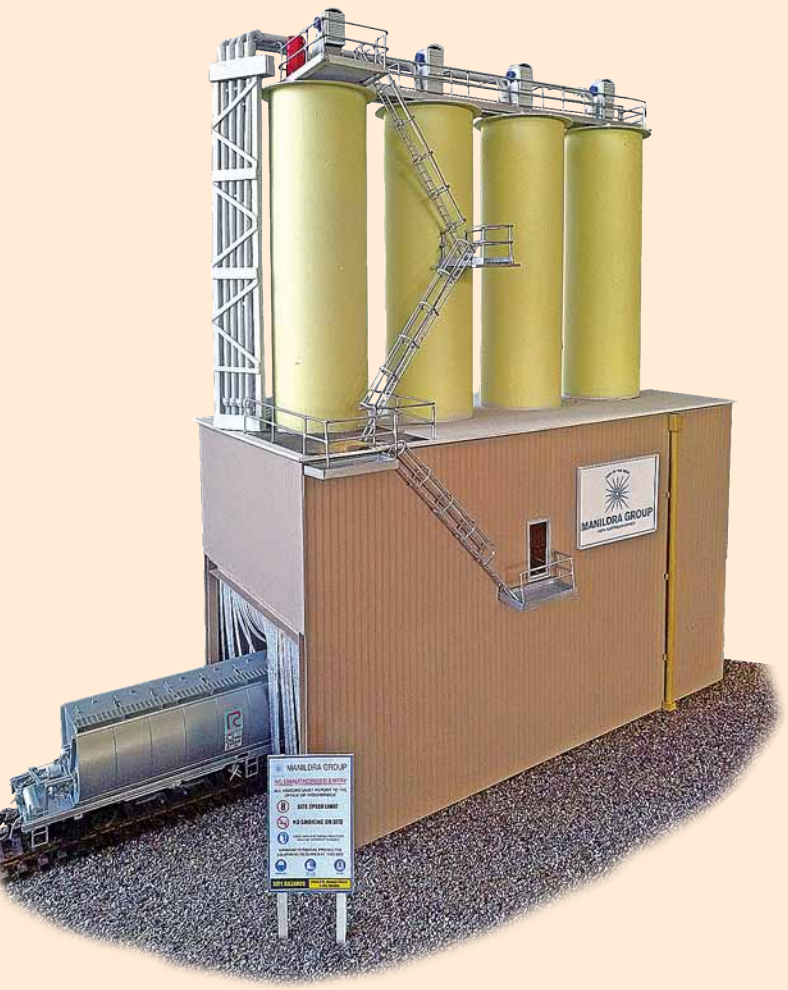


Build the Manildra Flour Silos at Gunnedah

Graeme Barnes scratchbuilds a modern era industrial building in HO scale. Photos by the author.

Flour delivery silos are an integral part of the Manildra operation in Gunnedah. The Manildra Group operates a multi-faceted business receiving grain, milling grain into products such as flour and delivering products by rail and road throughout the country. Grain for the milling operation is delivered in railway wagons and road trucks. At harvest, from October onwards, local farmers supply the mill with a range of wheat varieties, including soft wheats, prime hard wheats and durum. Australia grows high quality white wheat varieties. The soft varieties (*Triticum aestivum*) are the grains used for breads and cakes. Other wheat varieties with higher protein content are used for speciality doughs. Prime hard wheats are used in biscuit making. Durum wheat (*Triticum durum*) is the pasta wheat. Australia is a major world supplier of pasta wheat, a considerable amount of which is grown on the black self-mulching clay soils of the Gunnedah region.

After milling into flour, each type is shipped throughout the country. Flour is bulk handled into railway wagons under the flour loading silos.

This article describes a scratchbuilding project resulting in an HO scale model based on the Gunnedah flour delivery silos. The project came from the need to create structures for a module based on the Gunnedah rail yards [Diagram 1].

The project uses simple techniques. There is also plenty of opportunity to insert the builder's own creativity into this project, with items such as the roof top cabinets and the location and type of piping to suit the builder's own requirements, if they are not modelling a Gunnedah scene.

Measuring the Prototype

There were no plans available to the author for the Manildra silos. Instead all measurements are estimates made by:

- Pacing the base dimensions of the flour silos
- Estimating height from comparing base measurements with shadows cast by each part of the structure
- Counting the distances between screw lines on the cladding to confirm height measurements
- Observing the relative heights of components from known measurements, such as heights of workers on the roof and other components such as doorways on the structure

The estimated dimensions of the flour silos are 8m (width) x 45m (length) x 27m (height) over a single track.

