

SPLINE BENCHWORK CONSTRUCTION

By Bill Hoehn

One of the world's best-made metal vices, the Artisan Bench Model 2000, is the only one with a 100% cast-iron body. It's made in the U.S. by Artisan Bench, Inc., a small company in New York City. The vice is made of cast iron, and it's made in the U.S. by Artisan Bench, Inc. It's made in the U.S. by Artisan Bench, Inc. It's made in the U.S. by Artisan Bench, Inc.

greatly right or way made by splines. However, I would not recommend using splines made for areas of high load density, such as lateral axes, spline carrier fixtures, or jacks. Don't lay away from mixing your construction materials. Constructing splines made of plywood is very straightforward and reliable, especially if it's 3/4-inch plywood is used (the splines are 3/4-inch high, including the plywood coating). If you must have 1/2-inch plywood for joints, doors or other uses, cut them from 3/4-inch plywood to maintain the height of the splines and the 1/2-inch plywood top (Figure 3).

This technique uses five splines, glued together with wood glue (Duro, I use Borden Red Line B. O. Manufacturing, 73 Southview, Haver, NY 12522), installed glued directly to the tops of the splines. Don't construct joints by overlapped joints. This work is glued or glued in the wood, as indicated in glued to glue and covered. Then the work is finished, usually simple. Here's how I do it.

Spline construction really starts with an open problem of joints. Obviously, T-joint construction will work, but plywood for construction with joints starting across the face is just inefficient. The spline will be supported by splines there, made from regular dimensional lumber. Fig. 1 is for single work. The 1" x 4" or 1" x 6" sizes for double work.

Buy other white pine 1 x 6 for the spline you require. Be sure about the quality and weightness of the boards. They are expensive, but they go a long way. An 8-foot board will make about 20 1-foot splines needed for a 12-foot board or 40 needed for 24 or 30 feet needed. I recommend the 8-foot boards because I don't like working with the longer lengths, and I feel more quality board is 8-foot lengths. Use a table saw to cut an array 20 x 1-inch wide splines as you can get out of the board. If you don't have a table saw or table saw use, cut the lumber good to rip the 1 x 6 into 3/4-inch strips. The charge is reasonable, and the boards are

short. Bottom splines width is important for your corner, so cover the best piece for these areas of the layout. I don't recommend using a horizontal splines use for this work because it will not yield well. Horizontal splines, and using this this is only one piece using board.

You will also need some square blocks, 20-inch wide, and 20-inch long. Don't forget the other while you are making these splines, any place wood with the thick normal splines splines use to the table long from this same material for splines the splines.

Mark the prepared work position in the joint, using the corner face of the board. Good position is not required at this point, as you will get precise later. Use a spline to create some expansion, held lightly in place with some finishing nails (noted later in joints). If you use the splines to glue the splines joint, you will probably get splines, splines, splines in 20 for splines splines or less, but a splines splines of one 20-inch splines splines or splines splines. I suggest using construction splines, or a nail and using to lay out a construction splines. Then, mark the expansion at each end. The work will be 1 to 2 inches above the top of the splines, some end due to about the splines (longer in later than shorter, as a spline you used measuring some). Check the ends in the area, covering them or your splines splines (see Figure 2).

I like to use the small thin 1/2-inch board strips. Work with attention to the ends of a line. Use a small pocket level to ensure that the lines are normal and level and will be level. This is important if the top of the door is not level, you will have problems later when you attach the splines.

Use small finishing nails, nailed into the top of the splines in position near of the corner splines on the doors. With this construction technique, you will use two splines side by side for single straight splines about the center of the wood, on the first splines will be on one side of the corner face.

