Farnborough Road Tunnel

During the October show Farnborough Road was showing a few problems. Some stock (mostly coaches and long loco's) was derailing in the cutting between the road bridge and the tunnel. The sector plate fiddle yard had not been constructed that 2 tracks would line up at the same time, and now it was warping so as to make it difficult to line up anything.

After the show it was decided to replace the S curved track in the cutting with a crossover, this meant that there was at least a fairly straight track into and out of platform 1. The goods yard and other platforms would still need to go over the S curve of the crossover. It was also decided to replace the sector plate with cassettes. The cassettes are made from aluminium angle and ½ inch plywood., some of which are 5ft long.

The good thing about the sector plate is that trains several can be assembled, coupled and then the sector plate moved to dispatch the train, or an empty road can be selected very quickly. The bad thing was that loco's had to be picked up and placed at the other end of the train, or some of the badly lining up roads had to be used. With cassettes its going to be much slower to operate. For a train to arrive, a long cassette for the stock has to be connected to the entrance, and then a short cassette for the loco. After it arrives the loco has to be uncoupled, wood blocks positioned to stop the stock or loco rolling off, and the cassettes moved away. For a departing train, the cassette with the loco is connected to the exit road, and the wood blocks removed, then the 5ft stock cassette has to be moved into place, connected to the loco cassette, wood block removed, and coupled up.

People go to shows to see trains moving, not operators struggling with 5 ft planks of wood and aluminium. For this reason it seems necessary to widen the tunnel to 2 tracks, it will speed up operation a little even if its not the complete answer. Removing the old brick tunnel portal and part of the hillside was not easy. Everything was screwed and glued before being covered with the hillside. The old tunnel portal was made by John Bishop, but since he is not longer a member we can't expect him to make another. A stone tunnel portal would be easy, they can be bought or made without too much effort, and Nick had one already. However we needed a brick one, which is much more complex to make.
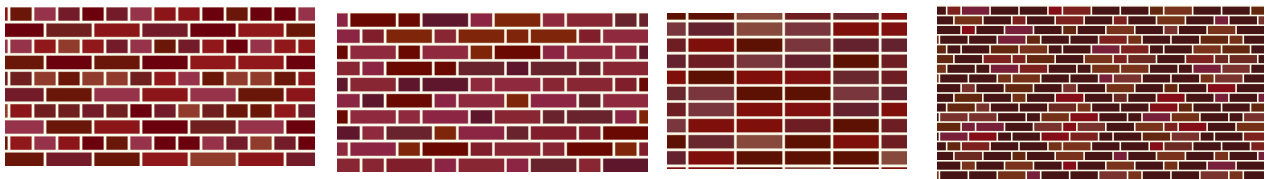
Bricks

Basic brick work can be easily obtained as pre-printed paper sheets or plastic sheets which need the mortar and all the bricks painted in slightly different shades. However, brick arches are a problem since there are too many different shapes and sizes of arch. The arch is made by laying one or more courses of bricks on a former the shape of the arch. The bricks are usually placed with the long thin edge to the former, and the smallest end visible. The previous tunnel had strips of header bricks cut from English bond brick sheet, formed into an arch, repeated for the several courses of bricks, this has the bricks the right size but the wrong way round. The Blackfriars bridge layout has several arches and they are cutting many small strips of granite setts to form the arches, this looks much better as the setts are square, but it's still not quite right. Either way it's a lot of work to cut and glue the strips before the work of painting mortar and each brick can start. On my own layout I'm planning a brick station building, with brick arches over the windows and doors, and I want something easier and quicker than cutting out strips of brick, glueing them down and then painting each brick.

It must be easier to print out the brick work using a computer. After all computers are good at repetitive work, and placing bricks and colouring them would be easy. Just generate a few random colours, select one of those colours at random and draw a brick. Red bricks seem best if they vary in shade of colour, grey bricks look terrible unless they only vary in brightness.

