



Layout Basics

The best strategy for building a successful finished layout is to follow the mantra of the late Frank Elliston. He always said that a model railway layout is a stage on which our models perform. This is also a reminder that the layout you build is your layout and should do what you want. It should also incorporate the type of scenery that you enjoy watching your trains run through. Do not be too influenced by friendly advice or magazine articles. When you build it you have to live with it and like it. More importantly you have to watch your rolling stock run on it so there are some very important decisions you have to make before you start.

LAYOUTS can be divided into three basic types

- Exhibition Layouts (e.g. Charging Moose)
- Scenic Layouts (e.g. Paul Morrants "Just Logging")
- Operational layouts (e.g. Gerry Hopkins "Great Falls Subdivision")

A layout can be a mixture of these but it is very difficult to build one layout that does all three well. For this reason you have to make a conscious decision as to what your layout is intended to achieve before you start. The main decisions you have to make are

- Minimum curve radius
- Maximum grade
- Length of freight sidings
- Length of passing sidings
- Length of passenger train handling tracks (including stations)

If you are building small exhibition layouts you need to decide whether you are going to have a loop out the back or an auto reverser. It is difficult to incorporate a fully visible loop because it ends up looking like a toy train set. Many of the late Jeff Nott's layouts had very little track and hidden rear loops with spectacular results. If you are building a small shelf type layout then it should incorporate a passing track. This will allow you to shunt trains rather than just running them backwards and forward.

When building your dream layout in a room or garage make sure there is room for the operators to move around. Very narrow aisles are not a good idea particularly if you and your friends like good food. To have any successful operation you need room for one person to pass another in the aisle.

I have operated and worked on double deck layouts and layouts with hidden staging. Great for the experts but if you are not experienced building and operating big layouts my advice is to avoid both. Hidden staging seems to be the best place for derailments even if tracks have indicators or track occupancy detectors. Double deck layouts are difficult to build and even more difficult to scenic.

When planning a layout there are some simple shortcuts which will almost ensure success particularly for the less experienced.



The most important is planning where the track will go. There are 5 shortcuts you can use to ensure success.

- Firstly draw a rough plan and then set it out with pieces of track and points. My advice about preparing highly complex plans and CAD is do not bother. You are creating a scenic stage for you trains to run on not building a car or a house. You know what you want so draw a simple sketch of the main line and then proceed to have fun turning it into a model railroad. I have a Tafe Certificate in CAD and I built a major CAD system for the organisation I worked for but I would never use it for a train layout.
- Plan and make sites for buildings and industries using the temporary track as a guide.
- Build as many buildings and industries as you can before laying track. Place them along the temporary track and decide if you like how they look. When you do this you will learn about perspective which is what makes good layouts look great.
- You can build a lot of scenery before laying track particularly at the rear of the layout. You can blend this with the backdrop and you will also get perspective before you go too far.
- Make room for scenery. If scenery is not carefully planned before we go too far with track and buildings the layout can end up a disaster. You need proper clearance for track and the whole world is not flat with vertical cliffs along the side of railway tracks.

Your layout will be most dependent on what you want to do with it, what you want to run on it and the size of your layout room. It is difficult to build a serious operational layout to run a fleet of articulated steam engines and DD40X diesel locos unless you have a huge area and virtually unlimited time and money. The point to make here is that a decision has to be made at the beginning, not halfway through when you start purchasing locos that are not going to suit what you have already built. This is often how modelers pull layouts apart six times before any real progress is made and often end up with a pile of timber or a plywood pacific. It can be very expensive because once you purchase layout items and change your mind it usually creates a whole lot of bargains for your fellow modelers.

I have spent a huge amount of time running the quality NSW models in particular the beautiful small steam engines on friend's layouts. My advice is do not have grades if you want to really enjoy watching these engines run with some of the fantastic rolling stock that they hauled in real life. You can improve their running with modifications but you will never be happy with their performance on grades once they have to pull a prototypical load. It is not a criticism of these beautiful models just my experience watching them struggle on grades pulling relatively small loads. This can make you



very disappointed if they will do not what you want on a layout you have spent years and a lot of money constructing.

