

Superelevation, made easy! By Michael Highsmith

Superelevation (SE) in the prototype is the process of elevating the outside rail of the track in order to combat the centrifugal forces created when a train goes through a curve "at speed". Figure 3-2, as reprinted from John Armstrong's book, "The Railroad, What It Is, What It Does", gives you a good perspective on the process of SE in the prototype. SE is gained gradually, over the length of the entry easement reaching maximum SE when the train is into the circular curve. The train then eases back down to level as it exits the circular curve and through the exit easement. By doing this, the train can remain "at speed" throughout the entire curve.

In model railroading, SE is an element of detail that adds a tremendous amount of realism, but can be such an intimidating

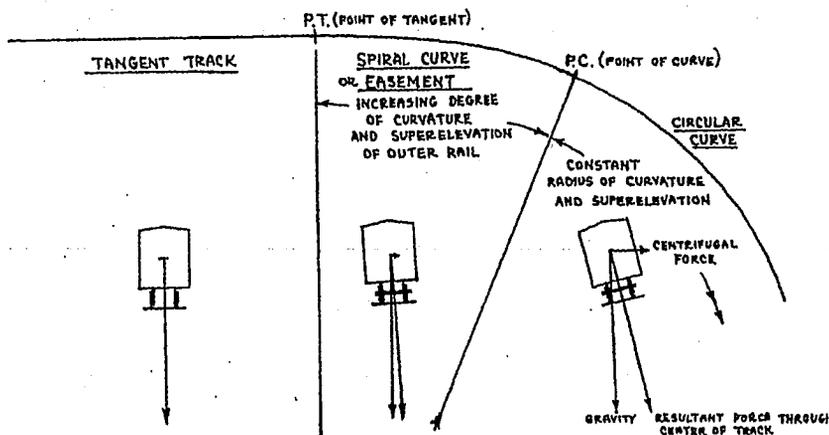


Figure 3-2 From Tangent to Curve — Smoothly

process that most people will completely ignore it in their construction plans. The common practice is to use strips of basswood, or similar material, and lay the splines along the outer edge of the curve. You then spend hours of time sanding or rasping the transition into the SE. The purpose of this clinic is to try and simplify the process and provide you with some tips and shortcuts so that you can add this prototypical realism to your scale railroad.

Figure 1-1 provides a list of the items you will need to lay out your curves, the appropriate easements and then to SE these curves once you have them in place. While there are clearly substitutes for some of the items on the list, I have found these items most effective.

CURVES & EASEMENTS

While this clinic is not specifically about laying out curves, before we get into SE, let's briefly overview laying out a curve and discuss the role transition "easements" play in effective curves. Scale curves are best laid out with templates, which can be made with items as accessible as string, a center point (nail) and cardboard, or as complex as a router with a circle cutting jig and countertop laminate. Whatever suits your needs, use it, there is no exact science. The key is to remember that in both the prototype and your scale railroad, straight track does not, or rather should not, immediately become curved track. The mechanical problems (coupler connections for instance), not to mention the poor aesthetic appearance of equipment lurching into a curve, are just not acceptable. The solution to this problem is a transition easement. The easement allows the train to gradually flow into the circular curve.

The two most important points in creating an easement are that, 1) the easement start and end equi-distant from the closest tangent point between the straight track centerline and the circular curve and 2) the centerline of the easement should cross halfway between the "offset" (1/4" in HO is plenty) distance of the tangent line and the curve. Keep this in mind at all times. I have found a metal spline, a metal yardstick, very useful in the creation of the easement. First off, they are inexpensive, second, they are flexible and third, they are solid enough not to cause problems when you are tracing the easement.

SUPERELEVATION

Once the curve and easement are in place, it is now time to put in the SE. According to John Armstrong's book, "The Railroad, What It Is, What It Does", Page 28, the prototype uses a maximum of 6 inches in SE. This converts to 1/16th inch in HO scale and slightly more than 1/32nd inch in N scale.

STEP 1. In place of strip wood, we are going to use common masking tape to create the SE. The first step is to cut the tape in half length-wise, leaving strips of 3/8 inch wide tape. It is best to do this while it is on the spool. Do not tack the tape down like you would for paint masking. You will want the tape at its "adhesive best" for this process. Use the x-acto blade for this, making sure to cut away from our body for safety. Cutting the tape will improve its ability to follow the curve.

WHAT YOU NEED

1. Trammel points or pre-cut curve templates.
2. Spline (metal yard stick).
3. Sharp knife (X-acto).
4. Common 3/4" masking tape.
5. "J" roller.
6. Roadbed and nails.
7. Gap filling, non-shrinking, sandable spackle.
8. 3 inch Putty knife.
9. Sanding block.
10. Track and spikes.

