilvie	Martin Knopp	Matt Gorman
Mark Pedersen	Martin Lewis	Matt Gregory
Mark Peyton	Martin M.	Matt Grosse
Mark Pullan	Martin Nichol	Matt Harbage
Mark Harrison Ramsay	Martin E. Stein & Scott A. Saxon	Matt Hawes
Mark Reindl	Martin Taferner	Matt Hemy
Mark "Horse Lord" Renye	Martin Wangsgaard Jorgensen	Matt Hollands
Mark Russe	Martin Yarsley	Matt Humphries
Mark Rybus	Marty Devine	Matt Jackson
Mark J. S.	Marty & Alicia Jones	Matt Jett
Mark Saniter	Marty McFly	Matt Koltonow
Mark Sconyers	Marty Milligan	Matt McElvogue
Mark Shearwood	Martyn Ponder	Matt McNair
Mark Shiell	Mascalzoni Giordano	Matt Monroe
Mark Shoring	Mason Athey	Matt Olson
Mark Skinner	Mason L.	Matt Philpott
Mark Somogyi	Masterhit242	Matt Q.
Mark Swordfish	Mat "MA-121" Bryce	Matt R.
Mark Tarver	Mat Freitas	Matt Richmond
Mark the Encaffeinated ONE	Mat Greenfield	Matt Roach
Mark Toogood	Matej	Matt Ryan
Mark Turnbull	Mathew Beane	Matt S.
Mark Tuson	Mathew Bell	Matt Schaning
Mark van der Upwich	Mathew Marolt	Matt "The Black Phoenix" Schofield
Mark W. Wyrick	Mathew Tinker	Matt "Glenbrook" Slade
Marko	Mathias Bar	Matt Snyder
Marko Dugandzic	Mathias Petersen, Denmark	Matt Solomon
Marko Miettinen	Mathieu Booth	Matt Sproats
Marko Paunovic	Mathieu Larrieu	Matt Strange
Markus C.	Mathieu Maltais	Matt Trindall
Markus Gawenda	Matias Del Bene	Matt Triplett
Markus Hildebrand	Matija Andrić	Matt Wallis
Markus N.	Mats	Matt Wayman
Markus Oehler	Matt	Matt "Frostie" White
Marky Erhardt	Matt	Matt Wood
Marshall Westfall	Matt Alix - 40K Radio	Matt4Jane

Matthew A. Smith	Max Keeren	Michael Hudson
Matthew Aravena	Max R.	Michael T. Jeffery
Matthew Bair	Max Shelkrot	Michael Kruley
Matthew L. Bane	Max Stock	Michael Lackey
Matthew Beard	Maxwell Dean	Michael Little
Matthew Boles	MDBock	Michael M.
Matthew Boyce	Mels Mauradures	Michael Martin
Matthew Bull	Melvin Fillerup	Michael Matera
Matthew Bullock	Menelduir	Michael McSwiney
Matthew Carroll	Mennok	Michael Mealor
Matthew Chittavanichprapa	Merlin Cox	Michael "Millsy" Mills
Matthew Douglas	MerlinHerk	Michael Nagara
Matthew Ephraim Duncan	Merrick Schincariol	Michael P. Jung
Matthew J. Edwards	Metalhed	Michael P. Linke
Matthew Fowles	Mezzek	Michael Pennell
Matthew Frentz	MHP Montfrooij	Michael Rinaldi
Matthew Golub	micabit	Michael Robinson
Matthew Helmen	Micah Lewis	Michael Rodgers
Matthew Hieb	Micha Oxy Heinz	Michael Rossel
Matthew Karpus	Michael	Michael S.
Matthew Kemp	Michael (Puggimer) Carter	Michael Scheunemann
Matthew J. Kraus	Michael A. J. Sullivan	Michael C. Scott
Matthew LaBerge	Michael Althausser	Michael "Chgowiz" Shorten
Matthew Lisitsky	Michael Anderson	Michael Shorten
Matthew Z. Miliani	Michael S. Bagley	Michael Simon
Matthew Mole	Michael Becker	Michael Six
Matthew Nobbs	Michael Behl	Michael Lee Strandt
Matthew Osborn	Michael R. Blair	Michael Topa
Matthew R. Moore	Michael Brooks	Michael Trent
Matthew Reise	Michael Bruno	Michael Turner
Matthew Sevald, RN	Michael Bryant	Michael Warren
Matthew "Blaster" Shelby	Michael Burgin	Michael Westendorf
Matthew Stark	Michael Cameron	Michael Wiese
Matthew Steed	Michael E. Campbell	Michael Wilster
Matthew E. Stiles	Michael Caracciolo	Michael Wright
Matthew Sutherland	Michael T. Cohen	Michail Woolf
Matthew Truex	Michael Cruise	Michal Janeček
Matthew Walker	Michael Cummings	Michel Godbout
Matthias Flott	Michael De Rosa	Michel Goulmy
Matthias Hertelt	Michael Douglas	Michigan Toy Soldier Company
Matthias Radtke	Michael Doyle	Mick Bulman
Matthias Stein	Michael Farnworth	Mick Her
Matthias Tellschaft-Stachowski	Michael J. Flynn	Mick Phillips
Matthias Weeks	Michael E. Gilkison Sr	Mick Rosenkrantz Bundgaard
Matthias "Thias" Wiesmann	Michael "Emergency Override" Greenhill	Mickle
Matthieu "Ookami" Schoenholzer	Michael Greenhill	MickScales
Matti	Michael Gulinger	Middle Earth Scenery
Mattias Berglund	Michael H. Gustafson	Miguel E. Flores
Mattttt	Michael Henderson - Straven	Mika Tourunen
Maulfiend	Michael Hensley	Mikael Persson
Maurice Samuelson	Michael Hopper	Mikael Stiles
Maurizio Alvarado Rodriguez	Michael Horgen	Mike D. Aquino
Max	Michael Horner	Mike B-S.

