CANE TRACK LAYOUTS FOR AUTHENTIC MODELLING

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Intoduction

There are 23 sugar mills in Queensland that have rail transport systems which total approximately 4,200 km. All but one are to 2' foot (610mm) gauge. Due to interconnections there are in fact just 17 separate systems and collectively they carry 36 million tonnes of cane in a five month season. The average cane haulage by rail is 18 km. Only CSR's Victoria and Macknade Mills still use their railway systems for the transport of raw sugar. Over $100M has been spent by millers since 1990 to extend and upgrade their railway systems.

There are about 250 locomotives used for cane haulage as well as a number of smaller locomotives used on maintenance (navvies) duties. An essential role of the railway networks is that, as well as providing transport of the cut cane, they also have a storage function. The cane is stored in the bins until it can be crushed at the mill. The arrival of deliveries is scheduled to maintain a continuous feed to the crushers.

This session will outline some of the basic features of cane railway networks. It must be remembered that the sugar mills have traditionally operated very independently leading to significant differences between the operations at each mill. This discussion will be of a general nature and will use specific examples to show some examples of operations.

Cane Loading Sidings

Originally cane was harvested by hand and cut into long lengths laid tranversely across cane trucks. Portable track was laid directly into the paddock where the cane cutting was being undertaken. Temporary riding points were used for the trucks to be diverted from the mainline. The trucks were hauled into the paddocks by horse or tractor. The locomotives did not leave the mainline or venture onto the portable track. In some locations, the cut cane was delivered to a siding by truck or horse drawn wagon where it was transfered by derricks to the cane trucks. Examples of these still exist on the Farleigh (Mackay) and Pioneer (Ayr) Mills' systems although they are no longer used.

With the introduction of mechanical harvesting, greater mobility was required so cane bins were loaded onto haul out tractors or trucks and taken into the cane fields to be loaded directly from the harvesters. This required siding layouts where the bins could be delivered to by rail and then transferred to truck or trailer. This system still operates in many areas. The introduction of high speed tractors and trucks - where ground conditions are suitable - has led to longer road hauls allowing more distant areas to be cultivated and/or rationalisation of sidings.

More recent developments have seen the introduction of haulout vehicles which collect the cut cane from the harvester and travel to the rail sidings. They then transfer the

cane to the bins via internal conveyor belts. In these cases, the cane bins never leave the rails. This has lead to the introduction of 9 to 11 tonne bins at a number of mills including Tully, Victoria and Mulgrave.

The actual layout of sidings varies from mill to mill as does the sophistication of any bin transfer arrangements. Ideally the sidings have an empty and a full road with the ability for the locomotive to "run around" its train.

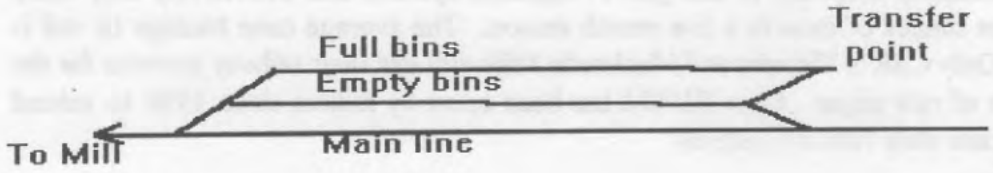


FIGURE 1. TYPICAL SIDING LAYOUT

There are however, examples of dead-end sidings where the bins must be pushed into the siding. These normally face the mill so that a locomotive couples onto the full bins and pulls them towards the mill. Placing the empties into the siding produces more problems. In some cases, the train may be stopped at the nearest loop and the locomotive then repositioned at the rear of the train and the bins pushed to the siding. Another method commonly used at Victoria and Macknade Mills which have many "fishtail" sidings and less commonly at Nambour Mill is rope shunting. In this form of shunting the locomotive remains on the mainline and is uncoupled from the train and passes the siding points which are then changed. A long rope is attached from the locomotive to the bins which are hauled into the siding as the locomotive moves forwards along the mainline.