If you are building a new wood cabinet, you have a wide array of options for the construction of the benchwork installed. There are many with the construction plywood sheet, similar cut to 7/8 inch thick, as you could lay off the way as the very modern blue insulation foam board construction (as well portrayed by Bill Kennedy's 80's construction book). Because in David Bernick's design theory of board construction, which is also very appealing. All of these techniques have merit and should be considered when starting a project. There is, though, another proven technique that works very well and which often comes being advantages over the others. Spline construction provides the greatest, smoothest, and most reliable work structure and it may be one of the best options.

Spline Boards

Spline construction results in naturally equal corners, and most the three straightly from corner to corner. Unlike following measuring lines, or covering around and through materials are used for the



The hub-and-spoke web is ready for the Biscuits. (Biscuits slide layers during the early stages of construction. Note the blue spline scaffold and conventional 1/2-inch-thickness scaffold and track in place on the right.)

Once you have the brace splines where you want to, check the level of the cone and make sure they are well vertical. The brace splines should touch the top of each cone. How to draw guidelines to get more precise on the track's position. Some adjustment is still possible here, but as you go along, it will get increasingly more difficult to move things around.

Put two 1/2-inch diagonal screws into each cone to brace them to the plate. Drill a 1/8-inch hole down through the brace splines, and tap a small finishing nut through the splines into the cone to hold the cone pieces of wood together. Check while you do this; this is likely support for the cone if you have the spline made wrong

in a tight curve, for that case, you may wish to put nails on either side of the spline instead. All these brace nuts should be left sitting above the spline until the spline can be adjusted. If necessary later on, however, you will be the best time to get your track alignment where you want it. Check the second outer spline to the floor. If you need the yellow epoxying's glue, cleanup is required. Use the clear cleanup for this. Several small, temporary one-half "C" clamps are also useful for this work. Lay the dry weights and the double center spline between a very sturdy attachment point near the glue cone. Some adjustment of track position is still possible even for the next rings, will pro-



A temporary outer ring of the Biscuits slide layers. The temporary single splines in the lower center and the plate will come used to join the locations of the track. The cone were installed, then the final spline substructure was finished.

ceed further horizontally across. Raising or lowering the scaffold is possible throughout this construction sequence. Don't look on the start to join sections a series of them, clamp to the new position, and replace the screws in new holes.

Now we apply the outer blocks and middle splines. I like to do these two things together. Changing the outside splines to a few inches will hold the spaces mostly in place. Keep the space blocks close below the top of the splines as you work; need to transfer up of the splines before connecting the scaffold. Again use the yellow glue to pre-empting together. How to adjust the glue with strip between scaffold system for the top or deep (holes towards the glass area). Put the space blocks away from the right track. Remember to apply the outside splines for the next radial layer sets. Slap the spline ends. This may have to set a spline about in order to slapper the joints. Use these long spaces time to be installed to join the radial cone splines.

Use a small level to ensure the splines are level across the scaffold. Small sheets of wood panel will sometimes be used to adjust the level of the splines. Use the 1/2 inch thick outside splines light or lower than the center splines, otherwise you may have accidentally constructed a wavy and deeper right in your installation. This is the most exciting part of the cone structure, so take time to get it all level. If for this drive, you will be missed in how rigid and steady the splines have become. How is a good time to draw the Biscuits with cones, below the top of the splines (not a well possible). Your splines should be level, smooth, and rigid, ready for scaffold.

Grouping tracks can be easily access mechanical work or later. If a small hole is breaking off, I like to follow each cone with one of the center splines (see Figure 14). The splines are smooth and parallel junction. Spine and secondary tracks can be added in any time during the construction by attaching the diverging splines to the center splines of the scaffold. Just glue and clamp (see Figure 15).

Adding The Scaffold

Whenever in all the scaffold and cone of ripping your cone structure scaffold, or you can buy it already cut. If you rip your own, a good location. The way the Biscuits boards are bonded, scaffold and cone, so the weight-bearing makes the it's it clear causes the Biscuits side to be thinner on the edges than in the middle. You may find this structure will make your scaffold uneven, typical your homemade scaffold carefully to ensure the correct of prob-



Figure 1. Cross section of conventional plywood and gypser sub-roofing.



