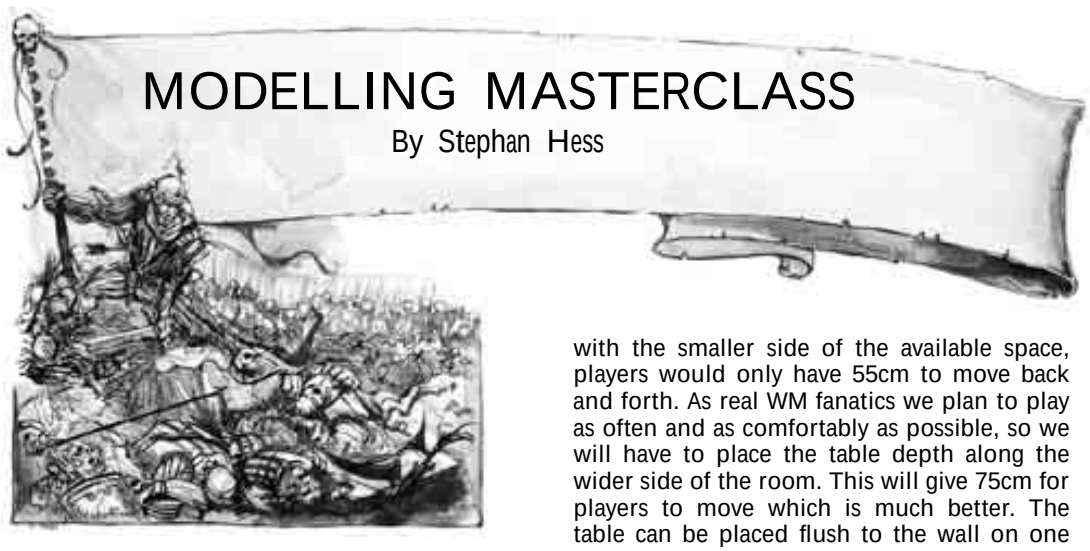
MODELLING MASTERCLASS

By Stephan Hess



Part One. The Wargames Table

Just as a home-cooked meal tastes better than a microwave dinner, a game with painted miniatures fought over well-made terrain is much more enjoyable than a battle between empty bases over a bare kitchen table.

It is my intention to explain in some detail, over a series of articles, some of the many and varied methods used to create terrain for Warmaster. This first article is mostly concerned with materials and making a table. These are matters that may be understood by old hands but which it seemed necessary to deal with first for the sake of completeness.

To keep things consistent all dimensions have been described in cms throughout. As this is the standard system for Warmaster this shouldn't present any difficulty.

TABLE SIZE & LOCATION

The first and most important step in making a games table is to determine the table size. For the sake of clarity, the short distance between opposing players is referred to as the table depth and the long direction is the table width.

The size of your army dictates the minimum dimensions required for the table. For a small Warmaster battle 120x120cm is enough, but a depth of 150cm is more desirable as it allows players to deploy in battle lines, something that is rewarded in Warmaster. It also gives you more room for sieges and scenarios that do not use the 'opposite side deployment'. The table width should be at least 120 cm, better 150cm which is just enough for two-three thousand points. A width of 240cm should cover all Warmaster needs.

When deciding on the depth and width of your table you also need to consider how much room it will take up in your gaming room and where you will set it up. For example, assume you have a total gaming area of 260x300cm available. We have already decided that the table should be at least 150cm deep, but if we place the table, so that the depth is aligned with the smaller side of the available space, players would only have 55cm to move back and forth. As real WM fanatics we plan to play as often and as comfortably as possible, so we will have to place the table depth along the wider side of the room. This will give 75cm for players to move which is much better. The table can be placed flush to the wall on one side and this allows a 210cm table width and 50cm of room to move around the side of the table and get out of the room. 210cm will easily allow battles of four thousand points. So, for this example, we might decide on a table size of 150x210cm.

Reaching the centre of the table will only be a problem for those thinking in bigger dimensions. Usually you would want to be able to reach units placed in the middle of the table, so the depth should not be more than 180cm, give or take a bit depending on the length of your arms. This doesn't affect our 'example' design as our table has a depth of only 150cm.

You also need to consider storage and transport of the table at this stage. If you can leave the table permanently set up there will be no problem. If the table needs to be set up for each game you will have to consider how the table is to be moved and stored when not in use. In addition the weight of the table itself might be a restriction, especially if you want to be able to set up the table on your own without help. Instead of making the table smaller you can divide it in sub-tables that are easier to handle and store than a single big table. Just as a reminder you will be able to transport a board of 80cmx120cm in most cars, but you would be advised to check first.

If you elect to use prefabricated tables or boards this will also influence table size. I.e. you buy three ready made folding tables each 120x60cm. This will give a total area of 180x120cm. As this is an inflexible option it is best to measure out the room and satisfy yourself the tables will fit before buying.

GAMING TERRAIN

For the purposes of this and the following articles I've split terrain into two broad types: 'ordinary terrain' and 'modular terrain'.

Ordinary terrain is the most common type of terrain. An ordinary terrain (OT) set-up uses a usually flat table surface covered with some basic texture, like grass, sand, earth or snow. On top separate terrain pieces will be placed

Ordinary Terrain

Modular Terrain

depicting all other kinds of terrain. The number of pieces, their position and rotation can be varied to give an endless number of different battlefields. The other big advantage of OT is that you can start playing as soon as the table is finished and add terrain pieces one by one.

Modular terrain (MT) set-ups consists of modules arranged like the squares of a chessboard. Each module is a complete albeit very small wargames table with fixed terrain. Varying the position of the modules and their rotation can change the battlefield. Because the playing surface is made from modules you will have to build a minimum number of them, before you can start to use your new table. The main advantage of MT is the more professional look and the sturdier construction.

It is important that you decide what kind of terrain you want to use; the OT which is faster to make and more flexible, or MT with it's more professional look and greater durability. Whichever you choose will have implications for the size of the table. For example, many players place OT on top of a suitably coloured cloth, and the size of the cloth will effect the size of the table. For MT the module size has an impact on the table size. I.e. if you already have decided the module size (you may already have some modules from an earlier project) make sure an integer number of modules fit on the table. If you haven't decided the module size yet, just make a short calculation to see if a sensible module size will fit onto your table. In practice a square grid size between 25cm and 40cm is preferable – I will discuss the why in the next article. If your modules are to have individual frames don't forget to take the frame width into account, usually 1 to 5cm per side depending on the kind of frame chosen.

TO DIVIDE OR NOT TO DIVIDE?

In course of the above you might have already decided whether you will use one big table or multiple smaller sub-tables. If you haven't now is the time. Good reasons for using sub-tables are: restricted storage room, restricted access between storage and gaming area, and available materials. If you decide to divide the table into sub-tables it is usually a good idea to make all sub-tables the same size and if possible you should make the length of the wider side an integer multiple of the length of the smaller side. All considerations that apply to making a big table apply to making sub-tables as well, so the following pages cover both. For the sake of simplicity the word table is used for table and sub-table alike.

Returning to our example table, we will make two sub-tables 150x100cm each, because it is easier to transport and set-up than one big 150x200 table.

COME ON, MAKE MY TABLE

There are three main ways to make the tabletop. The first is to use a thick solid sheet of some material. The second way is to make a frame and mount thin sheets on top and bottom. The third way is to buy a ready made table or tabletop – a kitchen or dining table for example.

This last option has some virtue to it. It doesn't amount a lot of work and can be reasonably priced (a table of 80x120cm can be as cheap as £20). However you will be stuck with a limited choice of sizes – often rather narrow for our purposes. Usually edges are chamfered and the corners are rounded off. A table with heavily chamfered edges and/or round corners is unsuitable for an OT sub-table.

WOOD I?

If you can't use or find a suitable ready made table the next simplest method is to use a solid sheet of some material – generally wood. Your local DIY shop will have different kinds of wood for you to choose from and will offer to cut it neatly to any size you want.

One thing worth bearing in mind is that wood is hydroscopic and this makes it warp. In fact

wood will warp with every change of humidity and moisture. The stability of wood and its tendency to warp are different along or across the grain. It warps up to 10% along the radius of the annual rings (i.e. the width of the tree) but only 0.2% in the direction across (i.e. the height of the tree). A large single board will therefore tend to warp significantly in one direction. This and the fact that good solid wood is relatively rare and expensive make it a bad choice for a tabletop.

To overcome this problem 'composite' boards were invented. The following list is not all-inclusive, but will give you a good idea what kinds of suitable composite wood you will find at your local DIY. All weights given are for boards of 150x150cm and the minimum thickness specified. The thickness given is the minimum thickness to get a useful, flat tabletop. If you want to be on the safe side take a thicker sheet.

• Plywood (weight 38-44 kg, 18 mm but there is always the risk of warping). The most common kind of composite wood is plywood. Gluing thin sheets of veneer together under high pressure makes plywood. The run of the grain of each subsequent layer is always rotated by 90 degrees, which gives good stability in all directions and reduces the amount of warping. The number of layers is always odd because the grain has to run into the same direction on the top and bottom layer. Multiplex boards are like plywood, but use thicker sheets. While plywood/multiplex is more stable and has less warp than wood, you will never really get rid of the tendency to warp. Plywood takes glue well and nails and screws will find hold easily, nails do so even on the sides.

• Block board/CLV (weight 22-26 kg, 13mm). Block board is made by gluing individual lengths of wood side by side, and then mounting veneer sheets on the top and bottom. Block board comes in a thickness of 13mm and above. 13mm is usually enough for our needs, except if you want to have a single large table of over 150cm width. When getting the block board cut to size have it cut so that the wood runs along the wider side. Block board takes glue well and nails and screws will find hold easily, even on the sides.

• Chipboard (weight 40-45 kg, (if veneered), 19mm). The chips (made of wood not of potatoes) are glued under pressure and heat to form boards. Usually the boards have three layers the two outer layers being denser. The

material is cheap and looks it. Even the more expensive veneered chipboard does so because of the raw edges. If you decide to go for chipboard, I recommend you take the raw board without veneering. It will take glue better and the surface will always be covered with terrain or modules, so you will not see the veneer anyway. In contrast to laminated chipboard, raw chipboard takes glue well. Nails and screws will find hold easily, but when inserted in the sides the wood may crack. To get rid of the ugly looking sides you can use a suitable edging material. These come in the form of veneer strips that are glued, nailed or (wonder!) ironed on.

• OSB (weight 31-35 kg, 15mm). Oriented strand board is a variant of Chipboard with long chips of defined length and thickness. All chips are generally oriented in the same direction, which makes the board more elastic than ordinary chipboard. Method of manufacture aside, for all intents and purposes chipboard and OSB can be considered the same.

• MDF (weight 39-42 kg, 15mm). Medium density fibreboard is very smooth and has good stability. The idea behind the fibreboard is just the same as with the chipboard, but fine fibres are used instead of chips. The fibres are not necessarily from wood but can also include tough plant materials like rape or flax. MDF takes glue well and screws and nails find hold well. Boards of 15 mm or thicker will hold fixings well even in the sides.

• Rib boards (weight 4--5 kg, 10mm). Made

from Polypropylene or Polycarbon, these are transparent or translucent. There appears to be a bottom and top layer resting on internal ribs 10mm apart, but a sheet is cast or extruded as one piece. The ribbing give high stability along its length, but the board bends rather easily in the other direction. So the use of supporting stands is recommended instead the use of screwed on legs. Rib board will not take nails or screws and it does not really like PVA glue. An MT table made from rib board will look cool. For an OT table it makes only sense if you use gaming cloths on top, but you will not see the surface anyway, so I recommend using a material that is easier to work with.

• Honeycomb cardboard (weight 3-4 kg, 20mm). This is a kind of composite cardboard. It is not really one card but a honeycomb like mesh with a top and bottom layer of paper or cardboard. It is very stable for it's weight and the version with cardboard top and bottom can be used as tabletop when the thickness is at least 20mm. The edges should be protected with plastic 'U' profiles. It can be cut and glued like any other cardboard.

To make a long story short, composite wood of one form or another is the material best suited for a solid tabletop. It is easily available, it is reasonable priced, it is easy to work with, it's sturdy and very importantly for an OT table it takes glue very well. Foam and Honeycomb cardboard might be an interesting alternative for special situations like tournaments..

GET FRAMED

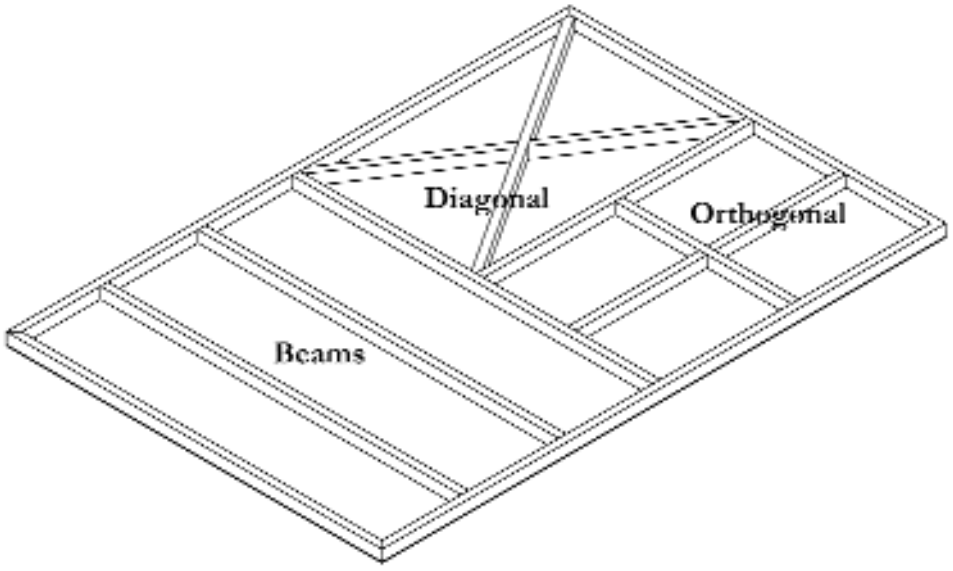
Instead of a solid tabletop you can use a frame with thin layers if lighter material mounted on top and bottom. The bottom layer can be omitted if you desire, but the board will not be as stable.