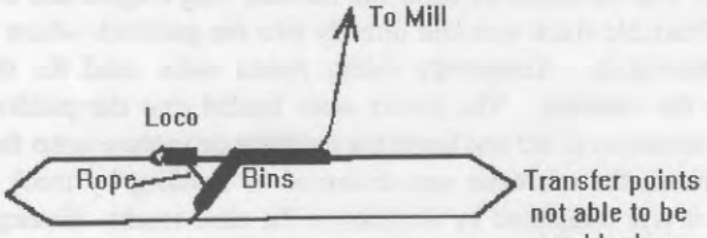


Figure 2. Example of rope shunting

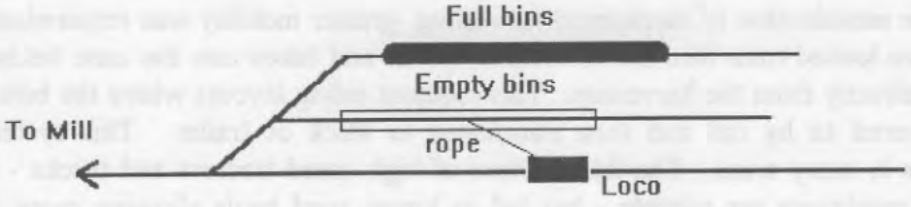


Figure 3: Fishtail Sidings - Victoria & Macknade Mills

A method used at the southern terminus of the Mossman Mill system was to use a long head shunt after the passing loop. In this case, a locomotive arriving with a rake of

empties simply pushes the fulls into the head shunt, disconnects from the empties and run around the empties with the full bins in tow.

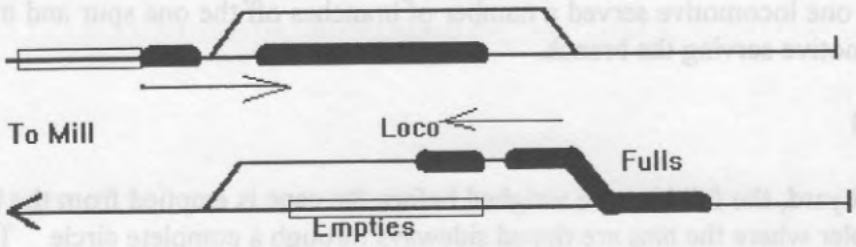


Figure 4: Shunting at Mossman Mill

Branchlines and Mainlines

A current trend is to use outlying road transfer stations where the bins are delivered to a main terminal by semi-trailer from remote areas not served by the railway. The locomotives then collect from these depots and haul back to the mill along mainlines.

In some mill areas such as Wallaville on the Bingera system and Japoonvale on the South Johnstone system, smaller 0-6-0 locomotives collect cane from the outlying branch lines and marshall these into longer trains for the bogie locomotives to transfer to the mills.