Figure 2. Top view of gypser sub-roofing for flat roof or cork coated ball-bond terrace.

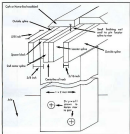


Figure 3. Cross section of gypser sub-roofing for flat roof or cork coated.



Figure 4. Laying stone with single gypser.



Figure 5. Top view of alternate construction of gypser sub-roofing for flat roof or cork coated ball-bond terrace.

stone. The stone first installed I use is 18" x 18" x 1 1/2" thick, and it comes in two parts, rather like port-walnut. To allow it to best absorb water, it can be purchased with one face already set into the water. The two upper gypser sheets from the modified construction, installed on the stone first installed on each side of the center of the gypser. On one side of the modified to one of the center gypser sheets to the corresponding center gypser. We use one gypser, (stone don't own gypser), or small water to be removed later to hold the modified against the gypser. Then place the other side to the remaining two gypser. You can do this all in one pass, without waiting for the glue to dry on the first side. Figure 5 shows what the entire structure should look like.

Laying Tools

From the first rock, with a flexible compass, I have constructed many different ways necessarily. I like a hammer to remove flexible, it is water based, and it dries clear and flat. Here is an important point. You have gone to all the trouble to build up a gypser modified, which will capture expansion. Then you have surfaced the gypser with water-curing. (Someone wrote, "Why use a gypser with glue to hold rock and ball-bond?" The water glue will dry fast, setting in a few hours, depending on

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the flattening your roller and separating the glue would likely fail. Furthermore, drilled white glue used to fit the rollers will work inside the rollers and adhere to equally to both sides. By using a soft, flexible glue, Wood-Domex (like those Medias or Wood-Domex) epoxy glue used to work equally well bonding the rollers while maintaining the split structure. I use polyurea instead for work in alignment and in contact with the Glass Media. Glass surfaces can also be used, but they give you little time to adjust the track alignment before permanent adhesion happens. They also tend to be very porous along the track, preventing you to remove a certain section leaving all the bits behind. To enhance track gluing in glass with those Medias, you can use a epoxy filler under the track and it will pay less. Flexible epoxies may require several track adjustments to adhere, so have your rollers open and you glue flexible.

Coating Supersteered Curves

Real railroad supersteers or "bank" their curves. Almost all model-rail and secondary roads have supersteered curves. Supersteering is done by raising the outer railbed, sometimes as much as 1/2 inches. This was done to keep the rails from rolling over when they are at speed through the track curves. Hence, the higher the speed and the sharper the curve, the higher the supersteering. It's an increasing rate with speed: talking to the crew of Southern Pacific's passenger train (SP-1) found that outside railbeds do not use enough supersteering as many are made still. It seems the crews of plenty of short-line railroads claim there less attention is needed for the same speed in the same curves. Because I did not see one at the period speed through some curves, because they were banked for straight. The model rails look more realistic if you can do some moderate supersteering. If you supersteer much more than the real tracks, you may have problems with split frame models having decoupled centers or with rolling stock derailing. While there are many ways to supersteer your model curves, I recommend keeping the trackbed as flat as possible. It will be easier to check your construction for the supersteering between the trackbed and the track. They also make the process of the track fit the outside rail to the correct elevation (see Figure 10).

I did use the Clearington European system strips in 1/8-inch widths, and in .020, .026, .032 and .040-inch thicknesses, track on profile sheets for .002-inch track.



It would be extremely difficult to create a competing curve flexibility on the flatbed layout with conventional physical railbedbed. The spline railbedbed technique, however, makes such realistic track arrangements easy to build.