For the top and bottom layer you can use any kind of wood. It should be at least 3 mm thick, but there is no reason why it should be thicker. Plywood, MDF and hardboard are available in the required thickness, chipboard is usually not available in sheets so thin, and would be very brittle.

The frame itself will be made from lengths of timber. Timber of 2 cm (width) x 3cm (height) are quite ideal, but 2 x 2cm will do for smaller tables. You will need 6 to 10 pieces depending on size and design.

The outer frame consists of 4 pieces. Your DIY shop will cut them to the size you specify; some shops will even mitre the joints for you if you wish. However, the simplest way to make the frame is by using blunt or butt joints. The long pieces need to be the full length of the table and the shorter pieces need to be cut to the table width minus the width of the timber. When doing mitre joints each piece has the same length as the edge it will be mounted on and the edges are mitred at 45 degrees.

Within the frame you need to position internal lengths of wood in such a way that there is no unsupported area larger than 30x30cm. This can be done with a diagonal or orthogonal cross arrangement inside the frame. You can also run parallel lengths of wood along the full width of the long side spaced about 30cm from each other. If you want to screw legs on, it is recommended to insert additional supports, so that the screws will always be set in a support rather than the table itself.



Lay out the lengths of wood on a flat surface and glue them together. There are numerous kinds of glue suitable but we shall concentrate on two types. The ordinary white wood glue and so called contact glue. Wood glue is available as water soluble or insoluble. Both sorts are useable but the water-soluble is usually cheaper and easier to work with. We will use wood glue later on as well, so you can go out and buy a bucket now. It is easy to work with and will dry transparent.

Apply wood glue on one or both of the surfaces using a brush or a toothed putty knife. Join the pieces while the glue is wet and clamp them together until the glue has dried. This makes alignment easy and excess glue can be wiped off with a cloth while still wet. On the other hand you will have to clamp the parts together for quite a while depending on material, kind and amount of glue between twenty minutes and four hours.

Contact glue works differently. Apply it to both surfaces using a toothed putty knife. When it feels dry (after 7 to 15 minutes) the objects are pressed together. Only the amount of pressure is essential for the bond not the length of time it is applied. This gives us the opportunity to get a strong bond quickly, but adjustment of the objects is only possible with small objects. This does make it quite difficult to align the top and bottom boards onto a completed frame. The best approach is to glue the frame in place piece by piece onto the board surface, in which case you only have to place the bottom board on as a single piece.

Depending on the size of the pieces you are gluing, clamps, duct tape or rubber bands come in handy. For making the table you will need a band clamp to hold the frame together until the glue has dried. Then join frame and top layer. To make sure the top surface stays put either use clamps or nail the top onto the supports. I usually use a staple gun because it is easy and fast. With staples or the nails you will see the nail heads. Using clamps will avoid this; you will need about four per metre. Alternatively, you can glue the frame pieces directly to the underside of the table surface piece by piece. This is slower but works as well, when done with care and does away with the need for so many clamps.

The bottom layer can only be fixed once all support is in place and everything is reasonably dry. You now can use a hammer and nails or staple gun as nobody will see the table bottom (unless hiding in shame after a humiliating defeat). Alternatively, find a suitable flat surface where you can place the bottom sheet, glue the frame/top layer assembly on and put weights on to ensure the frame makes contact as cleanly as possible.

For comparison purposes a 150x150cm table using 2x3cm timber and 3.2 mm hardboard for top and bottom layer would weigh 14-16 kg.

ON THESE LEGS RESTS THE WORLD

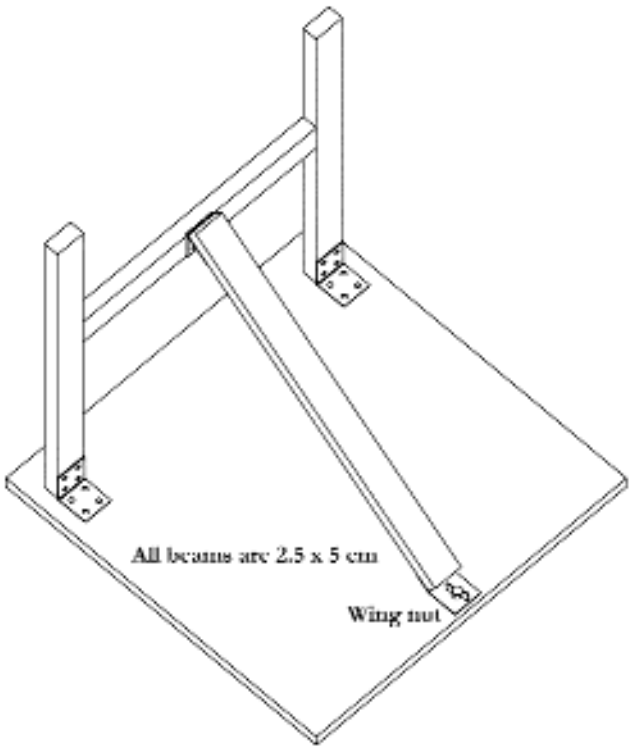
The simplest and quickest way to set up the table is to use trestles or stands. There are different kinds, usually made of wood or metal, prices ranging from £3 to £30 apiece. They all have a width from 70 to 80cm. Do not be too sparing, it's better to use one too many than one too few. As a rule of thumb place one trestle every meter of table (but a distance of 120cm will not be an undue strain) and the overhang should not be more than 15cm.

The advantage of trestles is that they can be folded and so are easy to store. They offer support not only at points but over their entire width. This makes them suitable not only for wooden table tops, but also for tables made from rib board, foam or honeycomb

cardboard. Sometimes the tabletop does not rest secure on its stands because the top of the stand and the bottom of the table are both very smooth. A small strip of rubber between both works wonders. If you set up the table and stands in a specific arrangement you can glue small timbers on the table bottom to act as a guide for the stands. You could also use Velcro or a slave to hold them in place.

The second method (nearly as simple as the first) is to buy ready-made legs from you local DIY shop. The legs come in different materials, forms and colours, and prices start at £2.50 apiece. Depending on the material and thickness of the table there should be a leg every 70 to 120cm and the overhang should not exceed 15 cm. The bad news is they need something firm to be screwed to. This reduces their use mainly to wooden tabletops. And if you use a framed table top it is recommended to mount them at a place where all screws can be fastened on to a wooden support, adding supports where necessary. Storage and transport are difficult if the legs are permanent features. If not, screwing on the legs before every game is a nuisance. Some legs have a useful mounting plate as separate piece. You fasten the mounting plate to the tabletop and than screw the leg on the plate without the need of additional screws. This is quite fast, but a single leg with mounting plate costs about £8.

An alternative is to make a folding leg mechanism, as shown in the diagram below. If you use a framed tabletop the hinges should be mounted on supports.



The complete height of the table should be between 75 and 80cm and you have to choose the length of the legs accordingly. The width should be chosen so that there is no overhang of more than 15cm. If the table is wider than 150 cm, you should plan for additional legs in the centre sections.

Of course you can also use another table as pedestal, especially if the table is in the gaming area and you can't move it out of the way, but make sure that you add support where needed so that the overhang doesn't exceed 15cm.

If your table is stationary you could use racks like the famous IVAR from IKEA as a pedestal for the gaming table. This gives you a handy place to store modules and miniatures.

ANOTHER FRAME

If you use MT you might want to consider ways to prevent the modules from being shoved off the table. There are many different and ingenious ways to achieve this, like using centre pins, guiding rods, Velcro tape or interlocking modules, but most need precision work to function satisfactorily. The best and simplest solution is a frame that runs round the outer edge of the table.

This frame can be made from wood glued in place as already described. Remember that the overall space for playing will be reduced slightly by the frame, so take this into account when deciding on the size of table required.

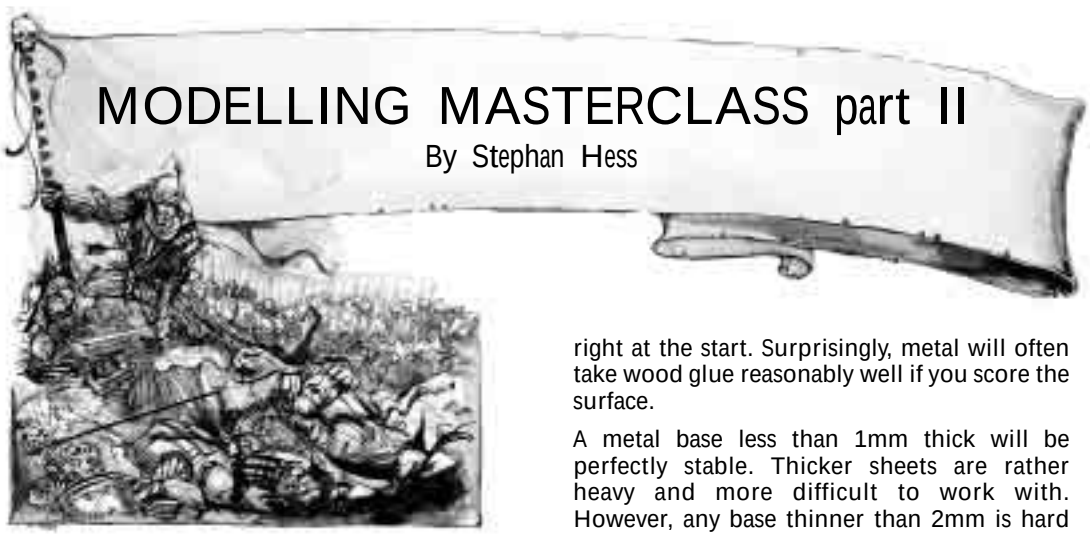
If you are using sub-tables it is better to drill holes along the table edge and insert wooden dowels to create a barrier that will stop the lemming like behaviour of the terrain modules. The dowels can be removed where required. Space the dowels at intervals equivalent to half the width of a module placing first dowel is placed about a quarter way into the edge. I.e. with a 30 cm sub-table the dowels would be 15 cm apart and the first would be 7.5 cm from the edge.

CONCLUSION

So much for the first article and I hope it answered many a question. Hopefully in a future issue I will discuss the construction of all terrain types.

MODELLING MASTERCLASS part II

By Stephan Hess



Foundations

If you followed last issue's article you are now well on your way to becoming the proud owner of a new wargames table. Before we start filling it with terrain we'll take a look at the bases or modules for the terrain itself. OT (Ordinary Terrain) style terrain pieces will need their own integral base whilst MT (Modular Terrain) will require a base for the module itself which I call the module body.

BASING SCENERY FOR O.T.

Bases make terrain easier to handle and stop it falling over. This is especially important for trees and card buildings which might otherwise be knocked over or displaced during play. In the case of woods and similar features the base conveniently demarcates the area covered by the entire wood/feature. This also allows us to use relatively few tree models thereby permitting practical movement of models within the wooded area.

Larger bases are needed for multiple or complex terrain features; a river running through a wood for example. In the case of villages I prefer to group several buildings onto a single base. This makes it possible to add streets, fences, a well and whatever else you fancy and turn the makeshift assembly of buildings into something more interesting.

It is highly recommended that you stick with one style and one kind of material for all your bases. Even where terrain pieces don't really need a base it looks better if all terrain pieces are based in the same way. The thinner the base the less obtrusive it will appear. I prefer such a base not to be thicker than 5mm, 3 to 4mm being the best compromise between appearance and ease of handling.

Metal sheet. Most thin wood or card gets rather wobbly, but a sheet of metal retains its stiffness in really thin sheets. Admittedly metal is harder to work than card or wood. Some metal sheets are supplied with a coating of grease to prevent the metal from oxidising. Make sure you wash off any residue of this kind right at the start. Surprisingly, metal will often take wood glue reasonably well if you score the surface.

A metal base less than 1mm thick will be perfectly stable. Thicker sheets are rather heavy and more difficult to work with. However, any base thinner than 2mm is hard to pick up, and often leads to it being picked up by a delicate feature instead of the base itself. This can damage the model and the whole thing will come apart if handled carelessly.

Cardboard. It is possible to glue multiple layers of thin card together to get a thicker base and for stability. This adds another step to the building process and does not cure the major drawback of warpage. Corrugated cardboard is preferable to ordinary cardboard, but is still liable to warp and can be bent, creased and nicked more easily than other materials. You will need to use an all purpose filler to get closed and smooth edges because of the corrugations.

Plastics. These come in many quite different forms. The soft expanded foams will easily snap if used in thin sections of 5mm or less. They also tend to bend under the weight of all but the lightest terrain features. An exception is 'architectural foam' or foam-board as it is often called. This is a layer of soft foams sandwiched between layers of cardboard top and bottom. This material is good for most purposes and can be obtained from some hobby or art stores specialising in architect's materials.

Poly Vinyl Chloride (PVC) & Polystyrene (PS). These are the most widely accessible types of hard plastic. Polystyrene is available in hobby shops while PVC can be found in DIYs. 'Hard-PVC' is most suitable. It can be worked using wood or metal cutting tools. PVC can be glued to PVC with contact glues. It can be bonded to other materials with super-glue or two-part epoxy. After roughening it will hold wood glue well enough. Polystyrene is very widely used and is familiar in the form of model kits. It can be worked with ordinary tools. With power tools you will need to use high revolutions and slow stepping speeds. Polystyrene can be glued using 'plastic glues' or polystyrene cement, or by means of solvents. It will take wood glue well enough but it is best to score the surface first.