An outline diagram [Diagram 2] of the side, front and top are included in this article, prepared using the estimated prototype dimensions. An HO scale model of the prototype structure would measure 92mm(w) x 517mm(l) x 310mm(h).

The space available on the author's layout was 120mm(w) x 250mm(l). Unlike the prototype silos, the location on the layout had two tracks. The 120mm wide space would have to accommodate the two tracks. The length of the silos was truncated to 250mm and the number of silos was reduced from seven to four to fit into the 250mm length available. Determining the diameter of the silos was the most difficult part of planning. Ultimately the size of PVC pipe available for the project dictated the diameter of the silos. I used 42mm OD PVC pipe (approximately a scale 3.6m), rather than scratchbuilding something to the more prototypically correct 4.5m (52mm in HO scale).

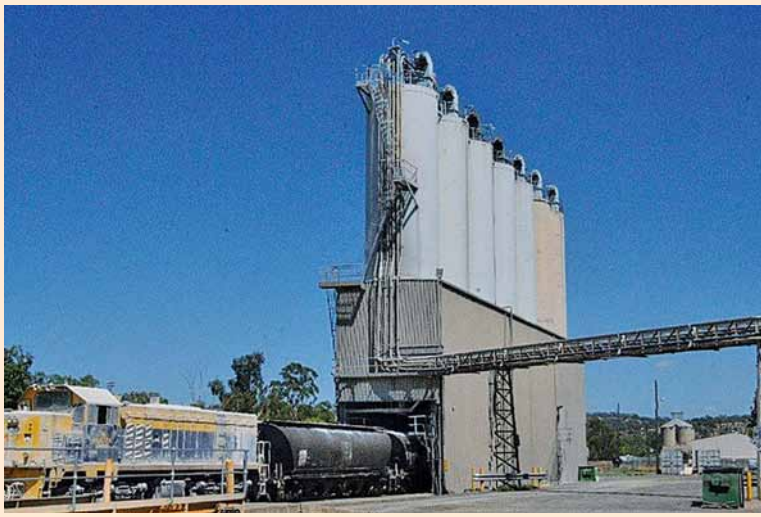
PROTOTYPE SILO DIMENSIONS

The table indicates the estimated dimensions of the prototype silos and the equivalent HO dimensions. In the table, diameters A and B of the silos are estimates made from ground level (the two diameters of pipe shown in the following table give modellers a choice).

Silo Structure	Estimate of Silo Dimension	HO Model Dimension
Ground level to base of silos	12m	138mm
Height of silos	12m	138mm
Silo roof walkway and delivery system	3m	34mm
A. Diameter of silos	3.6m	42mm
B. Diameter of silos	4.5m	52mm

▶ *The flour silos complex viewed from the north (from the Gunnedah station platform). Both company-owned shunting locos (MM02 and MM04) are active, shunting company-owned flour wagons.*

▲ *Another view of the silo complex at the northern end, just south of Gunnedah's station building and platform. This wagon entrance joins the main line to the Manildra complex.*



▲ *The southern end of the flour loading silos with MM02 shunting hopper wagons under the loading bins. Flour pipes, supported by webbed towers, deliver the processed flour from the mill (out of sight to the right) to the loading bins.*

▲ *Company shunting loco MM02 (formerly 4912) moves flour wagons into the loading bays under each silo. In the foreground is the (yellow) weighbridge for trucks bringing grain into the milling plant.*

Planning for Construction

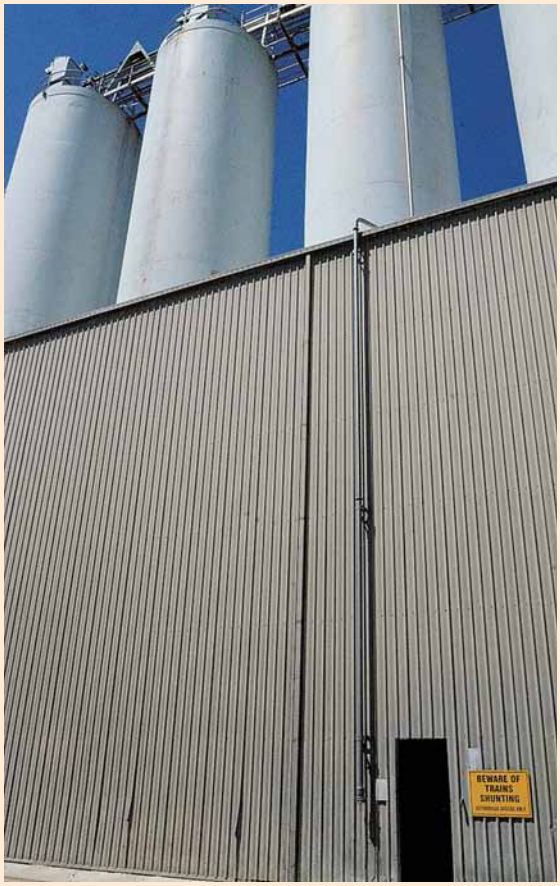
The model is constructed from two major subassemblies. The enclosed base of the building is built as a box with open ends and an open top. The open top eventually allows the flat base for the silos to be placed onto the top of the box structure. A dust curtain is constructed at wagon entrances.