Even with the heavier NSW and USA diesels it is better to acquire a reasonable proportion of your rolling stock before you start building a serious layout. At least buy enough representatives of each type so you can do proper testing at each stage. You cannot just lay 60 points and 300 feet of track put in six gradients and expect everything to run correctly. It does not happen. You should be able to test a reasonable percentage of your rolling stock progressively as track is laid and wired. The same is true even for a small flat shelf layout where the track is tight and sidings have to be almost exact lengths.

The next most important decisions are

- DC or DCC
- Brand, Code and type of track
- Method of construction

DC or DCC should be taken into consideration when doing a track plan. DC layouts need special areas to isolate locos and sometimes a whole train. This effects how you design your points and sidings as well as electrical blocks. The issues of switching with leading and trailing points must be addressed at the beginning. If you have a huge collection of locos and like to watch them run around DC is probably a better choice. However you should provide large areas to store them on the layout so that each change of loco does not involve an 0-5-0 switching move. Storage areas should be able to electrically isolate locos.

DCC is more flexible but reverse loops should if possible be long enough to accommodate a whole train so that metal wheels do not confuse automatic reversers. Locos do not have to be stored in specific locations and the issues of switching with leading and trailing points can be addressed using an extra loco.

As we get older there are serious advantages in building modular layouts. These will be demonstrated at the clinics and we have built small models of two types which will be passed around for inspection. The Montgomery modules can be joined together to form a very large layout with separate backdrops. They can also be fitted with a box structure containing the backdrop valance and lighting. The second module which has removable legs can be used to build a portable layout which can also be fitted with a box structure containing the backdrop valance and lighting.

For the Bluesky valley modules I needed a good base to support my layout which was to be portable and reasonably light. I also wanted to use materials which are easy to obtain and require very few



tools or special construction skills. I built the modules 120cm long by 61cm high by 48cm deep. This meant that I could use top quality plywood and dressed pine bought in small sizes from Bunnings with very little cutting. It also meant that a completed module or the raw materials required to build one fit in the back of an ordinary family car. Even though I used conventional ply and pine construction the completed modules were reasonably light and only took about 3 hours each to build. I am happy with the size and ease of construction and intend to build more modules for future projects. You can use exotic materials such as light weigh aluminium framing and high density foam but this can make your project more complicated. You will need to acquire different skills and a knowledge of adhesives and engineering principles. Plywood, pine, chipboard screws and simple tools make for simple framing and speedy building.

The buildings on the demonstration module are built on 3mm ply or MDF bases which fit into recessed sections of the layout. If you want to build a layout more than 60 Centimeters wide this allows you to remove buildings for maintenance on the less reachable sections of the layout. It also means you can detail each building as a full scene at the workbench instead of leaning over a layout to add detail.

Benchwork & Trackwork

These are simple guidelines for building good track work and rolling stock tips to keep everything on the track.

Weight all cars to NMRA standards. A good solution is plumbers lead which comes in a roll from hardware store. 1 roll will last a lifetime. You can stick it in the cars with 3M double sided tape. That's the stuff used to stick ducting to concrete walls. It's a 1mm thick foam tape with sticky on both sides. You can also use balance weights from wheels but you have to get these from a tyre supplier which makes it harder to obtain

Ensure all cars have good quality trucks wheels and axles, and check that all are in gauge with the NMRA standards gauge. The most common cause of derailments is out of gauge wheels followed by out of gauge track. If needed a good example of replacement wheels are Proto 2000 which come in sets of 12 in both 33 and 36 inch at a very reasonable price. Most hobby shops sell good quality replacement wheels and trucks. If cars that are weighted correctly with these wheels and quality trucks it will often greatly reduce the amount of grime the wheels collect from the rails. Generally a plastic axle in a plastic truck wears more than the metal axle in plastic truck. Use powered graphite in coupler boxes and joints and where axle meets truck and where truck mounts to the body of the car. Keep a spread sheet with all cars listed showing when they were last serviced. Cars should be checked and serviced at least every 12 months.

