

Tips & Tech #03

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- Benchwork-

Much has been written about bench work over the years. I have found that using good but inexpensive materials along with proper building techniques will provide a proper and sound base upon which to build your layout. When beginning to build the bench work everyone wants to get it done in a hurry so they can start putting down the track. This is one of the biggest problems with poor operation of a model railroad is improper bench work which yields track work that is not level and free from kinks, both horizontal and vertical.

Most of the printed material on bench work suggests using 1x4 lumber. Although this is a very good way to go, but if you have a lot of bench work to build using 1x2 milled lumber is an alternative. Now 1x2 lumber is sometimes called “furring strips” but there is a lot of difference between the two. Most furring strips are very crooked and have a lot of knots. Milled 1x2s are made from #2 grade SPF lumber and I have had many pieces that do not have a knot for the entire 8 foot length! It pays to pick through the pile at the lumberyard if they will let you.

I use the L-girder and T-girder methods of base bench work. I then use joists that are a maximum of 16” on center and usually a lot closer. If the L/T girders are spaced apart more than 3 feet it is wise to add another L/T girder in between. Legs spaced about every 4 feet is about the maximum one should go unless the L/T girders are doubled up or built of 1x4 material. The legs can be 2x4’s ripped in half making a 1 ½ somewhat square support. Second level bench work is made using the open grid with the same subroadbed as the lower levels.

Now for the subroadbed a lot has been said for using ¾ birch plywood. While this is, I feel overkill, none the less it is about as bullet proof a base as there is. There are other alternatives to this and one is using 7/16 OSB board. Now 5/8” would be better but the 7/16 will stand up to the task if your train room is not overly damp. This is the biggest problem with most layouts is the excessive dampness. Painting of the subroadbed is a must as it will seal the wood and keep the moisture from affecting it.

I use Homasote next laid on the subroadbed. This is glued to the subroadbed and then painted. This will again seal out the moisture. I have found that the thickness of the Homasote varies from shipment to shipment and the surface of the Homasote will also have minor variations. I will use a large rasp to grind down the thick piece of Homasote to match the adjoining one if necessary. I am now ready to begin laying the track. I use cork roadbed, this is to give the track

work the proper profile for ballast and help reduce noise. For the mainlines I use HO cork roadbed, on the passing sidings I use N scale cork and then for the sidings/industrial spurs the track is laid directly on the Homasote. This helps give the layout the impression that I am using smaller code track when in reality I am using code 100 flex throughout for durability and price. When putting down over 2400ft. of track, price soon becomes a major factor!

- Sturdy Bench work -

Having sturdy bench work is a necessity but it may not be easy with large peninsulas. If building a layout in a basement, more than likely there will be posts down the center of the room. If the layout is built around these posts, using them to help support the bench work is a good idea. Most basement posts are about 3 inch in diameter. Using a 3 inch muffler clamp is the easiest way to attach the bench work to the post without damaging it. To attach the muffler clamp to the bench work drill two 1/8" holes through both sides of the U shaped base of the clamp, install a joist next to the post. Install the muffler clamp so that 2 drywall screws can be used to attach the clamp to the joist. Tighten the clamp securely.

- Homasote -

When cutting Homasote using a table saw or power handsaw be sure to have adequate ventilation as this produces a lot of dust. To get around the dust problem I use a utility knife and cut the Homasote. Now this is not as hard as it may first appear to be. By making a light pass with a sharp blade and then making additional cuts applying more pressure each time the 1/2" Homasote can usually be cut in about 4 passes.

When attaching Homasote to the subroadbed the glue does not need to be spread 100% over the surface of the piece to be glued. Making 1/4" wide beads along the length of the piece and separate the beads by 1" will allow the piece to be removed, if needed, and still have adequate holding. To hold the Homasote tight to the subroadbed using weights and/or clamps will work. Also using drywall screws spaced 3" - 4" apart along the edge and 6" in the field, if the piece is over 6" wide. When installing the screws using the plasterboard drywall screw driving attachment will greatly speed up the installation of the screws, as it will limit the depth of the screw by keeping the screw from driving too deep or not deep enough to provide adequate holding until the glue sets. Remove the screws before painting the Homasote. The screws are only needed to hold the Homasote until the glue sets.