Mike B.	Mike Whitaker	Murfleness.
Mike Button	Mikel_Snarkis	Murray H Smith
Mike C.	MikeS	Murrell Sippy
Mike Cheatley	Mikey Robinson	Mustelas
Mike Clark	Mikey Syrett	mutant.com
Mike Collison	Mikhail G. Perlov	Mwesnav
Mike Colmen	Mikie Blake	My Dog Sk1p
Mike D.	Mikko Kurki-Suonio	Myles Ball
Mike Davis	milano7	Myxerion
Mike Ditchburn	Miles Turner	N. Armstrong
Mike "Dorky Dad" Epting	Miljan	N. Milfull
Mike Ernst	Millertime	N. Mondrik
Mike "Lightbulb" Evans	Millie Pearce	NamelessOne
Mike from Upton	Minoo Hamilton	Nanzerdivision
Mike Gehlsen	Minty	Naomi F Hutchin
Mike Gooding	Miroslav Anger	Narlotep
Mike Grimshaw	Mirparx	Narrative Event Organizer Network
Mike Hargiss	Mitch W.	Naryzhud
Mike Harper	MitchTT	Nate Ayotte
Mike Harris	Mithril Ogre (Dondy/Fredrick)	Nate Barker
Mike Henry	Mitzy	Nate Hendon
Mike Horan	MM	Nate Owen
Mike "Gaslands" Hutchinson	Module-R	Nate Raleigh
Mike Innella	Moe	Nate Reed
Mike Johnson	moiterei_1984	Nate Westcott
Mike Kirkham-Ingram	Mongo	Nathan Banning
Mike LaHay	Monkeyboy Maddi	Nathan "Bish" Bishop
Mike Landry	mononoke-fan	Nathan Bursac
Mike Lee	Monster Fight Club	Nathan Edwards
Mike Lowrey	Monty Maunsell	Nathan Flanders
Mike M.	Mop85	Nathan Herron
Mike Martin-White	Morgan French	Nathan Sorenson
Mike McCreery	Morgan Jones	Nathan Thompson
Mike McCulloch	morrisbh	Nathan Torrent
Mike Mer	Morten Pickering Jacobsen	Nathan Turner
Mike Moller	Morten "Thorheimer" Stage	Nathanael Robinson
Mike Nogle	Morten Toftdahl-Olesen	Nathaniel Lanza
Mike Oliver (COgliostro)	Morten "Miffer" Wifstrand	Nathaniel Mu
Mike Osman	Mountainjay	Nathaniel K. Webber
Mike R.	MPS	NCFishboy
Mike Reynolds	Mr Cool Beans	Neal Hyde
Mike Rogers	Mr E.	Nebressyl
Mike Rossmassler	Mr Elio	Nedo
Mike San Jose	Mr Mo	Nedward Bear
Mike Schaefer	Mr P.	Nefelenwen
Mike Schmitz	Mr Palombi	Nehahra
Mike Shapella	Mr Rick Rodriguez	Neidhart
Mike Sloup	Mr Ryan Keankowsmi	Neil Bates
Mike Strong	MrEB	Neil Boshier
Mike Taghon	Mroczny Helmut	Neil Burrell
Mike Tidman	mrtn	Neil Castelloe
Mike Underwood	MrUppervillage	Neil Caudwell
Mike Waine	Muddy Funster	Neil Google