The flat roof of the base is used to support and construct all the silo structures. The silos are built as separate units, including the superstructure of walkways, venting equipment, firefighting cabinet, individual silo vertical delivery piping and supporting web, along with caged ladders, landings and walkways.

This project requires a few skills most modellers will have acquired during their modelling career. Working with styrene and brass wire are the main skills required. Many parts of the model require careful working to produce clean and neat results; cutting of styrene and piping, using sanding materials, some filler where damage is unavoidable (such as drilling oversize holes to accurately locate walkways and landings).

The model requires painting of various parts. Airbrushing gives the best overall finish, but can be accomplished by using spray products in cans. Some small parts can be hand-painted before attaching to the model during construction.

The author's model will eventually be weathered, but has been left as a 'clean skin' for the purposes of this article. The prototype photos in this article are a good guide for the parts and degree of weathering needed to make the model look like a real working flour delivery building.



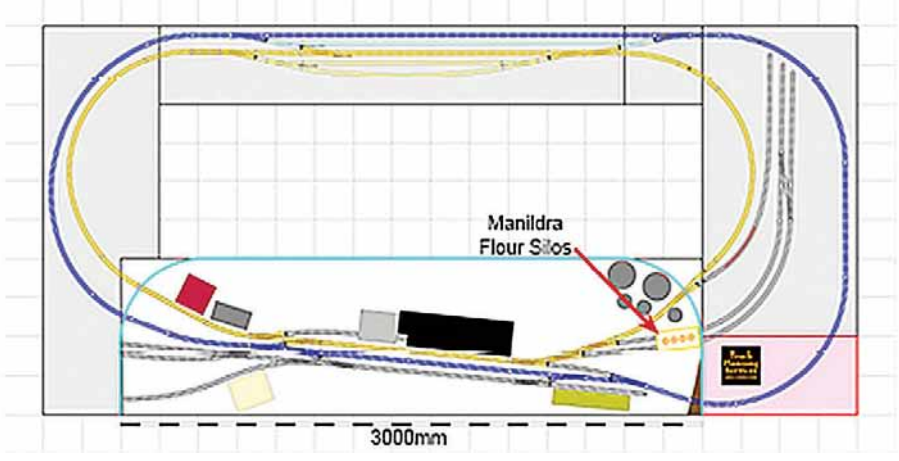
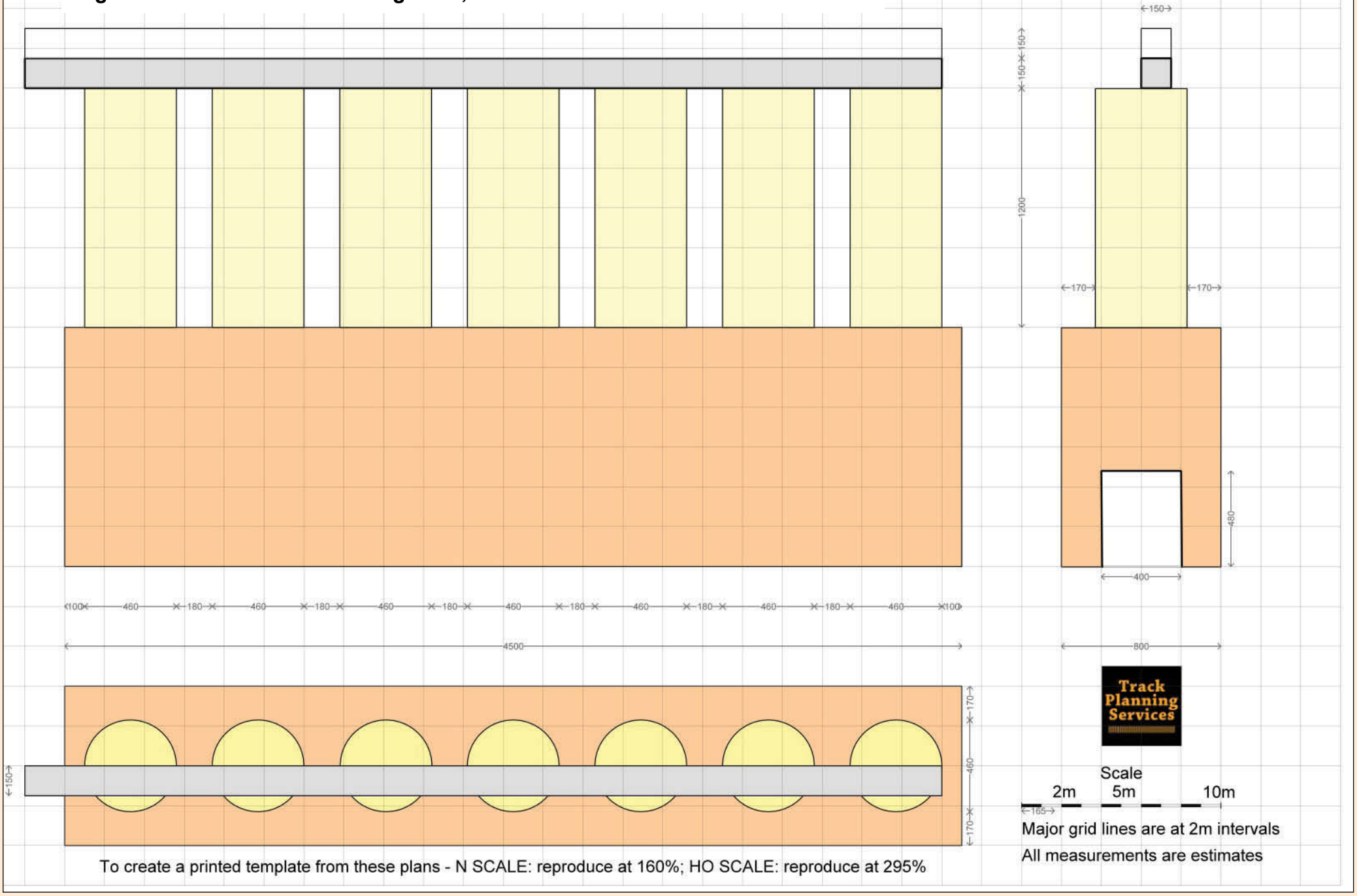
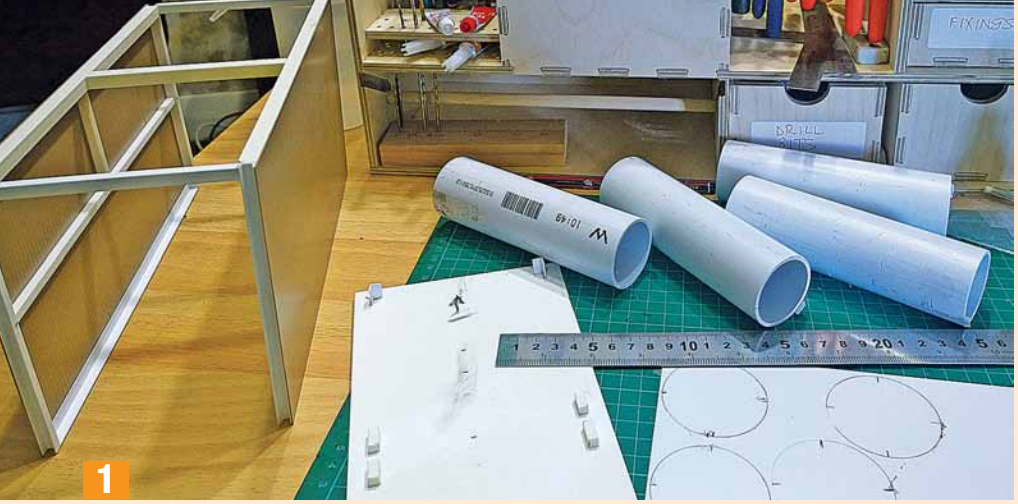


