

# Lightweight Baseboards

## Introduction

Farnham & District MRC's previous N gauge layout 'Basingstoke' had traditionally made baseboards of 9mm ply with Sundeala over the top surface. They were very strong but very heavy: it needed 2 (fit) people to move them. Our Club has no permanent layout room, so storage is in the basement; that meant to get it out for an afternoon and evening session was a major chore, we spent longer setting it up than working on it, and with advancing age it was not getting any easier! Other layouts have used frames of 2" x 1" timber and 9 / 12mm ply or MDF, but they are almost as heavy and less robust.

## Lighter Baseboards

Our new layout 'Wickwar' was to be an exhibition quality layout, and we wanted to be able to erect it regularly and quickly in our clubroom. So we needed baseboards that were light but robust enough to survive the knocks they will get attending exhibitions.

We decided to use strong foam sheets and thin lightweight ply. The result is at least as strong and rigid as 'Basingstoke', but far lighter. The boards have proved very stable, and not affected by damp (our basement is quite damp in winter).

For our recent 'Test Track' we have reduced the weight even further and simplified the construction, this is described towards the end of this article.

## 'Wickwar' Baseboards

These are built largely of blue Styrofoam. This is an extruded polystyrene foam, very tough, very light, and often used for building exhibition stands and, we are told, in caravans !! It is completely different to expanded polystyrene, which is far less strong. Some insulation foam boards (the type sold in DIY stores with silver foil) are almost as strong, though most are much softer. There are foams similar to Styrofoam but cheaper which companies may try to sell you: they are usable but not as good as proper Styrofoam. If you try to push your thumb into Styrofoam, it needs a lot of force to make even a small dent.

The 'Wickwar' baseboards are 3 ft by 4 ft and vary in depth between 9 and 18 inches (Wickwar is in a steep sided valley). Our baseboards, even with scenery and protective lid, can be easily moved by one person with a sack-truck.

We used an open framework construction: a rectangular frame with a ply surface only where track is to go, other areas being just foam. As well as saving weight, it makes it easy to have areas below track level as well as above.

We chose 3mm marine Gaboon / Okoume ply, about 30% lighter than normal ply and higher quality. It is used for boat building and was purchased from a timber merchant, not a builders' yard. The problem with cheap Chinese ply is that it may splinter when cut and the core is made from wood-dust & glue; and while exterior birch grade ply is better it is heavier and not much cheaper.

The outside frames comprise beams of 1" Styrofoam with ply glued both sides, and similar diagonal beams with 1/2" Styrofoam for bracing. The areas with track have a 1/2" sheet of Styrofoam with 3mm ply glued each side. We have found it possible to push track-pins into it, though we prefer to drill a pilot hole. It is strong enough to mount items like point motors.

The side beams would have been strong enough if we had used 1 cm thick foam instead of 1", and we only needed the side beams at all because of the large height differences in the scenery; if the layout we were building had been fairly flat then we could have just glued ply to the edge of a 1" Styrofoam sheet and not had the side beams.