- Track Plan Layout -

After the Homasote is painted it is time to begin planning the track layout. Drawing lines to either center the cork roadbed or the track itself is the way to get accurate track laid. Doing the straight sections is easy, just have a straight edge and draw the line. But when it comes to the curves now we have a problem. Outside radius' are fairly easy if you have a radius stick. Making one from a yardstick is the usual way. Also making one from a 3/4" square wood and drilling the holes on 2" centers works well. Now the inside radius is where everyone has a problem as there is no way to mark the center of the circle when it is in the middle of the aisle

way. Using a photo tri-pod with a post mounted on it to use as a pivot. Now it is adjustable for height as well as being moveable in any amount and has enough weight to keep the center pivot from moving around when drawing the radius.

- Interchanges -

What is a live interchange in reference to a model railroad?

This question has come up on various e-mail groups and forums over the years and their definition is somewhat different than the one our group uses. The discussions tend to revolve around the idea of a junction with another railroad and that junction is about the only thing modeled with a short stretch of track going into staging. This staging may be more than one or two tracks. They assign a crew to operate this interchange by running a train out of staging, switching the cars out of the train, picking up any left there by the modeled RR and then heading back to staging.

While this does add a certain amount of work for the layout crews and interchanges cars, it does leave a bit to be desired. But then, this is only my opinion!

Now what I have done on my layout is actually model the interchange railroads, albeit in a highly compressed form. The layout allows crews to work 6 live interchange railroads during an operating session without actually having to interface with the modeled CR Lowgrade other than at the interchange point. Luckily for me, building a prototype layout modeling the actual towns as they were in 1975/85, these 6 short lines did in fact exist and was the real reason the railroad was there.

I have not tried to model the shortline railroads exact, just the interchanges. I decided early on, in the planning stage, to try and add the so called Live Interchange to my layout, to add additional work for the crews. But as planning time went on, I soon found that I needed to have more than just a staging area for some of the shortlines.

Now I was in a dilemma, do I leave things go and not be happy with this limited operating scheme or go to all of the trouble of adding additional trackage and modeling a town with industries?

Well for one of the towns this was easy, as I had already added their trackage as it was needed to make the scene believable (Brookville and the P&S interchange). With the P&S interchange, it was so close to the CR trackage and it actually crossed over the Lowgrade line on a bridge. On the P&S part, I had to add additional trackage south to a yard to hold a few trains, but now the trains would have to be manually restaged between sessions. I found that if I extended the track under the layout (into hidden staging) I could then connect with another portion of the layout off the end of a yard and then use the hidden area as a double-ended staging. This would allow the crews to keep on moving the trains in and out of this staging all night and I would never have to manually restage this area. One down and 5 to go!

With the B&LE section, it was as simple as having a big reverse loop. It started out as a simple one track loop but then the area I had to use allowed me to add three more tracks. In the real world, the B&LE Kalor branch never went into Phillipston yard, but there were plans to do this before the war in 1943, so I added this connection. It now allows the Phillipston yard operator to use this area as a marshaling yard and overflow storage. Two down and 4 to go!

The town of Falls Creek had two railroad interchanges, the Falls Creek railroad (formerly the Falls Creek to Ridgway branch of the PRR) and the B&O (formerly the BR&P) plus a yard. This is where I had to make a number of decisions about what would be modeled and what would be staging only. Dubois, which is right next to Falls Creek, had a large car rebuilding company (RESCAR) and it would have been a great way of staging a large number of cars out in the open. It would also provide a lot of switching and this is what the layout was designed for BUT it was on the B&O/B&P railroad. Now what do I do? Do I alter the basic design of the layout and add this area to the CR Lowgrade or add the actual interchange point? Well this was an easy decision, as I had the room on the layout and it was easy enough to do. So, I now had a large area to do switching and the added open area for storage of my rolling stock! Three down and 3 to go!