Diagram 1

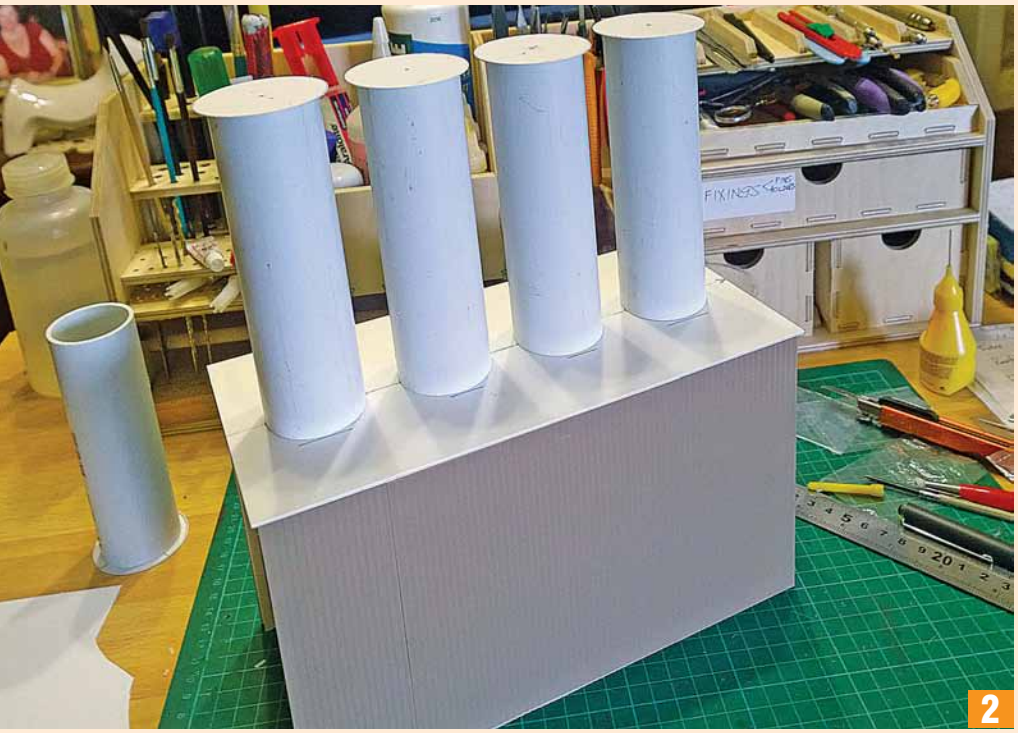
◀ *A diagram of the exhibition layout the silos were built for. The silos are at the right end of the display part of the layout (3m x 800mm). The curved backboard for the viewing area is shown in bright blue.*

Diagram 2. Manildra Flour Loading Silos, Gunnedah NSW





▲ *Begin construction by building two frames (138mm x 250mm) to support the wall cladding. Ideally, H section or square tube should be used to represent the true inner shapes to provide support for the silos above. Do not use flat styrene as it will not provide support against flexing, or strength to support the superstructure. Join the two frames together at the top with similarly strong styrene pieces for an outside width of 120mm. If this model is to be located on a layout before fixing rail, the frame can be strengthened by using a thin sheet of styrene (e.g. 0.25mm) under the base of the shed. The roof is 2mm styrene, with small pieces of styrene fixed underneath as locators onto the top of the shed. Do not glue the roof to the base!*



◀ *The walls of the shed are constructed from Klip-Lok, rather than corrugated iron. However, any cladding can be used, even flat sheets of styrene. Tubes for the silos (42mm x 138mm) should be cut with a small drop saw to ensure each end is square and even. Flat silo caps are cut from 0.25mm or 0.5mm styrene; about 5mm wider than the silos. This thickness is easy to cut with scissors. File and sand for smooth and even round edges. After completing the silo caps centre them on the silo tubes and glue in place. Centre the silos on their base and glue each silo evenly onto the base. Make sure each silo is vertical in all planes. The silos and their flat base are kept separate from the shed for further work. The two basic structures of the model are now complete.*

◀ *Commence construction of the railings and walkways for the top of the silos using a soft board and pins. Draw at least ten parallel lines representing the vertical walkway posts 31mm apart (2.7m apart on the prototype). Cut posts to at least 16mm length for one side of the walkway. Two horizontal rails are then drawn from the top of the posts with a gap to the second (lower) rail of 7mm (about 610 mm in real life). Lay the horizontal rails on the board and secure them by placing pins at various places along the rails. Allow at least 300mm for each completed railing. Soldering the posts to the rails is made easy by using good flux. Pre-tin the posts and the point on the rails where the posts will sit. The posts are placed on top of the rails and soldered in place using more flux and solder for a permanent join. This method produces long pieces of railing for one side of the walkway. Quality superglue will also produce a satisfactory result; however, extra care must be taken when handling the railing if glue is used.*