Neil Houltyby	Nick Ward	Oakley
Neil Hubbard	Nick Welp	Obeys-the-Wind
Neil Hughes	Nick Westoby	Obone
Neil Jeffery	Nickolas Bennett	Oddbjorn Lona
Neil McGurk	Niclas Vallin	Oddhin (Harri Hihnala)
Neil McKeagney	Nico St.	Odette Riley
Neil Reynolds	Nico van der Heide	Odin/Thorin Hoskin
Neil Shuck	Nicolai Kowalski	Off-grid Gamers
Neil Vaughan	Nicolas "Obone" Autret	OhJensens
Neil Whitmore	Nicolas aka "Kosni"	Ol'Frei
Neil Widmer	Nicolas Beguin	Ol'torgie
Nelson Hickman IV	Nicolas Chamontin	Ola Sundin
Neoteny Gaming	Nicolas Rigaudy	Olaf Goetsch & Michael Siggelkow
Nessie Knows	Nicolas Roche	Olcoli
NetRunner508	Nicolas Tremblay	Old N3rd
Neustrie	Nicolo' Sfriso	Ole Ingvar Stene
Newhoff	Niels Jochems	Oliver and Thomas Rose
Niall Donaldson was here	Niels Peter Lindemann	Oliver Jaeger
Nicholas Caldwell	Niels Weber	Oliver Liondale
Nicholas A. Duke	Nigel Britton	Oliver Newman
Nicholas Fauls	Nigel Johnson	Olivier Darles
Nicholas Freeman	Nigel Mallison	Ollie Brown
Nicholas Huddleston	Nigel W.	Olmec1
Nicholas McClellan	Nigel M. Wood	Omagouille
Nicholas Murnau & Cathi Gertz	Nik Doran	Omar Bailey
Nicholas Thomas	Nikfu	Omer Stone
Nicholas Thompson	Niko	Omri Arbiv
Nick	Niko Z.	Onlyonepinman
Nick Ash	Nils A Tonner-Oldefar	Onyre
Nick Betts	NinjaHza	Oog
Nick Bogart	Nirven	oorail.com
Nick Brady	Nischo	Oraan Thims
Nick Chapman	Nitch	Orclord
Nick Crones	Njh de Wilde	Orion
Nick Huffman	Nnamdi Ogbechi	Oscar Mardones Schopflin
Nick Hutchings	Noah A. Zemke	Oscar Q.
Nick Itsou	Noah Doyle	Oskar Forsslund
Nick "dysartes" Johnson	NomadZeke	Oskar Majewski
Nick Krogh Keller	NonEuclideanNick	Otibo
Nick Lanng	Norgalad	OTP Terrain Australia
Nick Letcher	Norm Dean	OTT Dawn Lomax
Nick Lincoln	Norman Brown, Jr	Ottar Roder
Nick Mangas	Norman Mark Rowe	Otterlyfunny
Nick Melchin	Norton	Overread
Nick Meredith	Nory Proctor	Owen Beste
Nick O'Mahony	noyboy	Owen Jackson
Nick "Sitrane" Porterfield	NTif	Øystein Jenserud
Nick Quenga	Nudspinespittle	P. Burza
Nick Salic	NumptyVC	P. A. Gee
Nick Siwerski	Nuno Castilho	P. Howell
Nick Skuda	Nuno Urbani Ramos da Silva	P. Williamson
Nick Stern	O. St-Pierre	Pablo Cuesta
Nick Walker	Oaken Dragon Press LLC	Pablo Estrella