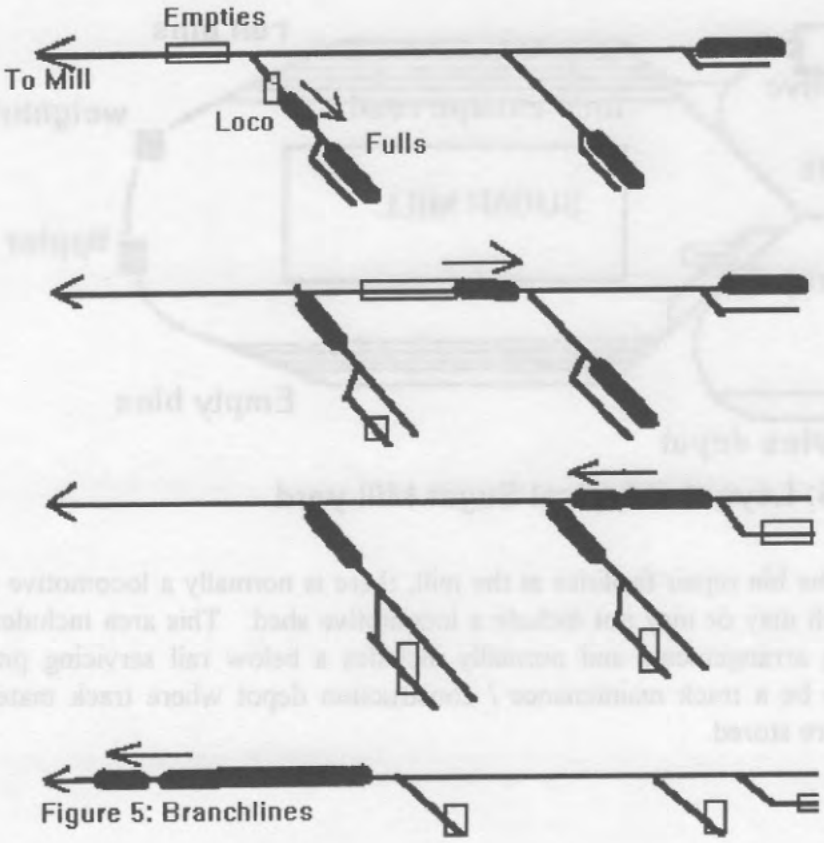


Figure 5: Branchlines

In most cases however, the locomotives leave the mill with empty bins which they deliver along the way and collect full bins on the return journey. In these cases only the number of bins to be delivered up a branch line would be taken and the remainder

left near the junction. The full bins would be brought back to the junction and collected on the return journey. Figure five shows the system used at Macknade Mill where the one locomotive served a number of branches off the one spur and it was the only locomotive serving the branch.

Mill Yard

At the mill yard, the full bins are weighed before the cane is emptied from the bins by a rotary tippler where the bins are tipped sideways through a complete circle. Therefore all bins must cross over this one point. The ideal situation is a continuous loop through the tippler with a fan of tracks for full bins before the tippler and a fan of tracks after for the empties. On the approach side, there will be an escape road for the locomotives as they do not cross the tippler. On the departure side, a method of removing damaged or faulty bins for repair is included.

This system operates at most mills with individual variations including the number and lengths of sidings depending on the number of bins to be handled and the available land. A notable exception is Mulgrave Mill at Gordonvale which has a sector plate arrangement so that the approach and departure tracks are parallel. This arrangement was used due to space restrictions. The Mill yard also includes a 3 way point to further minimise the land required.

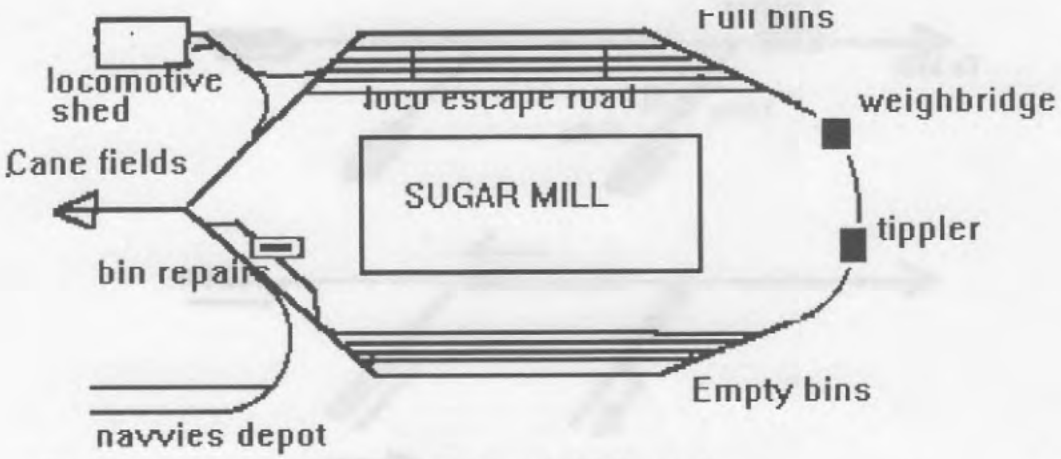


Figure 6: Layout of typical Sugar Mill yard

As well as the bin repair facilities at the mill, there is normally a locomotive servicing facility which may or may not include a locomotive shed. This area includes fuelling and sanding arrangements and normally includes a below rail servicing pit. There would also be a track maintenance / construction depot where track materials and equipment are stored.

Other Features

Bridges

The general developments in bridge building have found their way into cane railway networks. Originally, most bridges were typical timber structures with round piles and girders with squared headstocks, transoms and bracing members. Many of these bridges still exist. The next major step was into steel bridges - often as repairs to an existing timber bridge - where the girders were replaced with steel beams and the piers with either steel or concrete piers. This is not surprising given the number of metal trades used through out the mills. CSR used a common design of steel girders on concrete piers at many of its mills. The current trend is to use prestressed concrete for new or replacement bridges.