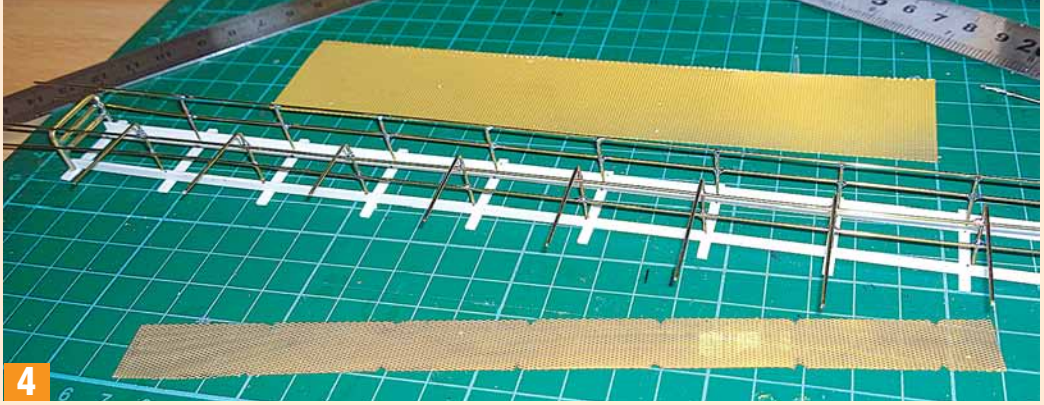
Construction

The methods I used to construct the building are ilustrated in the following photographs.

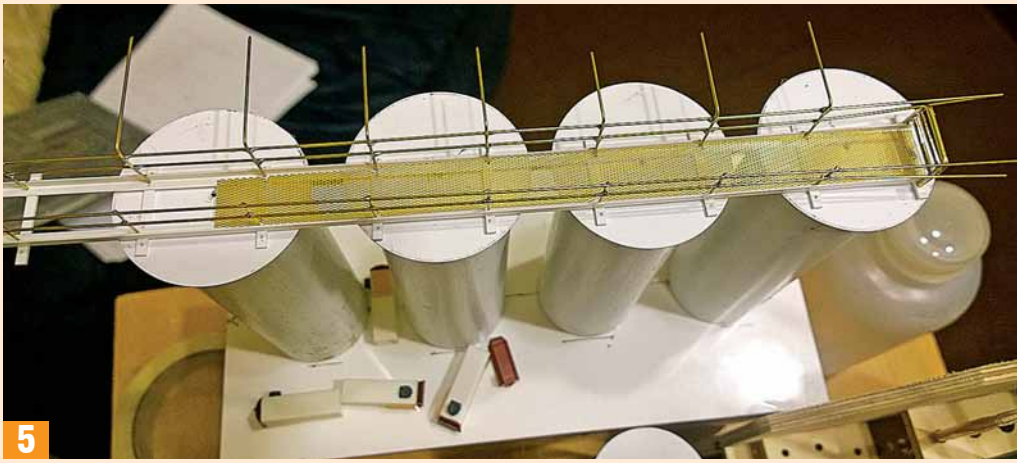
Materials Required

Most items for this model are readily available from hobby stores and local online suppliers. A general list of materials is:

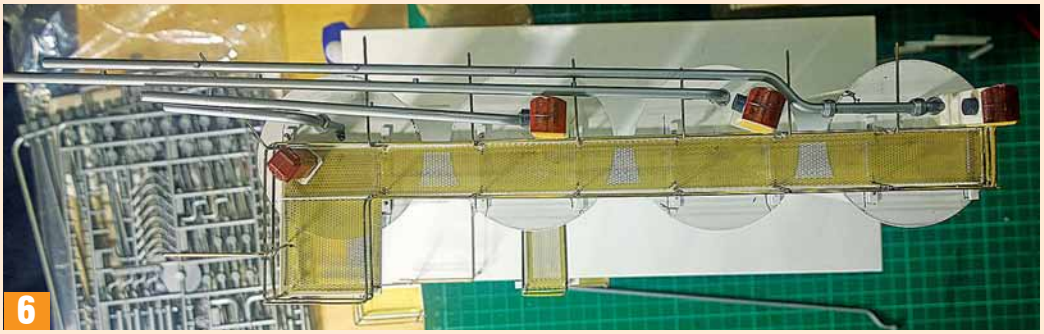
- Plain styrene sheet and construction shapes
- Styrene wall cladding; miniature Klip-Lok used for this article
- 0.4 mm brass wire for railings
- Brass mesh and ladders supplied by Keiran Ryan Models
- Piping for pressurised flour lines: Walthers No.933-3105
- Safety cage ladder: Tichy Train Group No.8002