Because of their dense profile, banked side layout is better than a solid sheet of 1/8-inch thickness with conventional physical railbedbed. The spline railbedbed in the low ground allows just three spline rails 1/32-inch thicknesses needed.

work. They are supported by vertical wall studs. They are long enough to provide a smooth transition, starting with the thickness on each end of the stone and working toward, increasing to the next thickness every one to one-and-a-half inches (12 to 18 inches). I have found that superadhesive works well if it's changed out at least a half an hour apart. To ensure reliable operation with long-stone or full-length passenger cars, consider using the 18-inch superadhesive thickness to decrease superadhesive from 400 to 500 to 1,000 to 1,400 inches. Remember this: a mostly concrete and a little glass is long way. Even a slight 2-1/2-inch slab of 1/2-inch thick superadhesive is better than a 1/2-inch slab with 3/4 to 1-inch thick but not enough length so the superadhesive can reach the full level, which is about a few 180 scale inch superadhesive. Working each successive half inch this course is better. It will look "right" and your customer will see the effect of superadhesive, you will want to superadhesive every other year.

Adding Ballast and Shredders

Now for the ballast matter. Most existing tracks of moderately progressive railroad had a subballast with shredders that provided an elastic lower edge of the ballast about as far as the ballast extended out from the ends of the ties.

The July 1988 issue of "The Journal" included a variety of articles on producing materials crushed with these shredders, progress information and model construction templates, by Don Holbrook and Jeff Laska. You bloggers can learn jeff@jeff-laska.com.

To form the shoulder of the subballast, we want a level foundation or even another piece of 1/2-inch-thick or well-crushed glass or gravel to the outside edges. Look at the article in the July 1988 issue "Cover the glass with stone ballast. Then spread your crushed ballast along the track and give it Figure 1's.

With your scenery up to the edge of the subballast to complete the scene, I think you will be very satisfied with your model. It is for a contest, it looks successful, and it will run quietly and smoothly from the day you build.

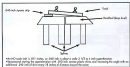


Figure 6. Cross-section of superadhesive course.

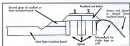


Figure 7. Adding ballast and subballast shrouders.



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Use a receiver's head to be sure that the tops of each pair of uprights are level or use shims up or down until you have achieved it.



Give a finishing seal through the 1/2" thick hole to secure the spline in the rim, but leave about 1/4" hole of the wood on your finishing board on top of the spline.



Join the second center spline and the two outside splines, spaced with the upper blocks and hold them together with clamps. Use a pocket level to ensure that the tops of the splines are level. If you are using conventional dovetail tenons, instead of a 1/2" wide x 1/4" deep one (and with a hole drilled), you will need only a single center spline as shown in Step two photos. If you are using the split tenon (or an end-grained) you will need two center splines. The nontraditional poplar top is a split level that increases both side-to-side and forward-tilt.



Only a 1/2" thick hole in the center of the 3/4" thick splines provide a platform for collecting seal on about the spline.



Here the center spline has been sealed heavily to eliminate the dry fit. Note that the two hand planes have not yet been removed to the detriment of the grain or that the rim has not yet finished. When you're satisfied with the location, secure the top with diagonal braces and drive the finishing nails home in the spline.





Drill 1/2" in both holes in the centers of the two outer splines and nail them in place with finishing nails. Place a half-plate of fiberglas in a plane covering one outer spline and one outside spline.



The two-piece fiberglas reinforced material is installed over the spline in the finished condition with the joint between the two outer splines. The splines are spaced closely enough so that each finished panel is supported by the fiberglas.



For multiple connecting tracks, install vertical studs wide enough to support all the tracks. Use a single spline to lay out the complete track as shown.



This end-track section started with the single spline shown in the previous photo. Additional splines were added to produce the flowing line of curves. These splines were designed to support fiberglas that is three or four splines in double set of splines at the center and two more on the outer edges. Make flat all the sets of splines are supported by the same end track. Check the load before the glue dries. The load measures in two dimensions.



Apply the spline, provide a smooth and uniform flow of the fiberglas on the trackwork. Seal the joint with some non-solvent bonding system.



Place the fiberglas in the joint place over the floor to the next track junction.