Next problem is putting the brick together. Google shows up quite a lot about bricks, walls and arches. Firstly there are 6 ways a brick can appear, stretcher and header are the common views, but

there are also soldier, sailor, rowlock and shiner. Rowlock is the one for the top of the tunnel or window arch. So with 6 ways to put down the first brick, putting down several bricks to make a wall could have a very large number of combinations, luckily only a few make sense. The most common ones are stretcher bond, English bond and Flemish bond. Stretcher bond is used for 4 inch walls, like cavity walls in newer houses. Flemish bond is often used for 8½ inch walls, older houses with solid walls use this. English bond is used for 8½ inch walls and thicker.

However, there are a large number of other patterns that are used, and there is no rule that says the whole wall has to have the same bond. Looking at the wall by the stairs at Eden park station, it starts in American bond, then English garden wall, then English bond, and lastly Flemish bond above platform level. Some bonds like stack bond look very weak, and of no practical use, but on the left side of the train just before London Bridge is a block of flats finished in stack bond. So I decided that since I would never be able to add all possible brick bonds to the program, it needed a user defined pattern feature.

Brick bond examples: English bond, Flemish bond, Stack bond and Flemish Garden Wall bond.

Pilasters

A pilaster is a slightly-projecting column built into or applied to the face of a wall. Usually there are one on each side of the tunnel portal. The problem with these is that the brick pattern has to go round corners, and that the brick pattern on the face should be symmetrical. This needed 4 extra pattern types for corner bricks and closers. The new tunnel for Farnborough Road has pilasters 35mm x 5mm (the size of the wood that was handy), which unfortunately converts to a scale 6.7 bricks x 1 brick.

Left the pattern for the pilaster face, and right the pattern extended for folding round the edges.

Arches

There are many types of arches, for the current application we only need the round arches using either 1 or 3 centres. For windows and doors the arch is either a short segment of a circle, a full half circle (Roman arch), or uses 3 centres with short radius at the ends and a larger radius in the centre. The brick pattern used is usually 3 courses of rowlock, 1 course of soldiers, or a bonded pattern of rowlock and soldier. Smaller radius arches look best in the rowlock pattern. Only very large radius arches look good in the bonded pattern and the arch width needs to be adjusted to make the width an odd number of bricks.

For a tunnel, there are usually around 6 courses of rowlock bricks. For the Farnborough Road tunnel it was necessary to find something simple. A search of the http://www.semgonline.com/ 's picture gallery site, under Southern structures gives photos of several tunnels. One similar to the one at Woolwich Dockyard Station is very simple and should be easy to make.

Working out the positions of the corners of a flat brick is easy. When the bricks are at an angle and forming part of a circle it is much more complex, and it took me several pages of geometry and algebra before getting it right.
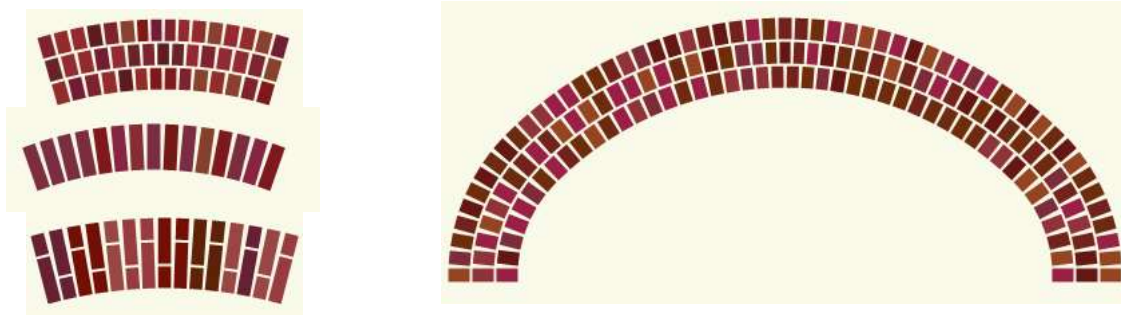
Arch examples: rowlock, soldier and bonded segmental arches, and a 3 centre arch.