Acrylic glass. There are two qualities; cast

(GS) and extruded (XT). Cast is more expensive, but is easier to work with and will not splinter so readily when cut, milled or drilled. It is not a natural choice for bases because of the cost, but for a display table or if you have different basic terrain (i.e. sand as well as grass) it might be worth it. Acrylic glass is available in some hobby stores or architect's shops. It can be worked using ordinary tools, but tools designed for treating metal are recommended. Solvents like Dichlormethan will bond it very well and without a seam, either to another piece of acrylic glass or other soluble plastics like polystyrene. Use contact glue and silicone to glue it to other materials.

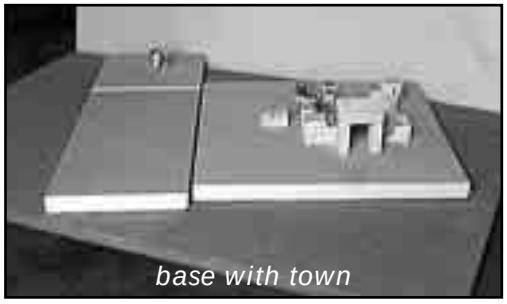
Wood. The most suitable is plywood, HDF (High Density Fibreboard) and hardboard which can be used as thin as 3 mm. Hardboard is despite its name rather soft and edges get damaged easily even under normal handling conditions. For bases this is not too much of a problem as most bases will not have vulnerable pointed corners. Plywood is the wood that will warp most easily and is the most expensive. HDF is first choice because it is well suited to the task and it is not expensive.

Making your Bases

In my view irregular shaped bases look better because they naturally distract the eye from the edge itself. Regular shapes can be chosen to underline the nature of a terrain piece or when more than one terrain piece will be arranged touching each other. If you base your buildings on rectangular bases you can place them next to each other to create the impression of a larger town.

Naturally the base will be need to be bigger than the feature that stands on it. By placing the terrain features close to the edge, within 5mm say, the surrounding edge will tend to look like an integral part of the feature. On the otherhand it is sometimes a good idea to leave a space large enough to place an infantry stand along the edge – allow 22mm for possible overhang which allows you to deploy within a wood without the trees getting in the way.

When the bases are not meant to fit against one another, chamfered edges will give a more professional look and minimise the apparent thickness of the base. An angle of 45 degrees is fine. Flatter angles might look better but anything less than 30 degrees and the edges will break too easily.



base with town

A scroll saw is ideal for cutting bases. Scroll saws are the power version of fretsaws and are at home cutting any kind of shape.

MAKING THE BODY FOR MODULAR TERRAIN

Modular terrain consists of individual modules that can be arranged in as many ways as possible. To ensure flexibility without chaos I begin with a grid – the smallest division of a grid being a single square or cell. Each module is designed to fit exactly into a single cell or into a pattern of adjacent cells.

The narrower the grid and therefore the cell size the more varied and intricate the scenery and the more modules you'll need to fill the table. I find 25cm is about the minimum width that allows for a feature like a (wide) river or the slope of a hill. Consequently, choose a grid size of at least 25cm to produce a cell edge length (CEL) the desired distance. Keep in mind that choosing too wide a grid will reduce the flexibility of the system.

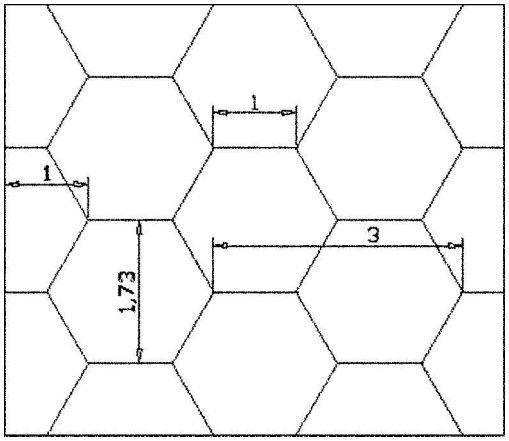
You can also design modules that spread over more than one cell – which gives you the best of both worlds. In practice a CEL of between 25 and 40cm has proven the most practical. The exact size depends on the size of the gaming table.

It is perfectly possibly to design a modular system based around hexagons, but I find squares work much better on the whole. The best reason to choose a hexagonal grid is that you can rotate a module in six instead of four steps, and of course we wargamers all love hexes. I have built a table with hex modules and got rid of it because the gain is very small for the increased complexity.

With both cell shape and size sorted, the next thing is do decide how deep you can dig into any module. A good dig-in-depth (DID) for Warmaster is 3 to 5cm. So you can have gorges, rivers and gullies up to five times the height of a Warmaster miniature. A depth greater than 5cm is of no great use in this scale except for very specialist terrain pieces and for those we can find a different solution. This ability to dig in to the terrain is one of the advantages of modular terrain. To make the models you will need dense insulation foam as thick as the DID, so check first what's available at your favourite DIY.

Cell shape, size and edge length will naturally define a set of standard modules. For hex cell modules you will also need half cell modules to match the table edges.

For square cells we only actually need one design of module, but as the time needed to make a module body varies little irrespective of its size it is a good idea to include double and



Mapping out your hexagon modules

quadruple sizes too as this makes them quicker to build. To begin I suggest this rule of thumb:- about eight cells should be covered by single cell modules, about half of the remaining cells should be covered by double cell modules, and the other half by quadruple cell modules. About 50% of all cells covered by the modules should be 'open ground' and the open ground cells should be spread evenly over the three standard types.

CEL Size

To find the optimum CEL size for your table divide the width once by 25cm and once by 40cm and note the results. The results indicate the range of cells that will fit the table width. For all possible cell numbers we calculate the cell width (rounding down to the nearest cm). Now divide the table depth by the cell width and see how close you get to an integer result. 30cm would be the perfect cell size resulting in a grid of 5 x 7 cells. If you're not satisfied with any result reverse the role of width and depth and try again. Like so often in life this reads more complicated than it is.

Hexagons are more complex so I will be brief – you will find further explanation on my web site (www.brumbaer.de). Remember with hex cells you can never fill a rectangular table completely. To do so special edge cells of at least two types are needed and so you will have to make some special modules for the sole purpose of using a rectangular table efficiently. To make everything as simple as possible the hex cells should fit in the way shown over.

Divide the table width once by 75cm and once by 120cm and note the results. The results indicate the range of double cells that will fit the table width. For all possible double cell numbers we calculate the CEL. If we go for 5 rows we will get a CEL of 24 cm. Note that the orientation for hex cells is important and the cells will only fit on the table if properly oriented. Note that any feature running from one module to another must not be wider than 24 cm in this example. Like so often in life this sounds as complicated as it is.

Making the module bodies

As all module bodies are made in the same way I'll only describe how to make those for the standard type.

DIY stores will cut the wooden sheets to size for you but only in rectangular shapes. So if you do square cells, you can leave the shop with ready-made module bodies. For the table described in last issue you would need to buy 9 sheets of 30 x 30cm, 7 sheets of 30 x 60cm and 3 sheets of 60 x 60cm.

For hex cells it is not that easy. For single cell modules get sheets cut to a length of twice the CEL and a width of 1.73 times CEL. Mark the centre of both smaller sides. Mark the quarters of both wider sides. Draw lines from the centre to both adjacent quarter marks and cut along.

For half-cell hexes get the sheets cut to CEL and a width of 1.73 times the cell edge length. Mark the centre of one of the wider sides. Mark the centres of both smaller sides. Draw lines from the wide side centre mark to both other centre marks and cut along. For the other half cells get sheets cut to a length of twice the cell edge length and a width of 0.86 time the cell edge length. Mark the quarters of one wider side. Draw a line from each of the marks to the closer of the opposite corners and cut along. Did I mention that hex modules are more complex than rectangular modules?

Foam of the kind with a foam core is best for making module bodies. The standard expanded polystyrene foam used for packaging is the least suitable material. Dense insulation foam is the way to go. It comes in different kinds, colours and thicknesses. Try to stay with one type as this will ensure a consistent depth and appearance.

You can either make the module bodies from foam alone or from a foam core within a frame. I've built both types and those with wooden frames are now seven years old and don't show any wear other than dust. On my Warmaster table I decided to dispense with the frame and now after one and a half years the corners are chipped and some edges have broken although I must admit that I'm not the most loving kind when it comes to terrain though.

Frameless Bodies. For those who are perhaps more easy going on their terrain that I am, we'll deal with the frameless version first. DIY stores won't usually cut foam so you will have to do it yourself. A large circular saw is useful. Few table saws provide a sufficiently deep cut and most struggle with pieces of 5cm

thickness. With a circular saw it is difficult to get cuts that are accurate, especially after changing the settings of guides and rulers, so it is a good idea to cut some spare or scrap material first until you are satisfied the saw is set-up to cut the exact length you want.

An alternative method to make wooden templates for the standard module sizes. Then put them on the foam and cut along with a long bladed knife or saw (thermos saws/polystyrene cutters are good for that). This works reasonably well so long as you are careful to maintain a right angle: the thicker the template the more guidance it provides.

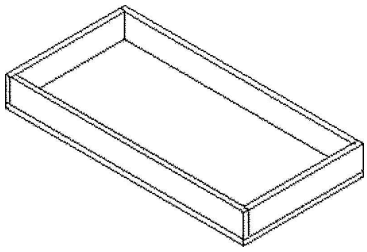
Framed bodies. To make a framed body you will need to construct a foam core with a wooden frame. This makes the module extremely robust and you can increase this even more by adding a wooden bottom piece so the foam is supported all around. A bottom piece will also help to align the frame sides. If you use sturdy battens for the frame this is not such an advantage, but if you use thin sheets for the sides I recommend adding a bottom sheet as well. There are different ways to build the frame, but to save space I'll concentrate on the method I find fastest. You could try using hard plastic sheets instead of wood but as you will need to glue the plastic this is likely to melt the foam so experiment beforehand if you want to pursue this option.

I prefer to use sheets of 5mm HDF for the frame and bottom. This is the minimum thickness I'd recommend. If you can't get HDF use plywood or hardboard whichever you prefer. Hardboard however, is a poor third choice as far as I'm concerned because the edges get damaged so easily.

The bottom sheet must be cut to the module's dimensions. On a module intended to lie at ground level on all edges (e.g. a stretch of plain grassland) the sides will need to be the same height as the foam core. Before you build your first module measure the foam you intend to use. It might be specified as 4cm deep but it may well be slightly thinner or deeper and it is best to check before committing yourself. This will determine the height of all ground level sides that you will ever build. If the foam is thinner than specified use the specified thickness as you can raise the foam insert slightly in its frame, if it is thicker use the measured thickness as your nominal ground height.

To start with we'll look at making standard modules as quickly and efficiently as possible. More complicated shapes are built using the same methods but need a bit more thought. For the sake of clarity we'll only concern ourselves with module bodies that have edges aligned to ground level, more complicated matters can be left for later. Similarly we'll start with modules based on square cells.

Because the saw cuts sheets at a 90 degree angle and the corners have to be at 90 degree angles we can join the pieces together using simple butt joints – there is no need to mitre the joints. Thus we need only two sizes of edge piece for all our standard modules. Both will have the same nominal ground height and the length of one is CEL minus sheet thickness and the other is twice the CEL minus sheet thickness.



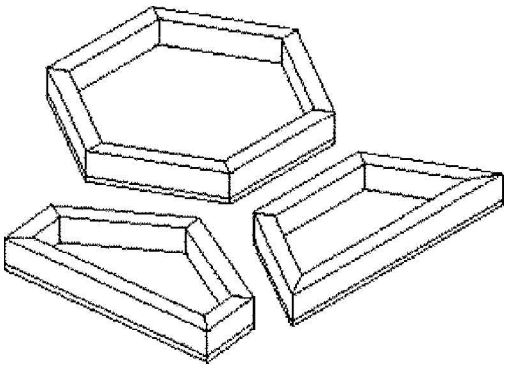
Standard framed module

Get yourself some sheets 30cm by the specified length. This will mean three sides are already cut to the correct dimensions. All you need to do then is use a circular saw to cut off strips in the required width (the nominal ground height). You can use any other saw but a circular saw is quickest. Remember to check that the saw is set-up to give the correct size by cutting a spare piece first. If you don't have the means to saw strips accurately it is better to use thicker wooden battens for the sides instead (see below). As you will need plenty cut some extra when you're at it.

With hex cell based modules mitre joints must be used. For a cell sized module each side piece needs to be as long as a cell edge and will require a 30 degree mitre joint at the vertical edges. You will need to make two different half hex types. For one you will need two standard sides, two sides of half length with one 30 degree mitre joint and one 90 degree joint, and one side 1.73 times the standard length width minus twice the sheet thickness – this with blunt edges. Of course you can use mitre

All the tools for the job...

joints entirely here as well. In this case the long piece is the full 1.73 and the half sides get one 30 degree and one 45 degree mitre joint. The other half-hex types will require one standard side, two sides of the same length with a 30 and 60 degree mitre joint and a long side the same length as the outer diameter width of the hexagon – this will need two 60 degree mitre joints. Have the sheet cut to about 30cm by a bit more than the required side length (depending on your tools between 1 and 5cm to allow for cutting round). If you haven't already guessed as much, square cell based modules are the easier to make.



Hexagon module frames

Before assembling the frame it is a good idea to make a wooden former to hold it in place as this will save time later. We will obviously need a different former for each of the standard modules that we intend to build. The former has exactly the same footprint as the module body's bottom sheet with every edge inset by the width of the sheet. To help support the sides during assembly it is helpful if the former is quite tall – ideally the same height as the side pieces themselves.