Figure 1-1

STEP 2. We need to find out how many layers of tape equal the scale 6 inches of SE we need. I'll save you the trouble of piling on layer after layer of tape to get to the height you desire. For HO scale, 14 layers of tape are needed to reach the 6" elevation and in N scale, you will need 8 layers of tape.

STEP 3. Determine where you want the transition to maximum SE to begin at each end of your curve. Mark these spots with a pencil or marking pen. A couple of considerations here, first, never start or end SE under a turnout. This is a BAD MOVE, and a guaranty to cause derail problems if you do. It is best to pick a spot just after the easement into the curve begins: Remember, straight track is not superelevated, so don't start the transition there.

STEP 4. Remember the prototype eases into the maximum SE, therefore in order to create a smooth transition into the maximum SE, you can do one of two things, divide the length of your easement by 14 for HO or 8 for N, giving you the stagger (Figure 2-2, the distance from the edge of the first layer of tape to the next layer) for each new layer, or simply "eyeball" the stagger and call it good. It's your railroad, so you pick! For larger curves (28" radius and above) in HO, I use a 1 inch stagger. This means it will take 14 inches of actual run before I reach the scale 6 inch maximum SE. By staggering the layers at equal distances, the transition up to and down out of maximum SE will be seamless, just like the prototype. It will also eliminate the hours of sanding and rasping of stripwood. This is a good thing.

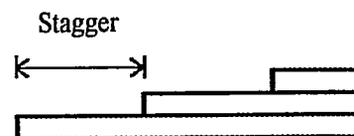


Figure 2-2

STEP 5. Fasten down the inside-curve piece(s) of roadbed. Glue and brads, usually work best. This will be important later.

STEP 6. Use a piece of roadbed, to mark the **outside (NOT THE INSIDE)** edge of the roadbed. Take the first layer of 3/8 inch tape and start at your first mark. Lay the tape along the outer edge of the outside track, See Figure 2-1, not along the centerline of your easement or curve. You are only trying to elevate the outer edge of the outside rail, not the center of the ties. Sorry, it doesn't work that way, trust me. Run the layer to the other mark. Press this down very firmly to ensure a solid base for the next layer..

STEP 7. Now start your second layer. This layer will start at the first stagger. For my railroad, it is 1 inch in from the first edge. Run this course until you are within the stagger distance of the opposite end of the curve. Stop there. You will repeat this step, moving in the stagger amount for each layer until the maximum SE layer is reached.

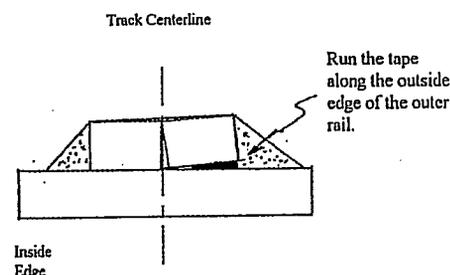


Figure 2-1

STEP 8. When you reach the final layer, 14 for HO or 8 for N, take a "J" roller, or any type of pressure device, even finger pressure will work and lightly press down the tape layers. **Work from the center of the curve out toward the end of the easements.** Do not compress them, that is not the goal. You only want to ensure adhesion of each layer to the other.

STEP 9. Lay down the outside piece(s) of roadbed. Again glue and brads work best. This outside piece will not lay flat, it is not supposed to, see Figure 2-1. Here is where having already laid the inside roadbed helps. The centerline edge of the inside roadbed gives you a solid edge to hold the outside piece against, minimizing any difficulties created by the tape. When in place, the roadbed will hold the tape down, eliminating warping due to humidity. You can trim any excess tape that is visible from under the roadbed, or you can simply cover it up with ballast.

STEP 10. Once the roadbed has dried for about 15 minutes, spread a decent coat of sandable spackle down the middle of the roadbed. Then smooth it out, filling the uneven void that exists in the center of the roadbed, which has been created by the superelevated edge .

STEP 11. After a day or so, depending on the drying recommendations of the spackle product, sand the roadbed smooth, leaving the void filled in the center. This will provide a solid base for your track.

STEP 12. Lay your track down, using the methods you are familiar with and then run a train across your new superelevated track and enjoy!

FINAL COMMENTS The most laborious part of this process is Step 7. It is a bit time consuming running each layer of tape, being sure to track along the curve. But the benefits of this method, versus conventional stripwood, which has to be planed down to a "smooth" transition, are undeniable. It is my hope that you will try and put this SE method to good use on your scale railroad. Should you have any questions about this process, call me.