Dual Purpose Bridges

In virtually all sugar districts, there are examples of daul purpose road / tramway bridges normally funded joinly by the mills and the road authorities. These range from simple single span timber bridges for farm access to high level prestressed concrete highway bridges. Some major examples of these exist on Marian and Pleystowe Mill networks west of Mackay.

In the final years before the closure of the remnants of the QGR's Netherdale branch west of Marian Mill, the mill gained access to the QGR bridge at Mirani and placed its rails between those of the QGR to give a joint railway / tramway bridge. With the closure of the QGR branch, this is now exclusively a cane railway bridge.

Trackwork

Many of the original systems were very lightly laid with little or no ballast and some became engulfed in grass. Some little used branches and siding are still like this. Tully Mill has a number of bin loading sidings where the use of locomotives is prohibited. The current trend towards large locomotives and long trains requires high standards of trackwork construction and maintenance. New construction includes continuously welded rail, prestressed concrete sleepers and crushed rock ballast.

Many areas of cane growing are the river flats which tend to be flat plains however these can rapidly change into hilly rainforest country. There are areas where quite steep grades are common such as Isis Mill and South Johnstone Mill. Traditionally the cane railways were built with minimum earthworks. Some recent construction such as Plane Creek Mill's Southern Cane Railway South of Koumala and Farleigh Mill's "The Summit" realignment has involved extensive earthworks.

Street Running

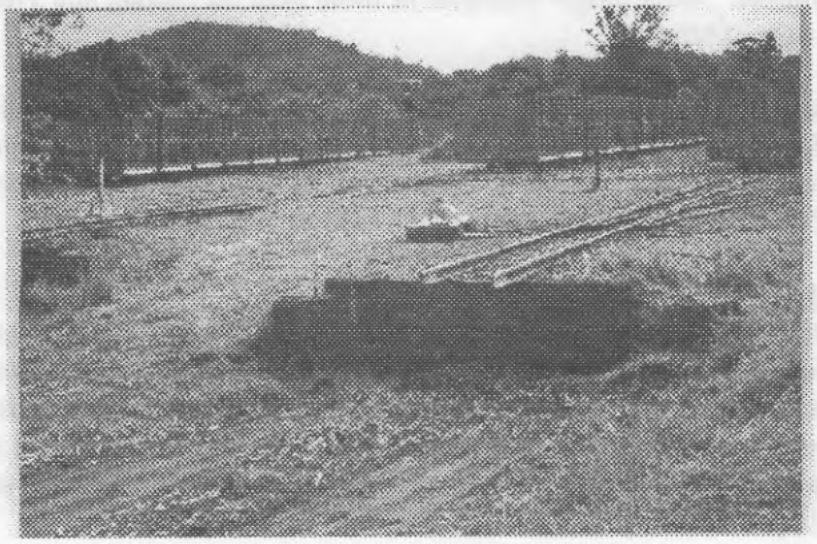
At a number of mills - most notably Nambour, South Johnstone and Mossman - the cane railways share the paved bitumen surface of the roadway with the traffic. These situations offer a big advantage for minimum space modelling. In most other areas, sections of the cane railways can either run beside the edge of the road of along the footpath. Where possible new construction favours a separate alignment but even these areas can be close to the roads.

Beyond The Cane Railways

In the tropical areas north of Ingham and around Mackay there is lush green growth and remnants of rainforest right up to the cane fields. In the irrigation areas around Ayr / Home Hill and Bundaberg, the growth is not quite so luxuriant away from the areas that are actually irrigated. Around Isis Mill, the red volanic soils are a feature.

Conclusion

This has been a very brief overview of the main features of transporting cut cane from the field to the sugar mill and methods of handling the cane in the mill yard. Some of the features which are common and unique to cane railways have been highlighted such as dual-purpose bridges and street running. I trust that this has provided some insight into cane railways and their operations which can be incorporated into authentic model railways.



Photograph of bin transfer point, Howard St Yard, Nambour.
Photograph by Bob Dow