Take the former and arrange the side pieces around it adding a bit of glue to the side pieces where they join. Fasten with a band clamp. Put the bottom piece on top of the assembly and use a staple gun to fasten it to the sides. You can add some glue for good measure but it is not necessary. When the bottom is fastened remove the band clamp and, if you have used butt joints, use the staple gun to lock the connecting sides firmly in place. And don't forget to remove the former before the glue starts to dry!

It is possible to use a hammer and tacks to join the frame rather than use the staple gun, but it is much slower, not as much fun and more dangerous for your thumb. It is also possible to use glue alone, but you will have to wait until the glue is dry before you can go on and that is rather slow.

Next put the former on the foam and, using it as a template, cut out along the edge to create your foam core. Put some wood glue on the bottom of the core and insert it into the frame. Do not take too much glue as it will take a long time to dry. You might think it possible to cut the core first and use it as the former to hold the frame as it is assembled. However, bear in mind it is difficult to cut the foam exactly (even using a circular or a thermo saw/polystyrene cutter) and that the foam is soft and will give under the strain of the band clamp.

When the core is inserted in the frame you might find there is a gap between frame and core (it happens). Use suitable filler to cover it. There is a type of filler especially designed for foam but it is not needed. I recommended any ready made filler.

With a bit of practice you can make a square module body as described here in less than 10 minutes no matter whether it is a single cell or four cell module.

If you make modules using shapes that are not standard rectangles or hexes you will have to consider two additional points. The first is that you will have to make a stencil so that the band clamp will work and secondly the standard sides you created earlier will not be sufficient and some additional side pieces with new dimensions will have to be cut.

If you do not have a circular saw it is simpler for you to use wooden battens to make the sides of the frame. The main point is to buy wood of a dimension that will give you the correct height for the module straight-away. In practice it is just like using thick sheets. If you can't get battens that give exactly the desired height get some that are slightly smaller and sand the foam down where it touches the frame. Alternatively buy them slightly higher and set the foam core higher in the frame to compensate. Glue the side pieces together with the aid of the former. There is no need for a bottom piece – the module will be plenty sturdy enough because of the thick frame. When the frame is dry put it on a flat surface. Take the foam core and sparingly apply glue to its sides before inserting in the frame. Press the foam down so that it is flush with the top of the frame and let it dry.

So far we have only dealt with modules intended to reach uniform ground level at every edge. Some modules will need edges that rise above or fall below this level. The most obvious examples are hills and rivers. We expect any river crossing a module edge to fit at any other river edge of another module. This can only happen if the river crosses the module edge in the exact centre of a cell. The riverbed has to have the same shape on both sides of the centre line. What the river looks like on the module doesn't matter, it can turn to a lake or a rivulet but where it runs to an edge the river must have the standard shape and size.

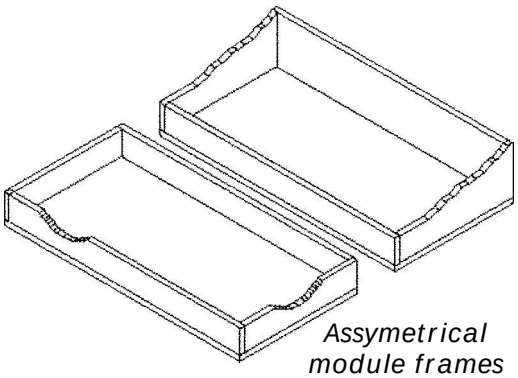
The best way to do this is make a standard river template. Take a standard single cell sized side piece that you have already prepared and cut out a shape that corresponds to the desired profile of the river bed. This must be absolutely symmetrical so either use a computer to create an outline pattern or draw one half on a piece of folded paper and cut out the shape to make a pattern. Use the pattern to copy the river bed profile onto your template. Be careful to mark out the exact centre of the template first. Note that if you are making your frames with butted edges the centre of the frame piece will be off-set by the sheet thickness, so your template will also need a profile that is off-set by the thickness of the material. Even so, you will still only need one river template for any size edge because just by flipping it over you can accommodate a length that butts at either end.

Make sure your river template is carefully labelled so that you don't accidentally mix it up with pieces you cut from it. To use it place it over any standard side piece and draw a pen along the river bed. Because of the thickness of the pen the outline will be smaller than the templates cut, but that is no problem, because all sides will still be the same.

For roads (except high ways in the literal sense) you will not have to change the sides but you must still bear in mind that all roads have to have the same width and must always be symmetrical to the cell centre point so that they join up. Of course this means that you will never have a river and a road that cross the same cell edge – though this is no problem as you can construct crossings on the modules themselves.

Asymmetrically features such as slopes are more awkward. Modules can only connect where the slope runs at exactly the same angle and distance. Because of this the feature does not have to be centred across the corresponding cell edge but it is necessary to plan out how the pieces will connect relative to each other. Wherever you place the slopes, if you are using butted joints you will still have to off-set the slope on the frame edge piece relative to its centre depending on which way it butts to its neighbour.

Models that incorporate slopes often have edges that are higher than ordinary ground level and you will find it useful to have additional formers of the required height. If you don't have a former of the required height it is a good idea to have plenty of spare packing material at hand to level it up so you can fix the bottom piece in place.

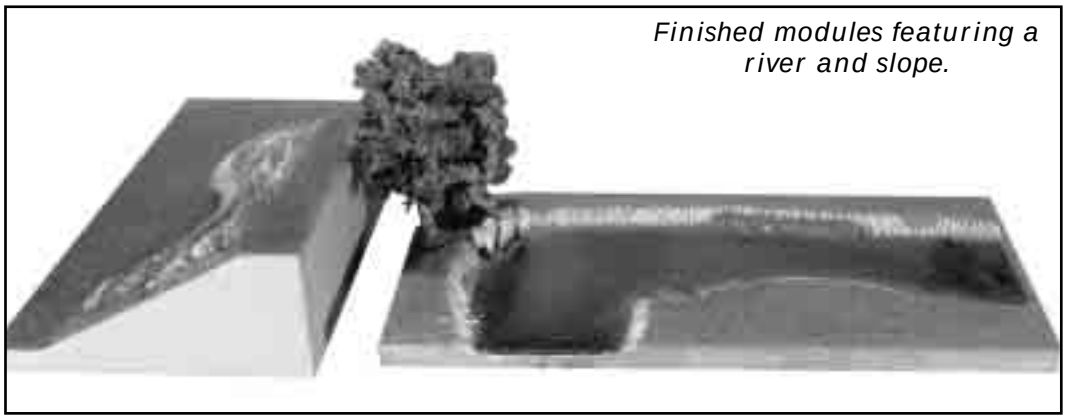


Assymetrical module frames

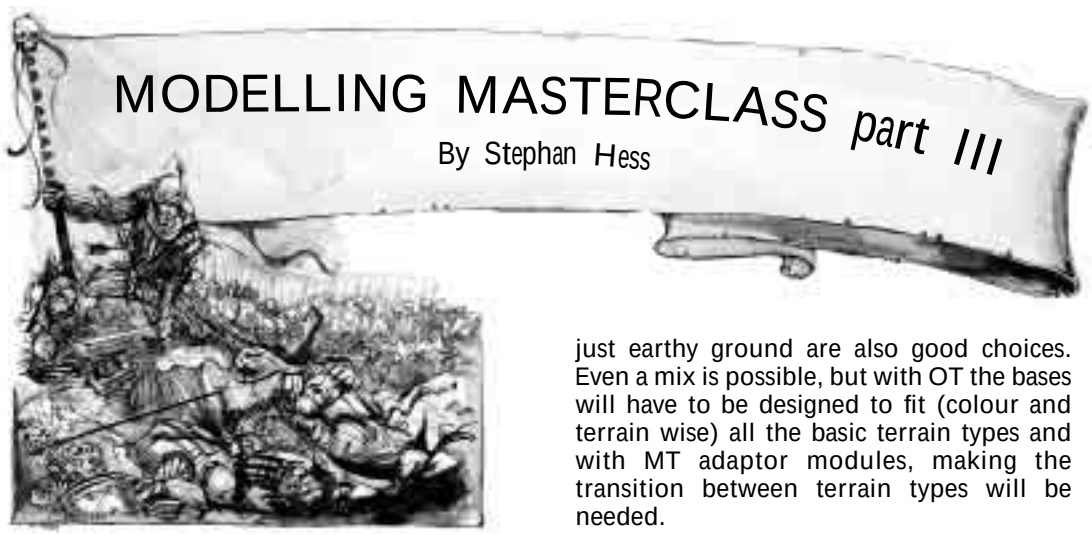
If you use battens for your frame you can cut into them to provide the appropriate profile in the same way as for thinner material – though it's harder work. For features that rise above ground level it is not worth attempting to raise the batten – though this is possible it is hard work. Instead it is easier to model the terrain feature over the top of the frame edge. This makes a less robust edge and is less exact as the sides would otherwise act as but it saves a lot of work.

Regardless of the exact type of module I find it a nice touch to put some self-adhesive felt pads (available in DIYs) on the bottom of the module body. This isn't strictly necessary but it's recommended, as the modules will sit nicely onto the table without damaging either table or the module itself.

And that's it for this issue. Next issue we'll start with real terrain. Have fun but please take care when using any of the tools described in this article.



Finished modules featuring a river and slope.



MODELLING MASTERCLASS part III

By Stephan Hess

You've decided between ordinary terrain (OT) and modular terrain (MT), built your gaming table and made yourself comfortable with the principles of modules and/or bases. So let's decorate them.

PLAIN & PLANE (P&P) TERRAIN

Plain stands for plain simple to build and for plain texture and colour. Plane stands for er... plane or flat.

P&p is used as the kind of terrain OT wargames tables are covered with. This kind of terrain has to be on a vertical plane (flat), because you must be able to place bases of terrain features flush with your games boards and enable efficient and safe storage of the table. It has to be plain to be easily made and to allow for simple matching when making bases for terrain features.

P&p is used on each featureless terrain edge to allow the seamless (as far as it goes) arrangement of modules. It has to be plane because the featureless module edges are plane and it has to be plain to allow simple reproduction and matching.

P&p is also used for what wargamers call open ground. This gives troops space to manoeuvre in and is in general the place where big formations will move and fight. Open ground must be plain and plane to be able to position models on the terrain as freely as possible and with the least risk of them falling over.

Because of its use for the gaming table/module edges and its use as open ground, the p&p will decide the overall appearance and theme of your wargames table.

The typical choice for p&p terrain is grassland, but dessert dunes, snow plains or just earthy ground are also good choices. Even a mix is possible, but with OT the bases will have to be designed to fit (colour and terrain wise) all the basic terrain types and with MT adaptor modules, making the transition between terrain types will be needed.

THE GREEN GREEN GRASS OF HOME

Grass mats are a quick way to create large areas of grassland. The mat is a sheet of paper flocked with static grass. Grass mats which end directly at the table edges may get rolled upwards and ripped eventually though. To prevent this use mats larger than the surface to be covered and fold them around the edges. Alternatively, you could use a frame that will cover the edges of the grass mats. Neither frames nor folding can be used with modules, as both will disturb the module arrangement. The only way to go for MT is to be extra careful when fixing the mat onto the module edges.

When choosing a grass mat, do not go for an overly gaudy or bright colour, be sure that the mat is available in a suitable size (ie, large enough to cover a module or part of the table) and be sure that the manufacturers offer static grass in the same colour and make. You will need the matching static grass for irregular shaped or elevated areas and to cover seams between mats.

Always cut a grass mat larger than the area you need to cover and trim the mat when it is fixed and the glue is dry.

Many manufacturers recommend wood glue for fixing the mats onto a surface. The theory is that you put wood glue on the surface to be covered and then put the mat on top and weigh it down to keep it flat. Any folds will be removed, because as the glue dries the mat will contract. However, this method has never worked for me, I can't explain why, it's just one of those things. Recently manufacturers started to recommend spray glue, which in my experience works much better than wood glue. Personally, I get much better results using contact glue. Cover (the paper side of) the mat and the table/module surface with contact glue

using a serrated putty knife, wait until the glue feels tacky and nearly dry and then press the mat onto the surface. You do this beginning on one edge and rolling out the mat using a rubber roller or smoothing it with your hands – it is very much like laminating a picture. This needs some practice, but gives good results.

Using wallpaper paste also works, but it is a bit messy. The procedure is just the same as for decorating a wall.

Grass mat

A simpler approach is to use double-sided tape. Place the tape along the edges of the table/module and place some additional strips running parallel to an edge throughout the depth of the module. Starting at an edge you draw/roll the mats onto the module. Practice will allow you to get good results.

Using double-sided tape

When in a hurry (ie, you have to prepare ten tables for tomorrow's tournament) you can use the parcel wrapping method. This is only recommended for OT and is only possible if the mat is large enough to be folded around the edges. Put the grass mat onto a table (grass side down), put the base on top, fold the mat around the edges and fix it, just like packing a parcel or wrapping a book in a jacket. The results aren't great compared with the above methods but it lets you get things done extremely fast. Scientific research has shown that the parcel packing gene runs stronger in the female of the species, so ask, your girlfriend, mother, sister or wife for help! Always use tape or glue (a hot glue gun is handy in this case) to fix the mat. When you use nails or staples the mat tends to rip easily when you pull it flat.

Double-sided

Wrinkles are a trademark of wrapping

These mats are not too flexible, so when you use them for bases or bumpy terrain you might have to cut slits to allow for simpler arrangement, or use a number of small pieces. Cover any resulting gaps with static grass of the same make.

If you can't get mats that are large enough to cover the entire surface of your table you will have to use two mats side-by-side. The large seams are less obtrusive when cut into an irregular shape and where necessary you can cover the seams with static grass.

Using static grass effectively

Static grass comes in many colours and now also in different lengths. It is made from short plastic fibres and because it is static the grass will align along an electrical field. This feature ensures that the grass will stand upright when making a grass mat.