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The new tunnel face was made from 6.5mm ply, 2 strips of some spare ¾ inch pine strip added on both sides, some point timber plywood strips added to the face and as capping. All painted with Humbrol red brick just in case there are any gaps in the papering over the wood. Most of the brickwork is English bond, so I printed several sheets of that.
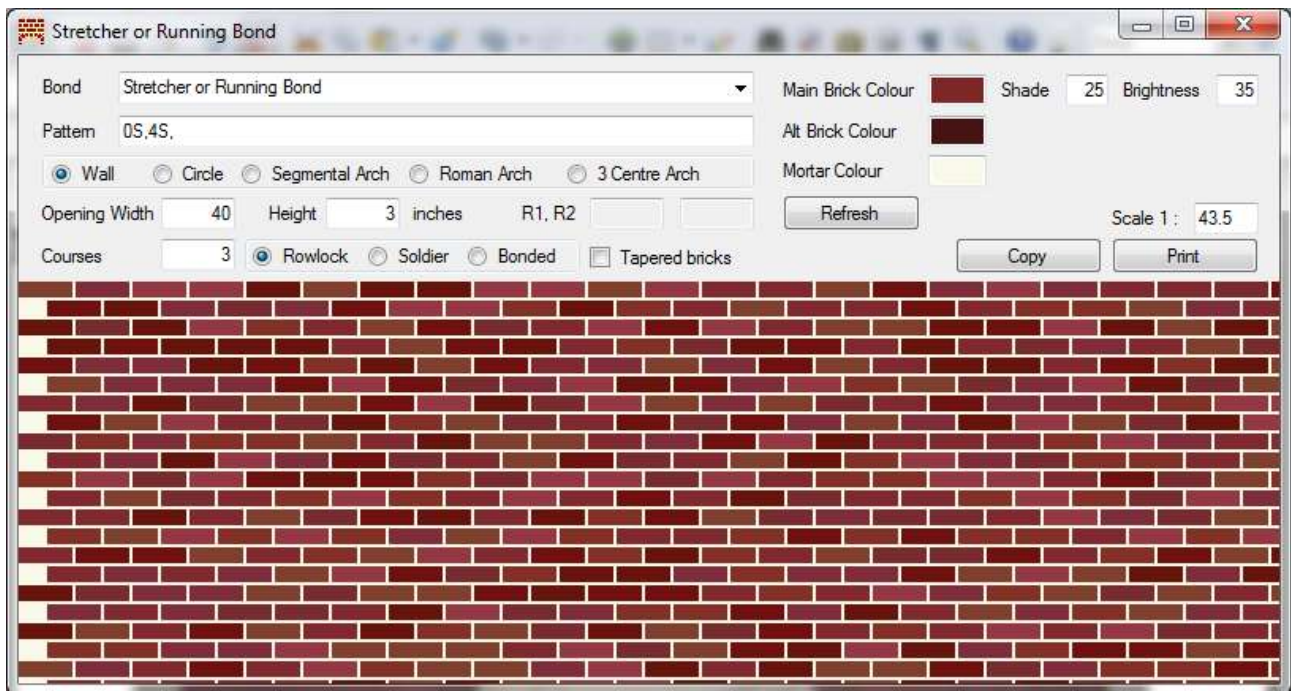
All the drawing in the program is done at 48 pixels per foot. In order to simplify the program I initially did not add a print feature, only a copy to clipboard. This allow me to use Photoshop Elements to modify the drawing with a little weathering before printing. Conversion to 7mm scale means the drawing needs to be printed at 174 dpi (48 / 7 x 25.4), and conversion to 4mm scale would need to be printed at 305 dpi. It turns out that scaling and printing only added about 10 lines of code, so not exactly difficult.

There are some problems with printing your own brick paper. Some inkjet ink fades under UV light, so it needs spraying with some protective coating. The paper expands when it gets damp or wet, so using water based glues like PVA makes it difficult to avoid bubbles and wrinkles. Also this expansion makes it hard to line up the courses of bricks when one sheet is dry and the other damp.

The arch was carefully cut and stuck on before the opening was cut. A sheet of brickwork for the pilasters also did the lower sides of the tunnel opening.

Completed tunnel.

Screenshot of my program.