The Falls Creek railroad (FCRR) interchanged with the CR Lowgrade only at Falls Creek and then ran only a few miles north. Although the FCRR never went to Ridgway I had only planned to have this as staging. This would be a live interchange staging. After looking over the area I had to work with, I decided to run the track a little further along the wall than I had originally planned, to get it away from some other operating areas (Brookville & Brook Industrial). With the track now at the front corner of the room, the lower level benchwork was too far out from the wall to make working the FCRR easy. A decision was made to extend the track around the corner of the room and add industry flats to the staging area (Ridgway). This made use of this trackage as an additional switching area that would have only been staging. Four down 2 to go.

The Lake Erie, Franklin & Clarion railroad (LEF&C) was planned early on to be included in the layout. A large portion of the design was allocated for Summerville. This ended up being the midpoint of the layout. I was very familiar with the LEF&C, as the Clarion Club has their own HO version. I just had to figure out a way to incorporate it into the layout. By adding a third level on one peninsula the LEF at Clarion was in operation. Five down 1 to go.

Phillipston, the only major yard on the layout, is actually not on the main line but a stub end yard. Originally it was a through yard on the PRR Buffalo/Pittsburgh main line but in 1908, the East Brady tunnel was opened and provided a shortcut through the hill which effectively cut off the yard. The yard was kept active as a marshaling yard, of sorts, as the coal, from the local companies on the Lowgrade line, would be moved here to either be sent north to Buffalo or south to Pittsburgh.

Now to accurately model the Phillipston area, the Buffalo/Pittsburgh main needs to be somewhat useable. This would require staging on both ends of the main line and only a short section would be visible. This was the plan, with the north end running into staging. But now that the P&S staging was added at its south end, a double-ended staging area could be built, as talked about above.

Now for the south end, it was planned from the beginning to go to staging. There would be a need for a large number of coal trains that would originate and terminate in this staging. Initial plans called for single end staging but with the north end working so well with double-ended staging, it was felt that a reverse loop type staging would be better and it would stop manual restaging between sessions. The reverse loop had four tracks and would allow four trains per each track. During one of the brainstorming sessions, an idea was put forth, to add trackage south to Kittanning on a lower level. Now this would add a little more industrial area to the layout, but now the staging area was not in the proper orientation with Kittanning. A major decision had to be made, as the layout was being held up if we were to move the staging. The staging area was finally moved down under the Summerville area. This move added more track and another town, Ford City. We added a bridge, which crossed the Kiski River, to designate the end of the line, as the track was now going into the staging. The staging track could now be called Kiski JCT just like the prototype. Six down!

Now the area east of Dubois, which was originally the end of the line, now needed to have some way to add additional staging. In another brainstorming session thoughts turned to a double end staging again, as was used with the P&S/CR main line. We now had to figure out how to get the east end connected with another section of the layout and make it all look like it was supposed to be that way. At Rose siding just west of Brookville the old JF&C branch (x NYC track, x Jamestown, Franklin & Clearfield RR) headed west. It too was planned to be a live interchange staging. It was headed in the right direction in the layout room so that the Dubois end could be connected with the JF&C branch. Now all we had to do is get them together in a double-ended staging. This was accomplished by adding a third level and having the staging on the other long wall side of the room. The grade from Dubois to Driftwood was kept rather reasonable but the JF&C side was made 4% to make the trains work as the real railroad had similar grades. We now had staging for the end of the line. So effectively this is number 7!

Enter 2004 and some more brain storming. We (Aric, Bryan & I) had talked many times about extending Ridgway across the doorway into the corner. This idea had been in the back of my mind and I had been thinking of ways to add a flip up bridge so the doorway would remain completely open when not in use.

We had also decided that Driftwood needed more staging. We build a section above the Reverse Loop staging and Summerville area and added 5 single ended tracks. This area was called South Driftwood. It would represent the Harrisburg/Buffalo main at Driftwood. This area was completed in late 2003. Design work began on a flip up bridge as this was still a project I needed to complete but really had no place to put it yet.