There are different ways to proceed, but with all you have to prepare a bedding. The bedding will take the grass and bond it to the surface. The bedding I use is made from wood glue and acrylic wall colour in the same measure, and a shot of washing up detergent. Depending on the consistency you might want to add some water, but the mixture should not be free flowing. The wood glue's purpose is evident; the colour keeps the glue for a bit longer and prevents the surface colour from shining through. Choose any hue you

like, but usually greens give the best result. The hue used will influence the appearance of your grassland and you can use different hues to good effect to break up an otherwise boring stretch of grassland. It can also be used to mark boggy areas or to make a darker grass for wooded areas. The washing up detergent will break the surface tension of the glue/colour mix. When a surface is smooth (especially with foams) and you apply colour or glue you will realise that the glue tries to form drops, so that some spots do not stay covered with colour or glue. The detergent prevents this.

When you have brushed the bedding on, you will need to apply the grass with one of the methods that follow. The mixture will dry quickly, so it is best to do a few smaller areas than one big area. You can add some wallpaper glue to the colour/glue/detergent mix to keep the mixture workable for a longer time. When dry shake off the excess grass onto a newspaper to be used again or even better use a vacuum cleaner to remove any excess grass. If you use a wide nozzle and cover it with nylon stocking the grass will be caught in the mesh and can be used again (a device like this can be seen on the tools and materials photo below).

The next step is to seal the grass to prevent it getting rubbed off easily. You could use spray glue or even varnish, but I personally prefer thinned down wood glue (consistency of milk) with a shot of washing up detergent – no colour this time. If you use a brush to soak the grass, the grass might start to swim away and/or fall flat, so fill the glue/water/detergent into a spray bottle designed for spraying water on flowers and spray it over the grass. If you do not clean the nozzle immediately after use it will glue itself shut. I found some cheap spray bottles for less than a pound each, so it is not too big a loss if this happens.

Tools and materials

If you feel that the grass is too sparse you can add another layer of grass while the seal is still wet. When dry you will have to seal the new layer as well.

The simplest, but least satisfying way to apply static grass, is to pour the grass from the bag onto the bedding and press the grass in carefully. Not very surprisingly it will just look like static grass poured onto a table.

A better way is to use a plastic bottle with a removable cap. The cap should have a number of holes of about 8mm diameter. It is important that the bottle is soft enough so that you can squeeze it. Fill the bottle three quarters full with static grass and shake it. Hold it about 10 to 15cm above the bedding, opening downwards, and squeeze the bottle. The grass gets hurled out, hopefully aligning itself because of the electrical charge created by shaking the bottle. The force should be strong enough to set the grass firmly into the bedding, but if you are not satisfied you can press the grass carefully in (avoid flattening the grass).

The hand is quicker than the eye

I know of two devices that are designed to ease the process. The first one is from a company called Noch and costs about fifty pounds. It looks like a hair dryer with a defective heating coil, that runs on 12 volts and has a container for static grass on top. It works reasonably well, and whilst it is more fancy than 'squeezing a bottle' the results are neither considerably better, nor considerably faster. The other device is from

Tools used throughout this article

Heki and costs about £500. It is a stick with a grass container on one end and two cables on the other. You will have to mount a metallic piece into the bedding (a nail) connect one of the cables to the piece and the other cable to the power supply and switch on the device. The stick has a high voltage generator built in which creates an electrical field between the grass container and the bedding via the nail. This draws the grass into the bedding, aligning it on the way down. The results are picture perfect, but the price tag is too steep for the casual user.

The hippy hippy shake!

Flocking

Grassmats and static grass are both kinds of flock. There are also other materials that fall into this category and that can be applied to bedding and sealed as described above, but in contrast to static grass you just pour them on or shake them through a sieve.

Flock used to represent earthy ground or grass is often called turf. Flock to be used for leaves is called foliage and coarse flock for undergrowth or small plants is called clump foliage. Older hands will be familiar with coloured sawdust. For modern eyes it looks a bit crude and has been widely replaced by static grass or foam flock.

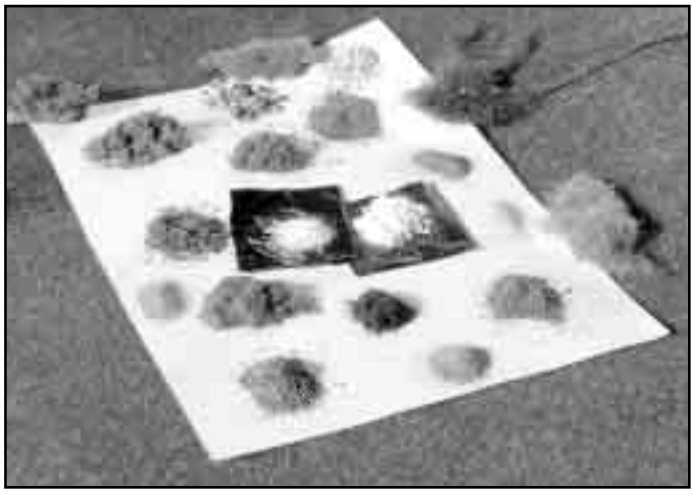
Foam flock (like the one from GW or Woodland) is made from sponge-like foam and comes in an endless number of colours and sizes. For Warmaster basic terrain a fine graded foam flock is recommended, leaving the coarser grades for representing undergrowth.

Of course you could use sand. Prepare a bedding as before, pour on the sand and seal it. Than use a spray paint to colour the sand and when dry drybrush it in the colour of your choice. The main advantage is that it is cheap and you can have any colour you like and using the same flock for different kinds of terrain because you set the colour by painting. For Warmaster use a fine sand, like the sand you get in petshops for use in birdcages. If you can get finer sand, then great. There are two drawbacks: for one painting the sand takes practice so that it does not look like painted sand, and second it's hard on gaming materials as well as your hands. I remember a tournament where all players had red and sore fingers at the end just from taking the dice off the table. Before you call me a 'Sissy!' remember that you do pick up the dice several hundred times in the course of a tournament.

Some people swear by textured wall paint, but I find it too coarse to represent any kind of Warmaster terrain.

I'VE GOT SAND IN MY SHOES

Desert sand is also quite popular as p&p terrain. The obvious choice to make sandy terrain is to use sand! Use a sand as fine as you can get, some railroad accessory manufacturers offer sand finer than is available in pet shops. Apply the sand using a wood glue/detergent/water mix (no colour). After the first layer of sand, the terrain will look rather disappointing, like a table with sand glued on. A second layer will



Types of flock

Sand

improve the look and if you use three layers the result is quite good.

You can get even better results by using a paste. Mix sand, glue, water and detergent in a bowl until it has a creamy consistency. Then pour it on the surface, distributing it evenly. You will have to attach some frame to your table to prevent the mixture flowing off the edges. With gaming tables, you could build the frame as part of the table, but with modules, you will have to attach the frame only until the mixture is dry. You will need to coat the frame with partition fluid. To make sure that the frame can still be removed afterwards.

Fine scale modellers will recognise that whatever sand you use it will be out of scale, because you will need sand 175 (nominal) times finer than the smallest sand. Some manufacturers offer powders to be used like flock. These might be in scale but just like using paint the results seem less realistic to the eye. It's probably more the existence of the texture than its grade that creates the impression of sand. Still you should use a sand that is as fine as possible.

SNOW WHITE

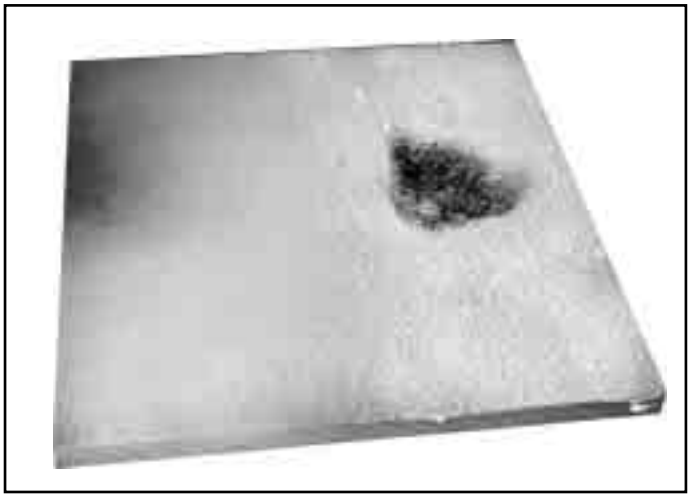
In the last few years the interest in winter-based tables has increased. A very quick and dusty way is to put flour through a sieve over your terrain. Add some diamantin (this is a very fine glitter) and you get some convincing snow. The major drawback is that flour is food and I'm not enough of a chemist to anticipate what it will look like after a year or so. Also, it does not take contact with water very well and is very difficult to fix. However, if you want to change the theme of your table for a battle or a short period, flour is fine and when the battle is over, just use a vacuum cleaner to bring the summer back.

For longer lasting winters using semi-gloss white spray paint works much better. Before spraying on the colour you really should apply a filler or the grain will shine through as you can see on the picture below. Using a brown or green priming coat first and adding the white in a way that the undercoat shines through on parts is a nice variant. To increase the appearance even more you can sprinkle diamantin into the still wet colour. While colour works better at representing snow than representing grass the result is still not that great.

The best method yet is a special flock distributed by Noch and Woodland. It has a very fine texture and is bright white. It is used like any other flock but should be applied through a sieve. This flock gives good results which can again be improved with diamantin.

Spray to the left and flock to the right

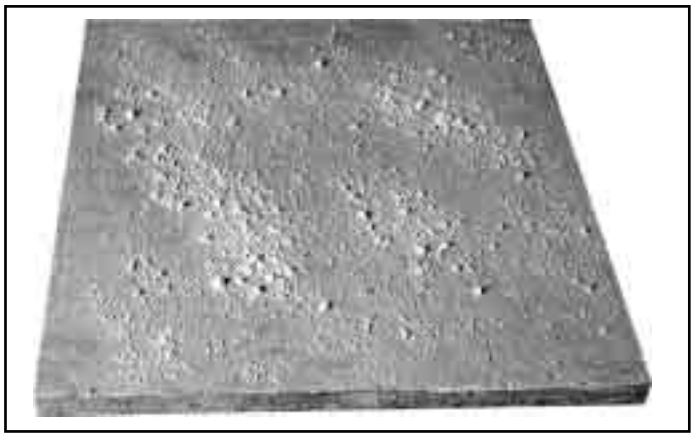
You can mix diamantin with your snow or apply it later on top. It gives a nice frozen snow glitter effect. Diamantin is offered by Faller, but similar products are available from other manufacturers. Faller also offers a winter set with diamantin, a special snow



Snow

plaster, special snow colour, some leafless trees and some icicles made from translucent plastic. There's not enough colour for a wargames table, but the diamantin, trees and icicles are quite useful.

A note of warning: Because of the bright white colour, a snowy wargames table will show traces of use and dust much quicker than any other kind of terrain.



Coarse Sand texture

BACK TO EARTH

You might want to use plain old earthy ground, not only for the Chaos Wastes, but also for open ground. You can take the real thing remove the stones and bits using a very fine sieve and apply it like you would apply sand. The results vary depending on the earth. Use only dry ordinary earth, not special compositions for gardens or potted flowers.

Woodland offers some flock in different grades and colours, which give a good representation of earth. It is just flock like any other flock and the same rules apply.

A further method which gives a nice effect is to cover the surface with a coat of thinned plaster. Just before the plaster dries, sprinkle some plaster (as it comes out of the bag) on top. Then put some acrylic earth colour on a palette and water it down a lot. Use a large brush and apply the watery colour. If you just hold the brush to the plaster the colour will soak in. Do not dab firmly or brush, just let the colour flow into the plaster. Water the colour down with different amounts of water to create different shades. When dry fix it with spray varnish or spray watered down glue/detergent onto it.

FIGHT BOREDOM

Large areas of p&p terrain might look very boring, the green grass mats often look like endless parks. A very simple solution is to use a grass mat that is not only green, but has some flowers or stones mixed in.

You can also add some coarser flock to represent undergrowth or mix in spots with a different shade of static grass. Recently, meshes with flock or long fibre static grass were introduced. They can be glued on top or can be massaged into static grass, whether fixed in bedding or as part of a grass mat. Of course you can also add stones or gravel of any variety. Outdoors, model railway shops and pet shops are good sources for stones and gravel. Be prepared to paint the gravel before use because the natural look of the stones will often look artificial and mismatched on a gaming table. Irregular shaped stones should be glued on using a hot glue gun as the area they touch the surface is very small. When you add gravel/undergrowth it will look better and will be easier to make if you glue on it first and than apply the flock or static grass.

You can also use colour to increase the variety. Just drybrush on some lighter colour or change the colour used in the bedding for flock. Using stones or other protruding features to break up the plain surfaces has to be well considered, because they may easily be ripped off and can hinder the positioning of bases and models. This is mainly a problem for the p&p covering the wargames table of OT.

This concludes this article, which covered more terrain than ground!

Earthy plain

MODELLING MASTERCLASS part IV,

by Stephan Hess

GREEN, GREENER, GREENEST!

TREES IN WARMASTER

In the last article we watched the grass grow and this month the excitement's reached new heights – tree height that is! This issue, we'll take a look at native (from our point of view) trees, jungle, hedges and fields of different kinds.

If you build some terrain entirely yourself it's not essential to know the exact scale because you can take a miniature as reference whenever the need arises. Of course, when you fall back on commercial products it is best to know what scale you are looking for.