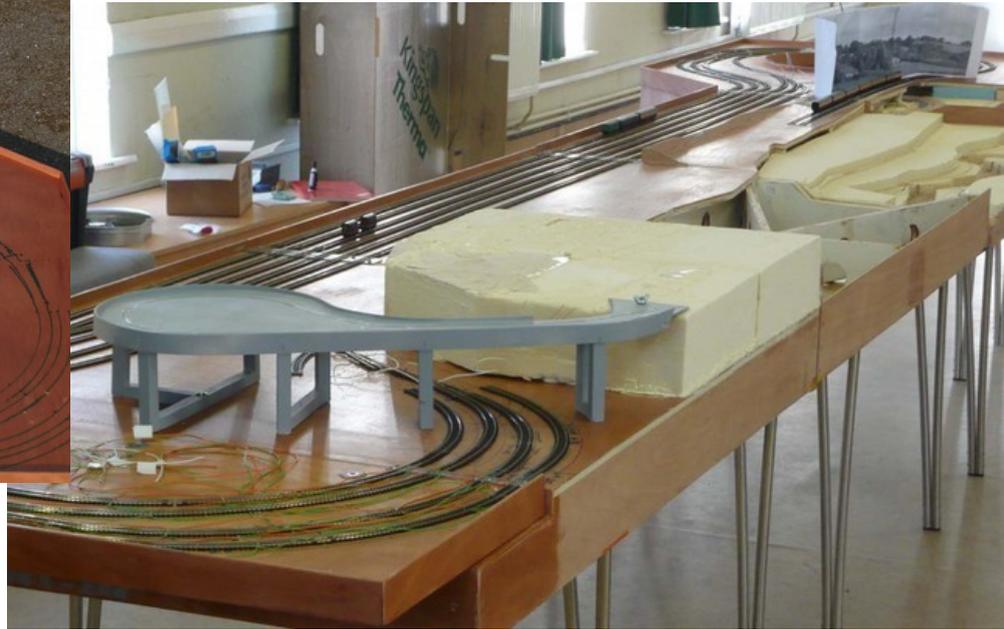


*A square of ply/styrofoam sandwich*



*Left. The baseboards at an early stage. The varnished ply is for track.*

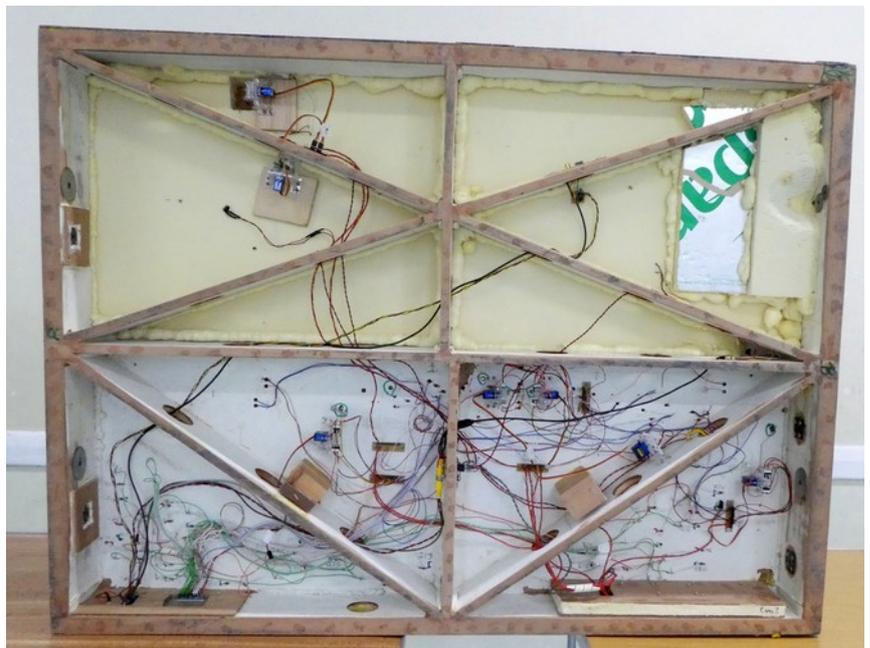
*Below. Later, with some track, the roadway turnaround and blocks of un-sculpted foam. Cantilevered Board-0 at this end.*



The ply would have been better if first sealed with 1 part varnish & 3 parts thinners; this we did on Board-0. For gluing the Styrofoam to the ply we recommend a 2-part epoxy adhesive, applied to the ply. We used Sicomin SR5550 epoxy resin plus microsphere glass beads to increase the volume, it can be used as a sealant as well if diluted with EP217 diluent. Epoxy allows temporary movement to get materials lined-up. One warning: it does prefer to set in warm conditions so not in the garage in winter. Don't use PVA – it will take months to dry, if it ever does. The foam supplier recommended a special contact adhesive that would not attack the foam. We tried this but not being able to reposition the sheets was a problem; worse, it needed large quantities of adhesive and seemed to need weeks to dry out. When we used it after a week some de-lamination occurred.