▶ *Similarly for the other side, prepare rails at least 300mm long. For this side of the walkway the posts must extend above the top rail by at least 25mm to allow for later bending into shape as supports for the flour delivery pipes for each silo. To complete the walkway, every post of each railing is inserted into 4mm x 4mm pieces of angle styrene supported at right angles by pieces of flat styrene strips at the position of each post (31mm apart). Glue together and drill 0.5mm holes for the posts. The walkway is 18mm between the posts. The angle styrene will also support the mesh walkway. When completed the two sides of the walkway and walkway base should appear as depicted in the photo. Do not cut railings to length at this stage or discard surplus railings as these will be used on landings elsewhere on the model. Use walkway mesh for the base of walkways and landings, cutting notches in the mesh for the base of each post.*



▶ *After constructing the roof-top walkway, locate it off-centre on top of the silos to allow for the flour delivery pipes to rise from the base of the silos and run adjacent to the top of the walkway. In the diagram the walkway extends over the end of the silo. This will be cut to length later and the surplus used as landings. The extended posts on one side of the walkway can now be bent ready to hold the delivery piping. Bend the extended posts at right angles about 3mm – 4mm above the top rail to avoid breaking the soldered join of the rail and post.*



▶ *Drill holes into the top of each silo for the flour delivery pipes. These holes must be offset from each other to allow the pipes to straddle the newly-bent supports for the pipes. Photos 5, 6 and 8 show where to locate these holes on the model. All piping used for this model is from the Walthers Piping Kit (No. 933-3105). Create lengths of pipe for each silo, using elbows, bends and joiners from the Walthers kit. Do not glue piping in place at this time. Prepare the firefighting cabinet/s, venting and electrical cabinets for each silo, using shapes and leftover pieces from your own spare parts bin. Alternatively, these cabinets can be constructed from short pieces or offcuts of square tube styrene or other shapes available to you. It is important that these cabinets are constructed before finalising the exact position of piping, to give enough space on the roof of each silo for all structures.*

◀▶ *Decide on the location of landings. In Photos 7a and 7b, landings have been constructed for HO workers to mount to the top of the silos. A doorway is cut into the side of the cladding to allow access for workers to enter the building above each wagon. Modern Workplace Health and Safety (WHS) rules require landings at reasonable intervals.*

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▲ *Piping to reach to the top of the silos rises in a vertical structure made by laying four pipes together, bordered on each side by square styrene. The pipes and square styrene are bound together by 4mm wide flat styrene arranged diagonally creating a web pattern. At the top and base of the riser pipes, glue elbows or bends to join with horizontal piping on top of the silos and on the roof of the main structure. After the structure for the vertical risers is completed, horizontal pipes on top of the silos can be cut to fit permanently into elbows previously fitted to the top of the risers. For this model, short horizontal pipes on the roof of the loading structure carry the pipes into the loading bay, out of sight. Depending on the location of the model on the layout, these delivery pipes could be continued to another model associated with this flour loader.*

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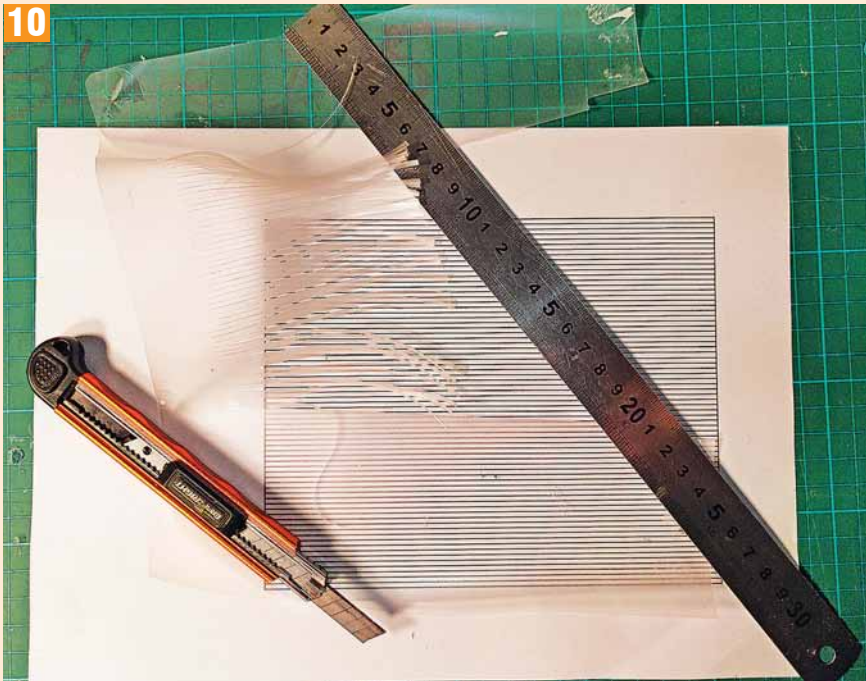
▲ *After all piping is attached, the platforms and landings can be finalised. Brass ladders from various sources are available. The cages are more difficult to make or obtain. Cages for this project were purchased from a supplier in the USA. At the base of the ladder on the roof of the loading bay, a small area bordered by surplus brass railing was created to represent a viewing and safe work station for HO workmen. Use fine grade wet and dry sandpaper to create a suitably tarred base for this area. Rain water downpipes were installed to drain water from the roof using spare styrene tubes and shapes.*