A Warmaster miniature has a nominal height of 10 mm. If we agree on an average height of a man being 175 cm the scale would be 1:175. "Ah," you say "but Warmaster miniatures are based, so even if you have a house in the right scale, the poor guys will still bang their heads against window frames and have to stoop when entering through a door!". It just looks ridiculous, when you put your crossbow men behind some windows and all you can see are their bellies! For that reason I always take the base into account. This increases the height of a Warmaster miniature to 11 mm and the scale changes to 1:160. All Warmaster miniatures are rather broad shouldered so that the miniatures are not too slim for the scale. Luckily enough 1:160 is what model railway enthusiasts call 'N' scale. This allows us to choose from a wide range of buildings and accessories such as trees and hedges.

Remember that buildings produced for model railways are designed with humans in mind and therefore will not be appropriate for other races such as Dwarfs, Orcs, Lizardmen, etc.

Native Trees

The following table shows heights of some trees. Sizes in m for the original and in cm for the scaled-down model tree.

Orchard	4-5m	2.5-3.5cm
Old fruit tree	8-10m	5 - 6cm
Maple, Lime and plane tree	20 -30 m	12 - 19 cm
Oak or poplar	25-35m	15-22cm
Beech and elm tree	30-40m	19-24cm
Spruce and pine tree	30-40m	19-24cm
Douglas fir	50-60m	30-40cm

Most of us live our lives without ever realising just how big trees are. Most people would assume a tree is about two to five times their own height (3.5m to 8.5m). I assume this has to do with perspective and the fact that you rarely have a direct tree/man size comparison. When you look at the range of commercially available trees you will see that these are too small, closer to that what we expect than what the reality is. Model railway accessory manufacturers specify a tree height of 3.5cm to 10cm as 'N' scale tree height. Basically they offer trees that are half their 'real scaled' size except for fruit trees which are scaled correctly. If you put a stand beside the trees you will see that the reduced size looks OK and your brain accepts them as being in the correct scale.

Now that we have decided to use the wrong size for our trees let's at least choose the right look. This, of course, is just as difficult. There is a certain type of model tree that I have always considered very unrealistic. One day, when looking out of the window of an aeroplane, I saw that trees in a forest look quite like these trees, sometimes you just

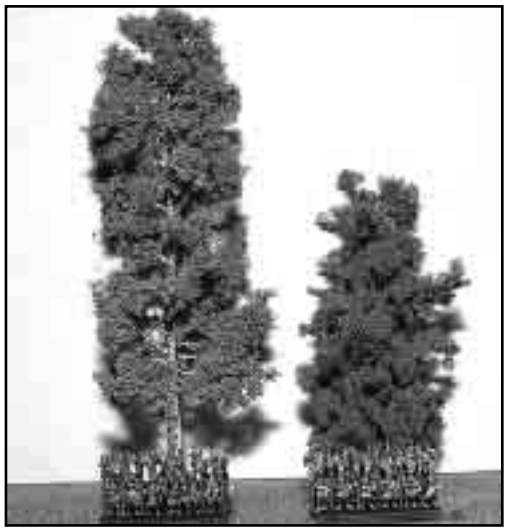
have to be far enough away I guess. Therefore, I'll leave the choice of what's realistic to you and give an overview of what trees are available and how to make them.

The oldest type of commercial tree is the bottle-cleaner tree. It is made like a wire-bottle-cleaner (pipe cleaner) and then cut to shape. Chemists and parents will know what they look like. Coniferous trees just need painting green and broad-leafed trees are flocked with foliage (coloured foam or sawdust as described in the last issue). The main advantage with this type of model tree is that it is cheap. The second advantage is that you can get some of them without roots or a base. This allows you to stick them into foam based terrain and to remove them when they get in the way.

The standard tree (as available in most model railway shops) has a plastic trunk with only the biggest boughs modelled onto it. These trees are flocked with different kinds of foliage. Some manufacturers don't use ordinary foam any more but 'open-celled' foam, which means you have more holes and less material. On model trees this resembles leaves and small branches. Some manufacturers use a rather coarse and flat material instead of foam that looks as false as foam but in a different way. Other manufacturers replace the standard foliage with a fabric/flock combination that gives a better impression of a thickly leafed tree. A radical new way is to use the ordinary plastic trunk/bough as a base, fill the gaps between the boughs with 'sea moss' a material with very thin branches to represent smaller boughs. This is covered with very fine foliage.

Some manufacturers offer trees made from sea moss and foliage only, but they look very fragile compared to other model trees. I prefer etched trees made from brass, readily painted and sometimes flocked. These are beautiful but expensive.

You can get materials for trees from some of the strangest places. Fellow modeller Lex Van der Roy has a special source for making palm trees, they are a bit small, but useable. Nobody would guess that these were originally cake decorations. These palms are made from soft plastic and the trunk requires a drybrush with a lighter brown or grey. This removes the plastic look and shine. Of course, if the leaves are made of a single coloured plastic they will need a touch of colour as well.



'Real' scale and 'N' – scale

Some of the better bottle cleaner trees

Standard model railway trees

Metal and 'sea moss' tree

Different stages of kit

Yarrow

DIY

I'm not really fond of making trees myself, as the relation between price and quality of ready made trees is quite good. Still, once in a while, I will do so, especially if I need a specific type of tree. You can model trees from the Chaos Wastes or a gallows tree for example, and if I can't convert an existing tree it will need to be made from scratch.

The simplest way is to buy a kit. They contain trunks and boughs usually made from plastic and foliage to flock them with. The trunk and boughs are usually flat and have to be bent into shape. The foliage can be applied with spray-on glue, or thinned down wood glue. The foliage itself comes as loose flock or as a very thin net covered with flock.

Filigreed trees can be made by cutting sea moss to shape and flocking it. Simple and they look the same as their ready-made cousins. This can be obtained at a garden centre or at a flower shop supplier (it's not that easy to get).

Another natural is yarrow as it looks a bit like an African tree. You will have to trim and colour it, but that's about all.

The first tree I made myself had a trunk made from a piece of plastic sprue and a 'ball' of island moss for treetop. Those were the days of innocence. This basic design is still useable. Get some twigs, attach island moss or open celled foam on top and, if you want, flock it as well. Simple but effective, especially in large numbers.

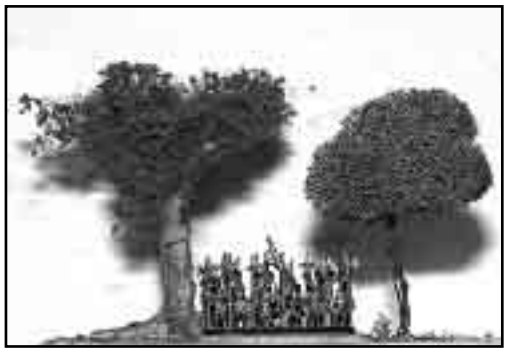
Thyme has very fine twigs and is well suited as a base to make small trees and bushes.

If you need a more complex shape or if you want to have some major boughs on your tree you will have to make a wire armature. Use three to five strands of wire and twist them together from the central trunk to form different boughs and roots,

The artists amongst you will probably want to use Green Stuff or modelling clay to model bark onto your armature and create the most refined texture. The easy approach is to use masking tape as used by painters. It has a rough surface that does look a bit like bark.

If you can lay your hands on some net foliage you can now paint and then flock your tree. If you can only get ordinary flock, you will need many branches. This is tedious to make, but you can cheat by gluing island moss or sea moss onto the boughs to stand in for the finer boughs and twigs. Again, paint your tree before you flock it.

You could use different coloured flock, but try to stick with one type of flock (ie, sponge like, open celled foam, etc).



Armature with and without bark

Metal, GW and 'cookie' palm

For a leafless tree it looks best and more dramatic if you only make the major boughs and refrain from having finer ones. The leafless tree is, of course, made like all the other trees but... without leaves!

Cheap palms on a desert module

Palms Up

There are many different types of palm trees, from as small as 5m to over 30m. Coconut palm trees will reach over 30m in height and have 20 to 30 feather-shaped leaves between 4.5m and 6m long and 30cm

The principle of rings

to 1m wide. Palm trees are rarely found in the range of model railway suppliers. As mentioned before cake decoration palm trees are very good and I have found some very nice metal ones too. The most accessible are the GW plastic jungle plants that make nice but short palms for Warmaster. You can also create palm trees yourself by making an armature for the trunk and then palm leaves from paper.

Dig Them In

First, let's distinguish between single trees and forest trees.

A single tree can be glued straight onto your terrain base or module using wood glue or hot glue, and does not interfere with game play. Do this before you flock the terrain piece and cover any tree roots partially when flocking so that it looks as though the roots are growing out of the ground.

When constructing a forest, more things are much different. Miniatures often prove hard to place within or move through a forest with the exception of the very edge of it. To allow the placement of miniatures within the forest we will need a way to make part of it removable. Before we start planting trees there are some other things to be considered. It will look good if the trees near the centre of the wood are a bit larger than those on the edges, so select your trees accordingly. Instead of using large trees for the centre area you could put them on a bit of raised ground. It is also a nice idea to have the trees at the edge of the wood at least 4cm apart, so that you can put a stand between them. Some people like to add details like undergrowth, stone heaps or fallen logs to their woods. I do so only if they are out of harms way, which means they can neither be ripped off easily, nor will they influence the play ability.

Back to our problem: We use different planting techniques for modular and ordinary terrain.

MT (Modular Terrain)

When you flock the area of the module that your forest will be, use a shade of flock darker than the flock used for ordinary terrain. This will define the area of the wood even if all trees are removed and will act as shadow when the trees are inserted.

Some commercially available trees have the roots as separate parts into which the trunks are inserted without the need of glue. This comes in quite handy as you glue the roots on to the module and stick in the trees later. Glue the roots on with the trees inserted so that you can judge how close the trees will stand to each other. When dry, remove the trees and flock the board. Then insert the trees afterwards.

The second method uses pins. If your modules have a foam core you will need to

Different kinds of pins

use very thin pins or needles. Use a good pair of pliers to remove the pinhead and then drill a very thin hole (less than 1mm) into the trunk from the underside. Glue the pin into the hole using a drop of super glue. You will be able to insert and remove trees easily and the hole made by the needle is too small to notice.

If you use DIY trees made with an armature you can bend one of the 'root wires' to act as pin.

If you do not have a foam core then you will have to use stronger pins, like nails. The tree is prepared in exactly the same way as for use with pins, but the drill naturally has to be larger. You then have to drill one hole for each tree into your module. Be sure that you do not set them too close together and that they are straight. You can drill the holes after flocking, but be sure the glue has dried firmly.

You do not have to make all of the trees removable but it will give you more flexibility if you do. Usually having the outer ring of trees fixed doesn't cause a problem and will define the 'area of forest' in addition to the darker flock.

OT (Ordinary Terrain)

You do not have to use a different shade of flock for your terrain as the base itself defines the outline of the forest.

If you want to make single trees removable and your base is thick enough, use the pin techniques described for MT.

Another way is to make rings. When you have cut out the base for the forest mount, the outer ring of trees, fastening them only temporarily using blue-tac or double-sided tape (or if you are a follower of Chaos grow some extra hands!). Trace the inner line of those and mark it on the base. It is important that the line does not overlap with the treetops or it will be difficult to remove the inner ring when playing.

Remove the trees. Drill a small hole anywhere on the line and use a fret saw or a scroll saw to cut along the line. You now have two separate pieces of terrain and you treat them as such. Glue on the trees and flock them one by one. It will be better if you do not flock the inner edge of the outer piece and the outer edge of the inner piece. Otherwise, they may not fit together. You could overcome this by trimming the inner piece by 2mm to 3mm, but it is not worth it.

When you glue on the trees be careful that the inner piece can still be removed.

Of course you could simply make two pieces of forest terrain one with the outer ring of trees and a second piece to be put in the ring but on top of the outer terrain piece, however, this does not look professional.

Bushes

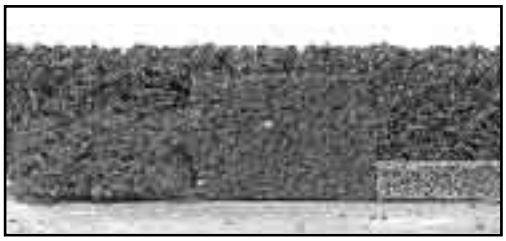
From the modeller's point of view, bushes are basically little trees without or with only a very short trunk. So all of the techniques mentioned earlier apply here as well, but usually finer materials give better results. Sea moss and Thyme are a good choice as a base. Probably the most widely used material is island moss, but it looks quite artificial if not trimmed to the right shape. Adding flock makes it more attractive. When you buy island moss make sure you buy some treated with glycerine or your bushes will dry out quickly and crumble when touched, like a vampire in the sun.

Jungle

This is basically a forest variant. The vastness of green and the lush, damp atmosphere create some strong images, but it is really bad terrain for playing Warmaster in. Still, if you want to give it a go...

There are not many suitable ready-made trees, so you will have to use DIY and kits. The GW jungle plants come in handy again and can be put to good use. A rather good

Jungle terrain



A mix of hedges

source of jungle trees are pet shops that offer a wide variety of plastic plants for fish tanks. Most of them are better suited for Warhammer because of their size, but there are still enough to be used in your Warmaster jungle.

You can also combine different types of plastic trees to create new and fearsome plants.

Dried fruits (read nuts and seeds not apples and pears!) come in useful shapes and sizes but will need heavy colouring to fit into their jungle surroundings. You can get them in flower or hobby shops that sell materials for dried flower arranging.

Of course, you can always make your own jungle trees with the same methods as described above. Have a look at a book about jungle flora for inspiration. Whilst real jungle has a lot of undergrowth it is a nuisance for game play. It is for you to decide where to set your priorities. Liana can be made from wire painted green or flocked fishing line. Other undergrowth can easily be represented with high grass or coarse turf. Marshy ground is made like ordinary ground but add a semi-gloss or gloss varnish.