Where ever possible use Kadee Couplers in Kadee Coupler boxes, measured for height, both glued and bolted to the car. The boxes on Athearn freight cars and locos will take Kadees without much modification but beware of binding. On some Athearn locos the height will be incorrect if you use



the existing boxes. There are offset Kadee Couplers that can address the height problems but the best performing coupler will always be a Kadee mounted in a Kadee Box.

Ensure your track is of the best quality standard. Try not to have rail joints on curves. If you need to have rail joints on curves solder them and stagger the joints to prevent the track forming a V and going out of gauge. There are numerous arguments about soldering joints. You can solder most joints and have continuous rail like the prototype if your layout is in a room where it does not get too hot. If heat is going to be enough of a problem that expansion will break the chairs on the curves then you have a heat problem not a joint problem. You need to address this before the first length of track is laid.

Use a 1 metre steel rule to keep track straight, spirit level and gauges to get gradients right. Use Track Setters to get curves as smooth as possible. If possible use transition curves particularly on the ends of points. Also keep it clean, and carefully remove any glue and excess ballast, and regularly check your turnouts for grime and damage.

The bigger the radius the better. The minimum recommended by most experienced modellers for HO is 24 inches. Many large layouts use minimum radius curves of 36 inches to get reliable operation from large trains using multiple locos and helpers.

Tune all locos that go in consist to same speed steps on DCC decoders so helpers don't tear cars off the rails, and loco shudder is eliminated. If possible use same branded decoders in consists. From previous experience, not all decoders behave the same way even if you tune them well. Speed increments differ; some have back emf or equivalent, and different amps ratings. If you want it to look good and stay on the track don't drive too fast.

Most modern track gives good running no matter what the brand or code. Many modellers use HO Peco track which comes in Code 70, 83 and 100. If you are starting out and have modern locos and rolling stock the Peco Code 83 series track and points are the easiest to set up for reliable operation, particularly if you are using DCC. The simplest system of track points and point motors is Peco track points and Peco point motors. There are better point motors particularly the Tortoise motors but beware of anything that requires a high level of engineering skills. Servos seem like a great idea but take a lot of skill to install and maintain. If they are running on DCC through the hand controller they can be both difficult and confusing to operate. They are however very suited to automated layouts if this is your thing and the electronics used to control them are continually improving.

Not all of the above is absolute or set in stone. If a car runs well do not modify it unless there is a good reason. There is a simple solution. If it is not broken do not fix it. However if it comes off the rails even once in 100 laps check it all over and ensure that it complies with all NMRA Standards particularly weight and gauge. If you have grades on a layout you should test what you can pull long before you complete scenery etc. Any layout capable of serious operation is designed around a train length and an assortment of motive power that will pull that train comfortably over the grade. The exception is using helpers but the same design parameters still apply to helper operation. Adding weight to a large assortment of rolling stock for no reason could turn a good running layout into a



dog. The NMRA Standards are universal and if you are going to follow weights you should also be using grades and curve radii to make sure it all works together. You can use what you like if you can make it work but the more you deviate from standards the more skill you will need to make it all work.

Putting it Together

The buildings we have used on the layout are mostly cheap plastic kits available in any hobby shop. That does not mean you cannot apply these principles to wood or even advanced craftsman kits. Before you assemble a kit you should look at the best method of preparing it for its final resting place on the layout. In many cases this means that the original base should either be discarded or cut down before you begin assembly, to suit the site it will occupy. Mixing several small kits to make an industrial scene is a cheap and effective way to create a relatively large industry. This can be done on a heavy cardboard or wood base which is then fitted into a space on the layout. This allows the building and other details to be blended into the ground. It also allows all detailing to be done on the workbench rather than leaning over the layout. . The difference between an ordinary looking plastic building and a really great looking structure is often only a few hours work and a few extra parts.

To get ideas about industries look at the real thing and if possible take photos. Note the way buildings are joined together and the external pipes and machinery that are appropriate for the industry in question. Many industries are a mixture of buildings which are not made out of the same materials. However to make it believable on a model it is usually preferable to paint them all the same colour particularly when mixing structures from different kits. They can be detailed with varying degrees of weathering to simulate the subtle manner in which different materials weather in nature.