▶ *The final piece of the model is the dust curtain hanging in the wagon entrance at each end. An early version of the curtain was constructed from clear plastic sheet, such as printer transparency sheet. Parallel vertical cuts about 3mm-4mm apart represent individual strips of the curtain. Allow about 20mm of uncut sheeting at one end for gluing the curtain inside the loading area. The curtain was given a dusty appearance with a very light spray of grey undercoat. This curtain proved unsatisfactory [Photo 9]. The plastic sheet was coarse and each strip was too wide, interfering with the passage of wagons into the building. Before the completed structure was located on the layout a new curtain was made. A much softer and thinner sheet of plastic was found. The strips were made 2mm wide by creating a printed template of parallel lines. The template was made by using a table format in Adobe InDesign. Both MS Word or Excel spreadsheet will also work to create the lines for the template. Place and fix the clear plastic sheet over the template and cut through the plastic sheet using a very sharp blade. The image of the paper template and tools shows the new completed curtain ready for installation. The building was placed on the layout near the front right side of the display module (see picture of model in place on the layout).*



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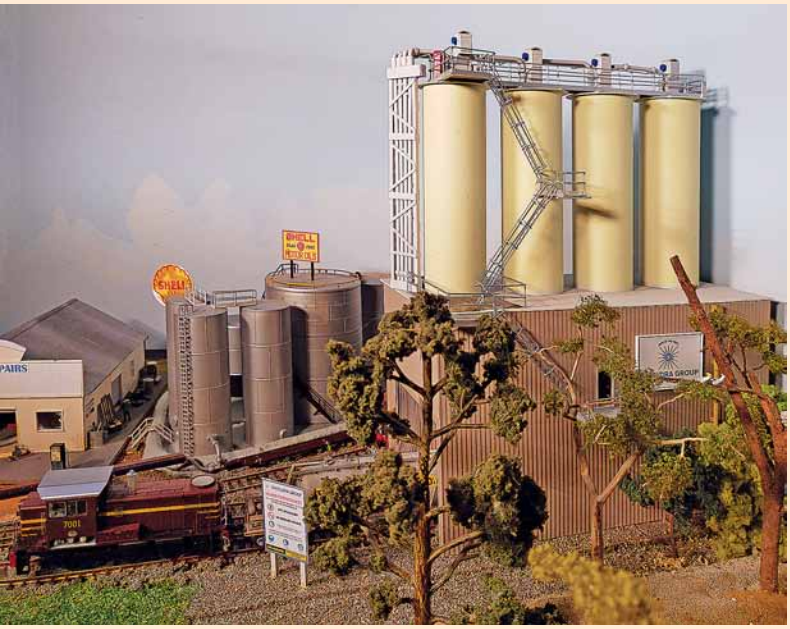
On Completion

The model of the Manildra flour loading silos is intended to be a representation of a country industry, rather than a precise replica of the prototype and to disguise the exit to the 'off stage' part of the layout to enable out-of-sight storage of wagons that will be used in shunting activities on the display part of the layout. The completed model certainly meets both of these goals.

Construction of the model was an enjoyable exercise, using simple, but practised, construction techniques. The model took about one month to complete, working mainly at night in front of the television with my wife, as she indulged her passion for embroidery!

◀ *The finished model, complete with signage. The model was awarded first place in the Scratchbuilt Structures Section at the 2018 NEMRC (New England Model Railway Club) Convention in Armidale.*

Artwork for the signs used on the model.



◀▲ *Two views of the flour-loading silos placed on the layout. Shunting is usually an around-the-clock activity, especially after harvest, which is also greatly enjoyed by the cockatoos in the trees, who are more than ready for a free meal of spilt grain and flour.*