For DOW Styrofoam, we now use a different supplier; the downside is that SiG only sell them in a pack of 16. However, we are slowly using them on new & personal projects; but currently have spares available !! If you only want a small quantity, you can buy it from the 4D model shop (East London) though it costs more. Joining sheets or pieces for landscape is easy using 'InstaStik'.

We made-up large (8' x 4') sheets. When dry these were sawn to form 5" deep under-board braces. The 5" depth was because the stream is 4.5" below track level. Using a hole-cutter in a drill, we cut large circular holes in the bracing beams, both to reduce weight and to allow us to feed wires through.



*Underside of a board. The outside beams are 1" foam, inside ones 1 cm. We added ply strips to the bottom of the beams after some damage attending a number of exhibitions.*

The finished ply was coated with varnish for the sides/top and white primer underneath (which makes wiring so much easier to see).

When realised that we needed a small extension, 3ft by 1ft ('Board-0'), it was made of a 1" Styrofoam sheet, faced on all sides with 3mm ply and using the 2-part resin, no bracing – quick, stiff & brilliant.

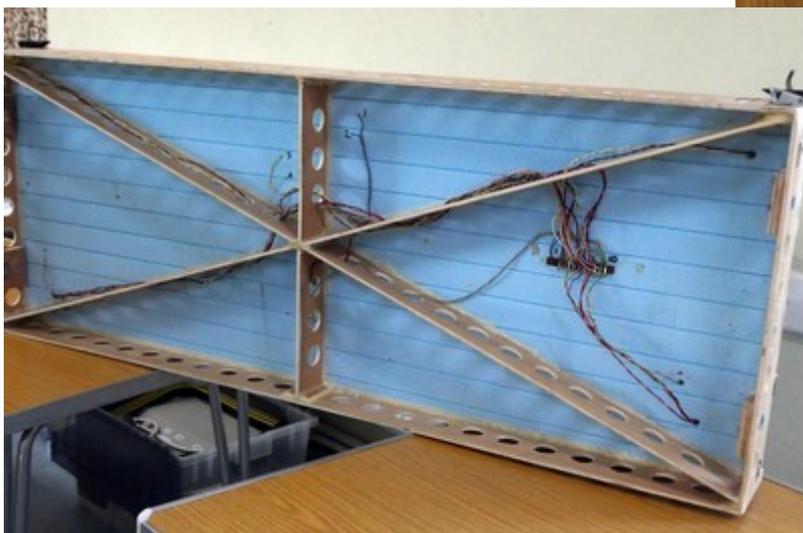
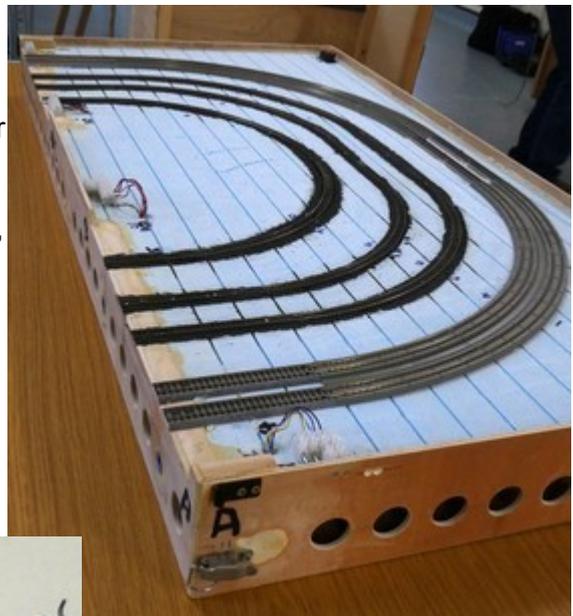
All joints were cut approximately, then glued with 'WudUcare' PU glue; it can foam to fill the gaps, so positional clamping (no ability to move) is essential. It goes hard in about 10mins; months later the skin is really hard. We water-misted the glued joints, this speeds the expansion & setting; so on damp days, don't leave the top off-the nozzle for long – even cover the top with insulation tape. We managed 3-4 joints/hour. A recent discovery is 'WudUcare Fast Grab Instant' and 'Evo-Stik Polyurethane Wood Adhesive' (both are tubes for a mastic-gun), gap-filling, strong bonding in 5 mins – really handy, but too expensive for large areas.