Coffee grounds can be used for damp, humus-rich earth. You can apply it like ordinary flock, but be prepared for your players constantly asking for a cup of coffee. You can strengthen the effect by pouring transparent liquid resin over the coffee grounds, so that it is soaked but not flooded and if you make the terrain a bit uneven, you will get small puddles in the deeper areas.

For parasitic plants, fabric-mounted flock comes in handy, but you can glue ordinary flock to trunks or other structures as well. Flock also comes in bright colours, which can be used for flowers and fruits. Some manufacturers even offer special 'flower flock'.

Because of the different materials, your jungle might look odd – mainly because of the different colours and different grades of shine. So it is useful to give all plants a colour treatment and also to use varnish on them to give them all a similar shine. The more glossy the varnish the more wet it will look. You can even go as far as using a more glossy varnish in the centre region of your jungle.

If you have a larger area of jungle it is advisable to extend the inner/outer ring technique and divide the inner ring in multiple sections, which can be used to fill the outer ring, but can also be used as separate jungle pieces if desired.

Hedges

The best commercially available hedges I have found are GW's (*ah, cheers mate – cheque's in the post – Ed*). Unfortunately because they are made for 28mm miniatures and can't readily be trimmed, they can only be used to represent rather high and wide hedges like a 'Gebueck' (intertwined hedges and trees forming an impenetrable wall used successfully as provincial and country borders). The hedges of all other manufacturers are sponges cut in strips and dyed green and they really look like it too!

DIY

You can use any of the commercially available hedges and flock them. This improves their look immensely. You can also buy some foam, cut it into shape and flock it which gives the same result.

Some nice effects can be gained with steel wool. Trim and bend it to the shape desired then spray it brown and flock it with very fine flock. Instead of spraying it brown you could drybrush it brown which gives a nice effect, but is very hard to the brush. If you shape the lower section a bit thinner and do not flock it, it will look like the roots of the hedge without additional effort.

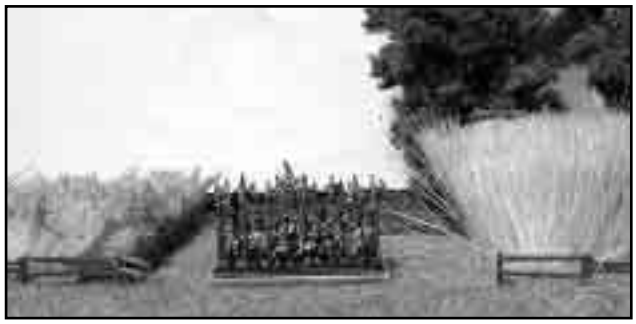
You can further decorate your hedges by adding parts of a fence or a piece of stone wall. Remember though we are building a wargames terrain and not a display piece. Usually, I recommend detail only at places, where it can be securely fastened and can't be ripped off or knocked down easily and won't interfere with game play.

High Grass, reeds and corn

For all of these you can get mats, just like ordinary grass mats, but with different kinds of vegetation represented. They are used just like any other grass mat, but make sure they blend in nicely.

Fences or stone walls can be used to divide up different fields and always look good. Do

keep in mind that whilst corn fields and high grass look nice, they do prove difficult to place miniatures on and a unit in the cornfield will in fact look like it is walking on top of it. Of course, you can apply the outer/inner ring method for fields as well as for forests.



Fields

Grass fibres are available which can be used like static grass. There is a variant that has the fibres mounted on a net or interwoven with each other. You tear bushels off and glue them on separately. This looks nice, but means some work. When you choose to do this make sure the grass is upright and not lying 'criss-cross' on the terrain piece.

For reeds and corn there are many types of loose material you can use. The bristles from a brush or a broom (the variety with stiff bristles) are always good for this. First apply a thick bedding of glue and colour to be stuck in, take a 'bushel' (what you can hold comfortably between two fingers) and cut, so that the bristles are even on one side. Stick them into the bedding. 'Knock' them softly to press them further into the bedding while keeping them upright with your other hand. Take some small pieces of wood and form a fence around the bushel to keep it upright while the glue dries. Start with a small bushel and when the glue is dry add the next one. The bushels can get bigger and bigger, because they can lean on those you have already done. When the last one is dry, cut them to roughly the same height and remove any loose bristles. And yes, it is as time consuming as it sounds.

Sometimes you can find a piece of cloth or rug that after colouring makes a good field, as you can see in the pictures that follow.

Vegetables

These are generally grown in plots. They are easily modelled by using corrugated cardboard with the top layer removed. Cut out a piece to the desired size and flock it. Instead of flock you can use thinned down filler or plaster watered down and applied like paint. When it is dry paint earth-brown and when drybrushed with a lighter tone it will look quite good.

Instead of using cardboard you can apply a layer of filler or plaster and use a sheet of corrugated cardboard or, even better, corrugated aluminium or corrugated brass as a stencil. The metal is usually smooth enough so that it comes off easily, but if needs be, brush on a tiny bit of oil to prevent the plaster sticking to the stencil. You can use machine or vegetable oil, it doesn't really matter which. The furrows will be very precise so you will probably want to add the odd break to make it more realistic. Painting and dry brushing will finish the plot.

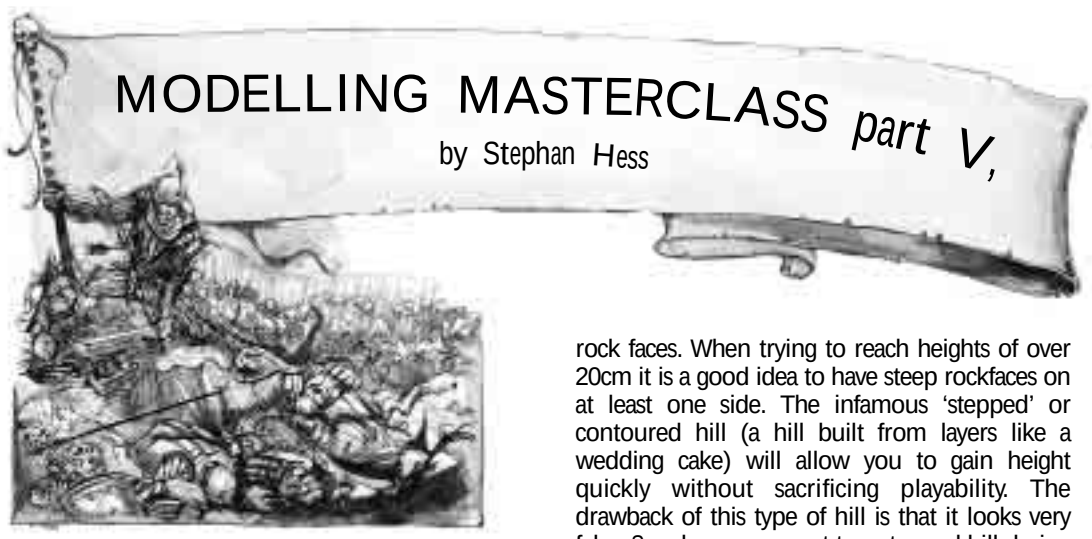
Of course, you can just scratch long lines into the filler, using a comb for the lines is the quickest way to do so, but using a stencil gives a better shape. Whenever you use filler or plaster, mix some colour into it before you apply it. You will only have to drybrush it later and if you spill something on already finished parts it will look more like the earth coming through than spilled plaster.

Small painted balls (1mm-2mm) made from wood or styrene can be used as vegetables. There is also coarse, coloured flock available that could be used and some small manufacturers even produce lettuce in 'N' scale!

You could also plant some peas or tomatoes. This will get fiddly and breaks easily in the heat of battle. So you will have to find a safe spot for that. Using brass rod instead of wooden rods increases the durability.

Until next time...

Grass mat



MODELLING MASTERCLASS part V,

by Stephan Hess

THE GREEN GREEN HILLS OF HOME!

Warmaster can be played on any flat surface. But folklore says; 'flat table, flat game'. In the last two articles we've worked on different ways, through the use of terrain, to ensure that our battlefield isn't totally flat and in this issue we will talk about the ultimate anti-flat-table device: the hill.

Standing Stands

Here we distinguish between the two types of hills you will get in a game of Warmaster: those that can be entered by troops and those that can't. Of course, there are hills that are part passable and part impassable.

An impassable hill offers complete freedom of design because you do not have to compromise with placing any miniatures on it.

Passable hills are more restrictive with regard to design. Warmaster stands have such a low centre of gravity that they will start to slide down the slope of a hill before they topple over. Monsters (and 28mm miniatures) tend to be a lot taller and so will topple quicker. Therefore a slope will need to be half the height difference (in cm) per cm of ground coverage (equivalent to 30 degrees). This is a good choice if you plan to use your hill for other scales as well.

Size Does Matter

The first thing to decide is what type of hill to make; a 'rolling' hill, a slight elevation or a mountain with steep rockfaces and a snow covered summit.

A (small) hill of 100m would be about 60cm high in Warmaster scale and with an elevation of 30 degrees the slope would cover 120cm until it reaches the peak. Obviously we will have to cheat with the scale again. Heights of 8-10 miniatures (about 100cm) are more than sufficient for a rolling hill. A playable slope would need to be 20cm to the summit.

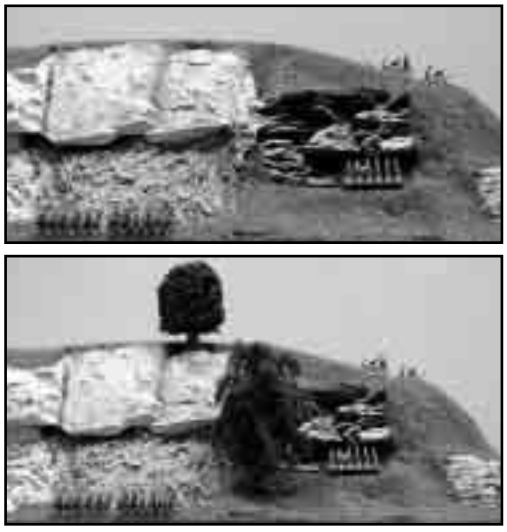
A height of 30cm will look quite impressive on the battlefield and allow for some steep and dramatic rock faces. When trying to reach heights of over 20cm it is a good idea to have steep rockfaces on at least one side. The infamous 'stepped' or contoured hill (a hill built from layers like a wedding cake) will allow you to gain height quickly without sacrificing playability. The drawback of this type of hill is that it looks very false. So when you resort to a stepped hill design try to hide the steps with terraces like the highlands or with small walls.

Designed to Shrink

If you want your hill to look impressive do not model other terrain onto it such as trees and buildings. If you put a stand of infantry at the foot of a 10cm high wall the wall looks too big but as soon as you put a house in front of the wall, it seems to shrink. The same is true for trees. Buildings and trees help to scale the hill. We expect a house or a tree to be just a tiny speck on a hill so you will need a rather big model hill to satisfy that expectation. Put trees or houses on a hill only if the hill is very big or if it is meant to be only a small elevation anyway.

Talking About Buildings...

Floors in buildings are always level with the sea so if you want to put buildings on your hill you will have to design a flat area parallel to the base as a platform for the building. Even if you plan to build the house 'into' the hill you will need to design a flat platform on the hill because model buildings usually have flat bottoms.



Placing a tree on a hill will shrink the perspective.

There are many different ways to make hills but all of these are based on either a massive core or on a skeleton core.

Massive Like a Massif

A massive core is made from foam sheets usually with a thickness of 2-5 cm. Cut the sheets to size and use layers of sheets to give the hill it's first rough shape. Then use a knife and rasp or sanding block to give it it's final shape. This is simple to do for irregular shape hills, but for a smooth round hill it's quite a task and you will quickly learn to appreciate the existence of power tools. If you use dense foam sheets you will be able to flock/paint the finished surface with no further ado. If you use the kind with pellets, and plan to paint the surface, you will have to add a coat of filler or plaster to prevent the pellet structure from shining through.

Another kind of foam comes in spray cans. It is used to fill hollows in walls or doorframes. When dry, it can be cut with a saw or sharp knife and shaped with a rasp or sanding block. Unfortunately the way that the foam expands is difficult to control and you will need some practice to get a natural shape. Nevertheless it is a good choice for some alien or chaotic shape to your terrain. When dry the canned foam has a smooth surface but is full of hollows and air bubbles inside. When you have finished shaping the hill, it will need a coat of filler or plaster to get a smooth surface. Of course, if you would like a 'Swiss cheese' look or you want to show some chaotic influence there's nothing to stop you from cutting away some of the surface material and showing the raw inside.

Foam sheets are perfect for stepped hills and massive core hills are well suited for rough and irregular shaped hills. It takes a lot of work to bring smooth and round hills into shape and it is especially difficult to get a natural, flowing shape as you have to work whilst thinking in all three dimensions at once.

Useable materials.

Nothing but Skin and Bone

Hills based on skeleton cores are simpler from an imaginative aspect. You can define the height lines and crests with the skeletal armature and the natural flow and smoothness of the slope will be automatically produced by the skin, stretched over the skeleton.

The skeleton can be based on height points or on crest/height lines.

Make Your Points

For height points, you put columns of varying heights on the base. The skin is then fixed onto the column tops. The terminology 'column' shouldn't be taken too literally – it can be in any shape so long as the outer skin is fastened only to the outer points of the columns.

Along the Line

A skeleton core based on crest/height lines is built in a similar fashion to the ribs and frames of a ship. You array a number of boards, usually wood or foam sheet, that define the crest lines and mount them on the base using wood glue or hot glue. The skin will be fastened along the crest lines and so you have closer control over the flow of the slope as with columns.