Paddy Fotovich	Paul Flebus	Pendraken Miniatures
Paelios	Paul G.	Pendy The 1st
Pafetik Bazerka	Paul Gonsowski	Pepe Timbale
Painted Plastics	Paul Grindrod	Per "aintnodollhouse" Jorisch
Pancakes25	Paul Jeffery	Per Sjokvist
Pandora's Hobbies	Paul Lalgee	Peredi Krisztián
PanzerRanger	Paul Long	Perry Craig
Paolo De Rossi	Paul M.	Perry Gray
Papa Stevie	Paul Edward Matthews	Perry Grosshans
Paper Goblin	Paul Martens	Pete B.
Paper or Plastic	Paul McDonnell	Pete Ball
Parker Stuart	Paul McErlean	Pete "PanzerKaput" Barfield
Pascal Tibald Arsac	Paul McKenna	Pete Boon
Pat G.	Paul Mosman	Pete Davies
Pat Hartman	Paul Murrell	Pete Ferry
Pat Turnock	Paul C. Newrick	Pete from Fightspanner
Patch Adams	Paul Northway	Pete Hockley
Patrick "Celowin" Jones	Paul Nowak	Peter "WaylanderPK" Kelly
Patrick Ball	Paul Nyitrai	Pete Jones
Patrick Barton	Paul Pawlak	Pete Simpson
Patrick F.	Paul E. Phillips	Peter Blenkinsopp
Patrick Henson	Paul Plackowski	Peter William Busch
Patrick M.	Paul Rascher	Peter Coyle
Patrick Magee	Paul Richardson	Peter Davies
Patrick W. Monaghan	Paul "Sperius" Roberts	Peter Caleb Davis
Patrick Mueller-Best	Paul Roche	Peter "Lenin" Edlin
Patrick Nadeau	Paul Rumbal	Peter Fastenau
Patrick O'Brien	Paul S.	Peter Fitzentheit
Patrick O'Hare	Paul Seeman	Peter Freitag
Patrick Potter	Paul Stanton	Peter Green
Patrick R. Montgomery	Paul Stubbs	Peter A. Grose
Patrick Stacey	Paul Taylor	Peter Harrison
Patrick Stroud	Paul Thomason	Peter Holgate
Patrick Weber	Paul Townsend	Peter G. Horne
Patrik Swärd	Paul (Broodrooster) van de Kamp	Peter Hustler-Wraight
Pattus Magnus	Paul VK	Peter Korteman
Patty Stadnicki	Paul W Hoffman	Peter Lakatos
Pau Aragoned Illanas	Paul W.	Peter Large
Paul Aebersold	Paul Welch	Peter Sebastian Lindley
Paul Austin	Paul J. Wheeler	Peter G. Lee, Esq.
Paul B.	Paul Wilkinson	Peter McPartlin
Paul Baldwin	Paul Kevin Williamson	Peter Mellett
Paul Brassington	Paul Wilson	Peter Norval
Paul Byrne	Paula Leach	Peter O'Brien
Paul Calvi	Paulo Melo	Peter Remias
Paul Curwen	Pavel Macik	Peter Szuromi
Paul David Crispell	PAYET Ma	Peter Thew
Paul Davies	PDRC	Peter V.
Paul Dawkins	Peabody	Peter W.
Paul A. Dempsey	Pedion Modular Battlefields	Peter Webb
Paul Dieken	Pedro Martins	Peter Welzien
Paul Dobson	Pedro Nunes	Peter Wheadon
Paul Duffy	pekke	Peter Wright