The scenic areas were blocks of foam glued between the beams and then carved to shape, a cheaper Styrofoam look-alike we had was used. Sticking them in place and joining them together is easy using Dow 'InstaStik', applied using a PTFE-coated foam gun. It is not only good for bonding foam, it can fill-in gaps and glue things like plaster rocks. It is possible to keep a part-used can for the future; allow some of the foam to cover the nozzle and then scrape it off before next use. **Wear disposable gloves** – even with many hand-washes per day, it takes about 8 days for these polyurethane and foam glues to peel off fingers!!

### Our N Gauge 'Test Track'

While the 'Wickwar' baseboards are light and have proved very strong, we feel they could have been made even lighter. We tried our ideas for lighter boards on our new 'Test Track'. The cross braces under the board are 5/6mm ply strips rebated & glued under the 1" Styrofoam sheet. We have not used ply under the track, the track is directly on the top of the Styrofoam.

Rectangles of ply glued underneath, or rebated into the surface, can be used to mount point motors or electronics. To reduce weight, we have used a 30mm hole-cutter with centres 50mm apart to make holes on the ply strips; achieving about 20% weight reduction in each piece of ply. This also makes for easier wiring.



*Above, one board of the 'Test Track'. Note the clips on the ends used to join the boards. To the left, the underside of a board.*

## Scenic Thoughts

Our sculpted foam scenery was given a hard surface of Amaco Sculptamold: a mix of plaster, clay, and wood fibre sold in most art supplies shops and some model shops. A 3 lb bag covers a lot, we only used one and a bit for the whole of 'Wickwar'. It only needs to be about 1mm thick so it does not add much weight, and is extremely durable. The compound, for some reason not for sale to under 18s, mixes easily with water and models like clay. It is slightly lumpy (moorland) but can be smoothed with a damp trowel. Provided you don't add too much water it dries like plaster in 30mins, if you add too much water it may take a day or two to dry fully. It sticks tenaciously to foam, indeed it sticks to most clean surfaces and the bowl, scraper, etc. used needs to be washed thoroughly before it sets. When dry it can be sanded, sawn and probably carved or nailed without chipping. If one area needs building-up you can add more on top. We tried adding coloured paint to the mix but it needed a lot even to colour it a little, and seemed to increase drying time and reduce hardness. So we prefer to paint it afterwards with a good quality mud coloured paint to prevent any white from showing through. We used test pots of 'dark chocolate' masonry paint from Homebase.

## Linking Boards Together

There are various 'Alignment Dowels' (male/female pairs) available. Those in brass are OK, although being a small diameter they probably do not give as much connection & robustness as those from DCC Concepts (which are inevitably more expensive). We used the latter on our 'Test Track' and on at least 2 personal layouts. For 'Wickwar', one of our engineering members brazed some metal tubes with end-plates. We set blocks of plywood/softwood where the dowels were to go to increase strength.

To secure the boards together on 'Wickwar' we use 6mm bolts with wing-nuts that pass through the centre of the inner (male) tube. For our 'Test Track' we use spring-clips on the outside, these are a lot easier but you need to be careful to protect them during transport (for example by a lid), both from getting knocked and from catching on other objects.

## Supports

To support 'Wickwar' we use timber 'A'-frames, hinged at the top with a chain to limit the open-width, plus adjustable feet to allow for uneven floors at some exhibition sites. To help getting the baseboards level we glued a bulb from a spirit level into an oval hole in the back of each board. These came from levels sold in Poundland, each of which contains 3 bulbs.

When working on single boards we don't have the weight or obstruction of the legs.