I prefer to assemble the walls of plastic buildings and airbrush them before fitting windows doors and roofs. I use the liquid plastic glues with the thin metal applicator spike for most joints. I glue them on a flat sheet of glass that will not stick to the glue and use a square to make sure the corners are at right angles. This allows me to make sure the corners are properly fitted while they can be easily rectified. You can use a minimal amount of glue on the actual joins and later reinforce the building on the inside with 5 minute Araldite, where it cannot be seen. Airbrushing plastic siding or bricks with flat acrylics gives a very good finish and provides a great base for detailing with chalks and washes. The windows and doors can be airbrushed a different colour before fitting while attached to the sprue. This saves a lot of time and usually gives a much better finish. Windows with small panes of glass will often look better if you form the glass using "Micro Kristal Klear". You can buy this from most hobby shops. Large windows should be formed with clear acrylic placed as close as possible to the inside of the frames. If the glass provided with the kit does not look shiny and real you can use acrylic from a shirt box. This can be attached with 5 minute Araldite.

Roofs can be airbrushed if they look realistic and detailed with dark chalks. Dark chalks make plastic tile roofs look much more realistic by getting in the cracks and making the tiles look three-



dimensional. You can improve the look of many buildings by replacing the roof with flat styrene, which has been covered with either masking tape to simulate tarpaper or commercial shingles.

Most buildings look flat in real life. For this reason flat acrylic paints usually look best on model structures. Most buildings are not perfectly clean. This can be best simulated using chalks and washes. The golden rule is never leave anything in original shiny plastic.

The backdrop should match what is in front of it. You should also try and create perspective by matching the height of buildings to the background behind them. Have taller buildings in front of higher scenery. Have a creek in front of a back scene that contains water or industrial buildings in front of an industrial back scene. Most stations had a town scene behind them or at least some residential buildings. This makes it all believable. I love building highly detailed laser kits but a good plastic building set against a great backdrop surrounded by good scenery and covered in detail looks better than the best kit in town sitting on ply with a plain blue background.

Detailing the Layout

The simplest forms of lighting are fluorescents mounted on the ceiling or LED strips mounted behind a valance. With LED strip lighting a good effect can be achieved by using a mix of white and yellow LEDs. The whites provide a very strong light and the yellows bring out the colours in your rolling stock buildings and scenery. This mixture works well with digital cameras for taking photos with strong accurate colour balance.

The backdrop on the module was made by cutting up and joining pages from some old books. Trees and buildings have been used to hide the joins. There are many ways to do backdrops and there are some other clinics which go further into this topic so I will not dwell on it.

There are many detail items you can add to a structure that are free. Small drinking straws with fluted bends that come with popper drinks make excellent large diameter pipes. Nails, steel wire brazing rods even meat skewers make smaller pipes. Even larger diameter pipes can be made from normal drinking straws with or without fluted bends. Painted cotton makes steel cable. Old tank cars can be made into stationary storage tanks. Storage tanks can also be made from plastic electrical conduit with flat styrene glued on the ends. The most important thing is painting these items to make them look like they are made from metal.

Details can also be purchased separately from most hobby shops. Typical items, which can be used on most industries, are Rix roof vents, Kibri pipe and vent kits and Walthers Cyclones. Other detail items such as junk, pallets, garbage bins etc are made by Woodland Scenics. Some Woodlands Scenics whitemetal kits are a goldmine of detail parts. British manufacturers also make a lot of basic



detail items. Antons Trains makes some very good quality cast metal detail parts suitable for industrial scenes. Two of the best places to buy detail items are The Model Railroad Craftsman at Blacktown, which has a huge range or the Railcar which is usually at trainshows and online.

People, crates, lumber, barrels, drums and other small detail items should be placed in strategic locations to make a complete scene. They should also be painted and weathered in an appropriate manner.

The final thing to remember is finish. Rust and dirt should only be used where appropriate. You can use washes, dry brushing and chinks on the same building. The real trick is following the prototype and it will look effective and realistic.

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