As the flip up bridge project was coming together (I wanted to have a very sturdy bridge with no sideways movement as all of the other designs I had seen had) we again talked about the Ridgway project. I figured that this would be a good place to try out the flip up bridge and add a little more work for the FCRR crew. Rather than end the track in the corner I decided to continue the trackage on around the corner and into the South Driftwood staging area. This would eliminate the single ended staging which I dislike immensely. Using the Conrail ZTS maps I tried to justify the old Ridgway branch coming into Driftwood and found that Emporium

yard looked very much like the way the South Driftwood trackage was laid out. So now I had a way to use the South Driftwood trackage, which is now called Emporium.

So now what do I have, live interchanges or a number of live short lines?

Bob H

- Track or Layout Height -

So now we have gotten past the basic design stage and are looking at layout benchwork.

How high do we make the track off the floor?

I think this is the second most ask question in model railroading! And most of the experts (those that get printed in magazines and spend more than a few hours on the internet) will give various heights, usually around the 42" to 48" range.

This is OK for a single level layout but what about a multi-level layout?

Now, this is where the so called experts really go wild! Very few can come up with a real measurement only because everyone of them are a different height. Yes, that is the real cause of all of the different opinions, yet no one seems to ever have pointed that out. Or maybe they could never really explain it. John Armstrong (the original layout designer) had given guidelines in his many books using figures showing body angles and line of sight. But everyone just jumped right over that, or thought that is was not important.

Well I am here to tell you, that was one of the most important things that a new modeler needs to understand when thoughts turn to a multi-level layout.

Now let's use some everyday standard height items to get a reference. A Kitchen table or a desk is usually 29" - 30" high. A Kitchen counter top is 36" high. We use these things every day but have we ever really thought about why they are this height?

What is the average height of a person? 5ft 6 - 5ft 8 - 5ft 10 - 6ft !

The internet states it is 5ft 10 is the average. This is for a male in the USA and again most modelers are male, so this is what the height of a layout is set for.

At 5ft 10 the hip would be around 39" so having lower level benchwork at 30" (table height) for the average person would allow you to sit on a rolling chair and work a yard.

And again for the average person 52" is about chest high. So then using the 42" to 48" for the middle level and then having the top level at 55" would be about right. Again this for the average person.

Now if you are taller than the average and I am 6ft then I made my layout to fit me. The main yard area is 33" which might be a little low but my yard area is quite wide and I have a lot of tracks that go all the way to the back. The lower level allows me to reach the rear track without any trouble, even with buildings in the way.

The middle level varies from 45" at Reynoldsville to 50" at Falls Creek. Again right around the average layout height area.

Now the upper level is set at 60". After I built it I feel that I should have made it a little lower. But I have built flip out steps that boosts the operators up 8 inches. This now puts the upper level in the chest high end of the average height range of 54". But the layout depth in this area is only 1 foot wide. So operating it is easy as you no not have to reach through any benchwork to uncouple the cars.

So the point I am trying to make is use your body height to determine YOUR layout height. Don't build the layout to fit the average unless there are going to be way more taller or shorter operators. Then you may feel that you need to accommodate them but then that decision is up to you.

Now for each 2 inches taller you are above the average person then figure adding 1 inch to all of the layout levels as we have to assume that the extra 2 inches is split evenly 1 inch above the belt and 1 inch below the belt. The same goes if you are shorter than the average subtract 1 inch for each 2 inches shorter. For those that are not an even value then you could split the difference higher or lower. But this gives you a guideline to at least begin your benchwork.

Then the layout needs to be operated, even just a little to get a feel if the benchwork needs to be adjusted up or down. Quite a number of modelers do not run trains at all until the layout is, so called, finished and only find out that it is not right. Most of the time they let it go and dislike the layout and soon abandon it (either tearing it down or not running it at all).

BOB H