## Lids

Our layout protection lids, for transport and storage, are made of 1" thick silver-foil covered stiff insulation foam sheet from builders' merchants. It cuts easily with a saw. We used 9mm ply ends, though our OO group have used foam all around. InstaStik was used to glue the lids together and duct tape to reinforce and protect the edges & joins, the stronger the better (e.g. Gorilla).

We use the inside of the top of the lids to store and transport display boards and Board-0 that are part of the layout, secured in place by wing nuts on bolts in softwood blocks set into the top.



As it has no fixed backscene we found we were sometimes damaging the scenery when putting the lids on, so we now use a ply panel that fits over the ends before we put the lid on. This also protects the ends of the baseboard and track.

## In Conclusion

The 'Wickwar' and 'Test Track' construction methods produce light boards that are robust and stable, and could be used for larger gauges. They are a lot better than thick ply, chipboard, MDF or blockboard – all too heavy. And much better than hardboard and Sundeala – these change shape with humidity & age.

Each 3 ft x 4 ft baseboard for 'Wickwar' cost us about £60; thus not significantly different from good quality boards made by traditional methods. If we were making them again we would use less material.

## Summary of Materials

<i>Material</i>	<i>Possible Supplier(s)</i>	<i>Cost 2019 (incl. VAT)</i>
DOW Styrofoam RTM-X 25 x 600 x 2500mm sheet	SiG (Sheffield Insulations Group), Barking (East London)	~ £12 [beware shipping costs]
Gaboon/Okoume ply 3 x 1220 x 2500 mm sheet; i.e. 3.05 sq.m.	Totton Timber	£33 i.e. £10.76 / sq.m.
European Birch Ply 3 x 1525 x 1525 mm sheet; i.e. 2.33 sq.m.	Totton Timber	£16.50 i.e. £7.11 / sq.m.
Far East Hardwood Ply 3 x 1220 x 2440 mm sheet; i.e. 2.98 sq.m	Totton Timber	£13.60 i.e. £4.57 / sq.m.
Sicomini SR5550 wood epoxy resin; plus SD5503 (Slow) hardener [highest impact strength and low-ish exothermic (reaction) temperature]. [Formulated for building marine composites: bonding, laminating and wood protection; excellent adhesion to all types of wood.] Coverage: ~0.3 kg / sq.m.	Matrix Composite Materials Company Ltd or East Coast Fibreglass Supplies or Sicomini (France)	1 + 0.29 kg £33.65 3 + 0.87 kg £72 6 + 0.45 kg £105.13 Cheaper if bought direct & delivered to an address in France)
Sicomini Glass microspheres 'Glasscell 10' (ultra-lightweight version of '25')	Matrix Composite Materials Company Ltd or Sicomini (France)	T: 0117-954-8040 £30.42
Diluent EP217 (to create sealant)	Matrix Composite Materials	£19.78
'WudCare' Fast Grab 5mins PU (polyurethane) glue. [Green plastic bottle, cures by moisture – so don't keep it on shelf for long; if on fingers, nail varnish remover (acetone) works, but before it dries !!] [Expands if not clamped; can make ultra-thin, strong ply pieces.]	Axminster Tools; e-Bay;	0.5 kg £12.50 1 kg £17
Dow 'InstaStik' PU foam glue 750 mls [gun version is soooo much better for control & next use]	Travis Perkins, Screwfix	£10.80
PU Applicator Gun (Teflon coated is useful)	Amazon	£8 - £13
Dow Great Stuff Pro Foam Applicator Kit [5 x 750 mls tubes, Gun and Cleaner] [A really good investment; mine had very long shelf-life]	Amazon	£56
'WudCare Fast Grab Instant' 310 mls cartridge	e-Bay, Axminster Tools	~£9
'Evo-Stik Polyurethane Wood Adhesive' 310 mls cartridge	Screwfix, B&Q	~£10
Amaco Sculptamold – 3 lb bag (a mix of plaster, clay, and wood fibre)	Most art supplies shops and some model shops	~ £12