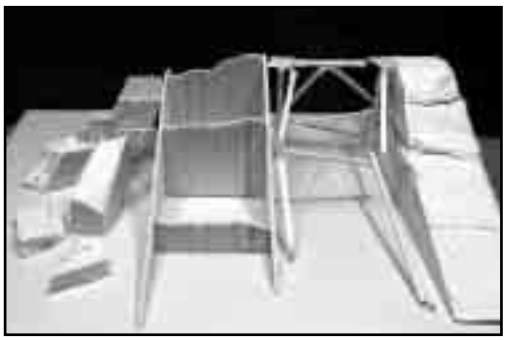
All Mixed Up

The company Noch offers an interesting system called TERRA FORM, which consists of plastic sticks and supports which allow different numbers of sticks to be combined and placed at any angle. These sticks are used both for defining the height (as with columns) and crest lines. With this you create a frame which looks close to the support struts of a tent. There is even a flexible stick, which allows you to define crest lines of any shape.

Grassy Skin

The skeleton core offers the basic outline, but the final shape is defined by the outer skin. With small hills and dense skeleton cores, with many points/lines of support, you can use grass mats as skin. Grass mats are rather rigid and can really only be used for relatively smooth slopes. Sometimes a well-placed cut will help you out of (or better into) a tight corner. Moistening the underside of the mat will give a bit of flexibility.

Don't overdo it though because if the mat gets too soggy the grass will swim away! The grass mat can be fixed with wood glue, contact glue or hot glue – hot glue being the most convenient way.



From left to right: Skeleton-column, skeleton-frame, Terra Form, massive.

Between Skin and Bone

In most cases you will need an intermediate layer between the skeleton core and surface material. The best choice for this is dense aluminium-mesh (aluminium is used because many materials used for the skin are applied wet). The mesh will be fastened with wood glue or hot glue (the odd well-placed nail will keep it in place until the glue is dry). The good thing about the mesh is that it flows quite naturally and can be shaped/bent easily to meet your imagination.

Skin

Obviously you can't flock the mesh, so you will need an additional layer to act as skin. You can apply filler or plaster directly, but the method I prefer is using 'plaster cloth', a bandage covered with plaster which is available in most model shops. Cut the cloth into strips of about 5 x 20cm. Dip a strip into water for two seconds and place it on the mesh. The cloth will follow the contours of the mesh perfectly and you can smooth the cloth with your hands to hide where bandages join. If you need extra strength use two layers of cloth

Crepe Paper

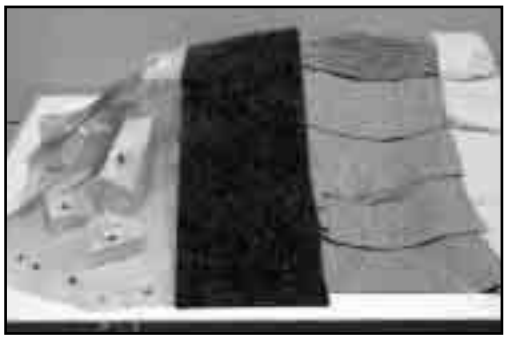
An alternative to mesh is crepe paper; it 'flows' and can be shaped easier than a grass mat, but not nearly as well as the mesh/plaster cloth combo. Crepe paper can be flocked directly but in some cases the structure will shine through. In those cases or when you want to show a rocky surface a layer of filler will hide the structure.

All inclusive

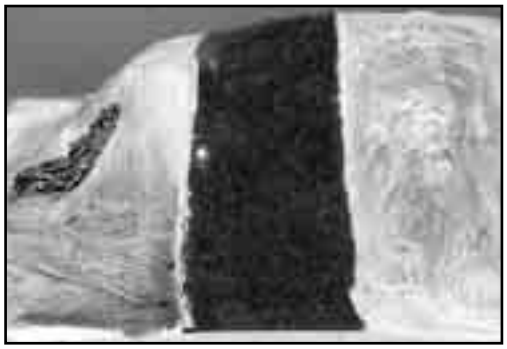
A sturdy paper enforced with wire is available from most model shops. Skeleton core and outer skin in one. It is stable enough for small hills. Besides having the skin built-in you will have to add a layer of filler/plaster or the frame like structure will show through.

Not As Bad As It Sounds

The aforementioned multi-layer approach does sound tedious but it is no slower to do than shaping a hill from foam sheets and it is more flexible.



From left to right: Aluminium mesh, grass mat, crepe paper, 'natural' foam sheet



From left to right: Plaster cloth and a patch of rmc, grass mat, coat of plaster, foam.

Sheer walls and rocky faces

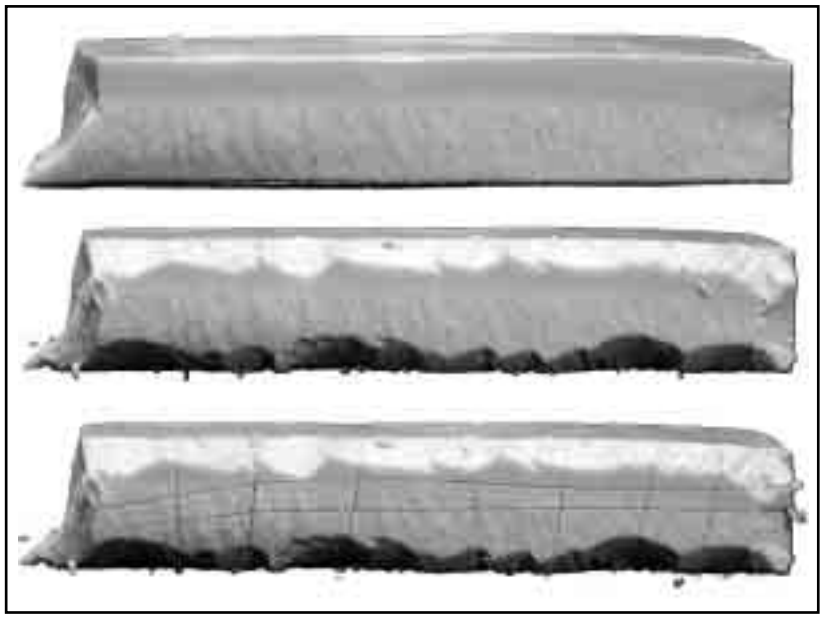
Walls of naked stone add to the dramatic nature of any terrain piece. If you are using a massive core you can cut rock faces out of the hill or add them as separate pieces and blend them in. With skeleton based designs you can only blend them in but it is a good idea to reserve the space for the rock faces when you make the frame and to insert them before you add the skin, because this makes the blending easier.

Foam Sheets

The white pellet based foam is only usable for special hills, which use the pellet structure as a design feature. For natural looking rocks you will have to use dense foam. Using a knife 'faze' the edges. Then cut a pattern of horizontal and vertical lines and break the resulting blocks out using the knife. The foam will break along the cuts and will break with flat areas. By making the lines denser in horizontal or vertical directions you can decide the overall appearance of the rock face.

Another way is to use a knife with a tip. Stick it in, turn it a bit and break chunks out of the foam. Or cut junks out of the frame in any other way that you like. When finished, apply a very thin coat of diluted filler or watery plaster (like milk) using a

brush. Make sure to cover all crooks and crannies.



Rock Face to Sell

Some manufacturers offer ready made rock faces. They represent different structure/kinds of rocks and are made from hard foam. You cut pieces from a sheet and glue them in place using hot glue or wood glue. If you heat the foam (from the underside) using a hair dryer you can bend it within certain limits to cover corners. If you need sharper edges then thin the foam at the bend before heating by cutting a wedge from the back. If you use more than one piece (i.e. to follow the flow of a hill) fill the gaps with plaster or filler. You can try to copy the structure with filler/plaster as well. The Rocky walls are already coloured, but to fit in with your terrain better you should repaint them using your usual painting scheme.

Plaster mould

Moulds are used to cast walls and rock faces using plaster. Moulds are made from latex and come in different shapes, representing different kinds of rocks. The plaster for the cast has to be free flowing. When you fill in the plaster, first spread a small amount throughout the mould and only when the mould's surface is covered fill up the mould. Rocking the mould lightly will make enclosed air leave the plaster. The results are very good and the pieces can be easily glued in or set in a bed of plaster. If you have to go around corners break the cast pieces and arrange them along the corner/edge and fill the space in between with plaster/filler.

You can make your own moulds as well, but usually it is not worth the hassle. Still if you want to, make sure the models you use are of the right scale and that the structure isn't too big and coarse. I.e. pieces of coal give good surfaces for model rocks.

Plaster Sculptor

Make the layer of plaster about 1 cm thick and when dry work out the rock structure with knife and chisel. Usually you will make quite flat structures. With a bit or practice this gives good results.

Too Real To Be Real

Real stones can be used, but often look wrong. Painting them to give them a model like appearance is a must, but sometimes it is still not enough to get rid of that 'real stone meets model look.

Knead A Wall

A new way to make a rock face comes from Heki. They produce a thin sheet of plastic with a rock structure moulded in. Cut out a piece to the required size and knead and crumble it to work out the structure. Finally glue it on using hot glue. Because the sheet is very thin you can easily cover corners and edges. Very simple and efficient.

Rock Modelling Compound

Many model railroad accessory manufacturers offer special 'mountain plaster' or rock modelling compound. It is prepared and applied like plaster. Depending on type and manufacturer it comes in different colours and consistency. Common to all is that the compound produces a rough surface when dry. Some even crack. When coloured they do a good job as naked rock. You can use them as well to represent ground for areas of bone dry or broken earth.

Bark

This is a material from the good old days of model railroading. You can buy bark in junks and its rough surface will give a reasonable representation of a rock face. Bark is rather soft and can easily be cut with a knife or saw.

From left to right: Carved foam, cast plaster (top) rmc (bottom), commercial foam, Heki plastic sheet surrounded by plaster cloth.

Colouring

If you paint directly onto foam use ordinary wall paint diluted with water and a shot of washing up detergent. The base coat can also be done with water based spray colours from DIY shops. Drybrush to highlight as you see fit this time using undiluted wallpaper colour. The wall colour stays 'fresh' for a long time, so even when the colour feels dry the highlights will be soft as the colour will soak into the base colour. This looks quite nice. Nonetheless if you want tack sharp highlights let the base colour dry thoroughly overnight

If you colour plaster or filler (even if it's just a thin coat brushed on) use a wash (made from wall colour thinned down a lot). If the colour isn't dark enough then just apply a second wash. Add highlights using dry brushing. Again, the colour stays fresh for a long time and to get sharp highlights the base colour has to dry thoroughly.

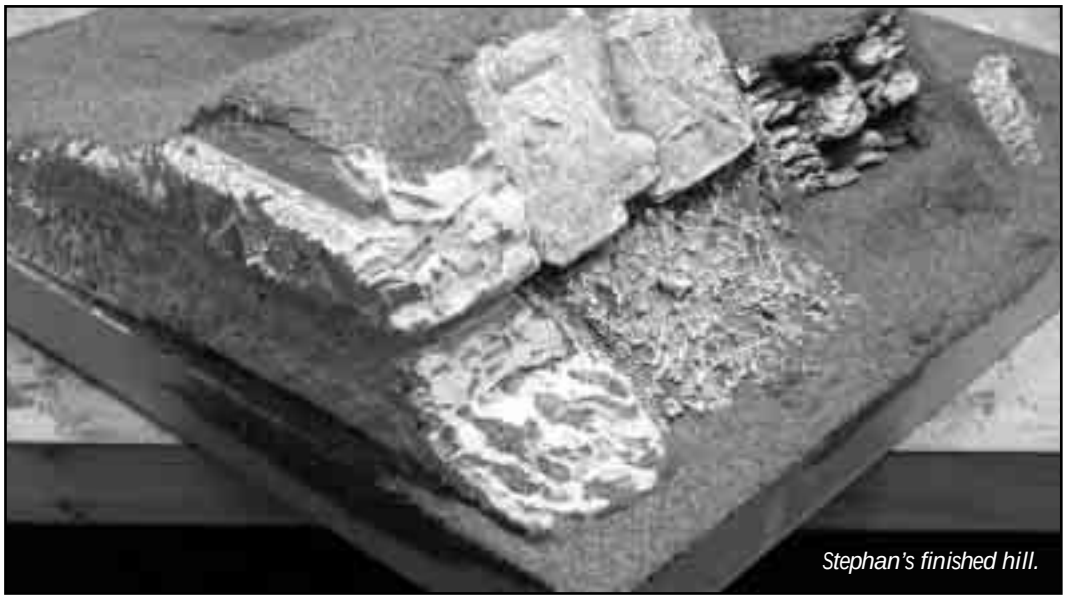
Thinned dark brown (looks a bit like flesh when applied to the plaster), ochre, black (grey) are good choices for your hills. Adding a bit of brown, green or blue to black/grey give interesting and more natural looking hills.

Debris and Boulders

Wherever there are steep walls there will be debris. The best materials to use are stones themselves. Of course, you can just pick stones from the garden, but finding the right types is most tedious. Stones of all sizes and shapes can be bought in model shops. Aquatic shops are another great source as they have stones of any kind for a small amount of money. It's a good idea to choose a bag with stones of different sizes. Just keep in mind that big Warmaster stones might be called fine by others.

The rest of the 'rock modelling compound' (I love this word construct) that stays in the mug will also make nice debris. Break it to smaller pieces and grind it down if still too big.

Place the bigger stones/pieces first using a bed of wood glue or press them into the plaster while



Stephan's finished hill.

wet. Next add the next layer of smaller stones/pieces again using (diluted) wood glue. You can add as many layers as you like, but use smaller and smaller pieces/stones as you go on. To get a natural distribution of the smaller stones you put the glue on the last layer and have the stones roll down the hill. No matter what kind of material you use, you will have to paint it to ensure that it fits in with the overall appearance of your terrain.

Running Out of Space™

Just enough space to remind you that hot glue is really hot, sharp knives are real sharp and little green men from outer space are real green.

Stay well

Stephan

And here's one we did earlier, by Mark Jones in the Studio