Peter Yockney	Pinardouze	Ralph "BBQKING" Castro
Petrus Lugduni	Piotr Kowalski	Ralph Fitzpatrick
Peyton McCauley	Pitarch	Ralph Hodge Jr.
pezo	Pitu	Ralph Plowman
pgarster	PJ	Ralph Wesseling
Phil Adler	PJ Martian	Rami Sunnari
Phil Atkinson	PJ Yanosko	Ramiro Aznar
Phil Beale	PL of Sweden	Ramon Marti
Phil by twenty8	Pleasurehood	Ramon V.
Phil Criswell	PointZeroOne	Randall Short
Phil Curran	Poiter50	Randolph Brühl
Phil Edmunds	Pojgh	Randy S. Brown
Phil Jefferson	Pontus Lind	Randy Fung
Phil Siewe	Poog	Randy Smith
Phil Stone	Postcardpaul	Racel Caballero
Phil Toker	Poul Christian Secher	Raoul
Phil Vestey	Preston Buck	Raoul de Rooij
Phil Wilson	Preston Smith	Raphael Harada
Philip Barnes	Printable Scenery	Rasmus Juhlin
Philip Floyd	Probie	Rasmus Petersen
Philip Fracica	Protothe	Rats Patrol
Philip C. Hagan	Psarris Petros	Ray Bogusz
Philip Hagelkvist Fowlie	Pär Lindström	Ray Gibson
Philip D. Jones	Psynova	Ray S. Karnes
Philip Karpowich	Pyttroll	Ray "Savageray" Prado
Philip Payne	Queen of Credits	Raymond Baker
Philip Reed	Quellcrist	Raymond A. Kubeczka Jr.
Philip Schmutz	Quinian's Budget Crafts	Raymond Marshall Slover Jr.
Philip Schneider	Quinn (Mattimeo) Louw	Raymond Martinez
Philip Taylor	Quintus Sertorius	Raymond Matthews
PhilipC	Quisk Lightbringer	Raymond Terry
Philipp "Sp3c1" Hinrichsen	Quizamil	ReBalith
Philipp M.	Qwillet	Rebecca Hobart
Philipp Sander	R. D. Brooks	Recardo K.G. Basuil
Philipp Speh	R. L. Brow II esq.	Red Bear AKA Col.Clausewitz
Philippe Ghestin	R. Fuentes	Red Claw Games
Philippe Isabelle	R. Hask	Redeemer144
Philippe Robillard	R. Lee S.	Redvers "Red" Thompson
Philippe Tremblay	R. D. Madrid, Jr	Reece Walker
Phillip "Yankboy" Lewis	R. Mucha	Reed Burdine
Phillip Robinson	R. Whitehead	Reed K. Dawley
Phillip Zeller	Rabidgremlin	Reggie Crown
Philonius Rex	RAD	Reid Bambridge
phoenix	Radegast6	Remi Gagne-Monfette
Phoenix	Radouane Betayeb	Remi Letourneau
Photeth	Raechel Coon	Remus Dunkelwald
Pierre "Le Gaming Dude" Gravelat	Rafa_ "Brother_Bethor" Bartosik	Renaat
Pierre "Luinsil" POUCHÉ	Rafael Rico Correa	Renato Da Conceicao
Pierre Roussel	Ragnar	Rene Butter
Pieter-Michiel Geuze	Rainer Haiden	Resonance
Piggy Corrosion	Raj Kapoor	Rev. Rodney W. Lilley
Pilgrim TETDUR	Rajiana	RevDay
Pim	Ralf from River Rhine	Rhavnos

Rhett D. Scott	Richard Smith	RobC
Rhiannon	Richard Spinabella	Robert Allen
Rhys Jones (New Zealand)	Richard "Mortis" Tabor	Robert B.
Rhys Parry	Richard Wheeler	Robert O. Bent III
Ricardo Cohen Montoya	Richard Ziulkowski	Robert Bittorf
Riccardo Cuppone	Rick	Robert Burr
Riccardo Gröning	Rick aka plasticbutcher	Robert Cook
Rich Berrill	Rick Ankney	Robert David Pille
Rich Bourque	Rick Casler	Robert David Smith
Rich Frausto	Rick Dorsey	Robert Del'Nero
Rich Galati	Rick Durr	Robert Ethan Riley
Rich Hawkins	Rick Gore	Robert Foster
Rich Hieron	Rick Green	Robert Gilson
Rich Kitchen	Rick Hauxwell	Robert Hanby
Rich Orbain	Rick Hewitt	Robert Horton
Rich Perry	Rick Martin	Robert Hutton
Richard	Rick Pennington	Robert Isler
Richard J. Anderson	Rick V.	Robert Layne
Richard Andrews	Rick Westbrook	Robert Losacco
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TERRAIN ESSENTIALS

Mel Bose – **The Terrain Tutor** – has been building terrain for almost as long as he can remember. When he was five, Mel built playsets for his little green army men in the corner of a craft store. He was often assisted by model railroaders who were regulars at the store and, by the time he turned 15, Mel was primed for a life of building terrain.

Mel has traveled the world, as a medic in the army, a physiotherapist, and even a salesman. He has worked with people from all walks of life, and looked at things from many different perspectives. It is this approach that he brings to his successful YouTube channel, **The Terrain Tutor**. Since 2014, Mel has been able to make a living from sharing his passion – teaching people everything he knows about building terrain for tabletop wargaming, for hobbyists, clubs, displays, and for dioramas – and it's that passion and knowledge that he brings to this book.

THIS BIG GREEN BOOK COVERS:

- **PLANNING.** The most important step is thinking it through before you start.
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