Queensland's Cane Railways—An Introduction

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The Industry

Queensland's cane railways—tram lines—annually transport in excess of 24,000,000 tonnes of cut sugar cane over 3,500 plus kms of primarily 2' (610 mm) gauge privately owned track. Raw sugar is one of Australia's largest export crops; transport costs (road and rail) are 30-40% of the total milling cost.

Sugar cane, a tropical grass with a fibrous stalk, requires sunny frost-free weather, fertile well-drained soils and either lots of rain or very good irrigation. A clump of about 12 stalks grows from each cut length of mature cane planted in well-spaced furrows to allow for mechanical cultivation. The cane is grown for 12 to 16 months before being harvested in the second half of the year. It stands roughly 2 metres tall when mature and is harvested by self-propelled wheeled or tracked machines (often owned by independent harvesting contractors).

The dual cutters on this harvester (right above) raise up and down to cut the leafy tops off the cane. The roller mechanism guides the cane into the billet cutters. Leaves and other trash are blown out the back while the billets are dumped into a bin, usually moving along beside the harvester.

Green cutting of cane removes the leafy tops as the stalks are cut near the ground and chopped into 25 cm long billets. In some areas the cane is still burnt prior to cutting to remove leaves and weeds. In either case, the billets must be transported to the mill within 24 hours to obtain the best quality sugar. Rail provides the most economic means to do this.

The cut cane is often directly loaded in the field into 4 or 6 ton rail bins carried on trucks or trailers and then hauled the short distance to the farm siding for transfer onto the tram-line. Recent developments include self-propelled dumpsters carrying the cut cane from the field to waiting rail bins.

Since the tram lines are owned by the individual mills each line's equipment has been somewhat unique, although recent mill consolidation has led to more uniformity. For many years the tram lines were lightly built and poorly maintained with temporary track laid right into the fields. Today, however, they rank among the world's heavy haul railways, their trackwork standards often equal or exceed those of traditional railways, and train lengths/tonnage and locomotive power have increased.

Locomotives

Given the nature of the industry it is not surprising to find that some locomotives have been purpose built, others are standard industrial locomotives and recent acquisitions are often rebuilt mainline locomotives. Steam was phased out in the 1960s.

Some lines double head their locomotives. It is more common, however, to use radio-controlled slave locomotives in the centre of a long rake. Cane bins do not have brakes, thus the locomotive(s), and perhaps a brake van at the rear of the rake, provide the necessary braking power.

Locomotives are generally brightly painted for safety reasons and, until recent mill consolidations, had individual mill colour schemes. The locomotives will be hung about with brooms, chains and rerailers, end-of-rake markers, chocks, and other equipment. As well, they will have at least one flashing roof light and a radio antenna.

Cane Bins

Bins were designed to transport either 4 or 6 tons of cut cane billets (the use of whole stalk cane ended in the 1960s). Each mill had its own construction design, although the use of different materials and periodic maintenance resulted in quite distinctive bins over time. Sides and ends are constructed to be folded down or replaced in a single piece; bin floors are commonly metal sheets (corrugated, etc.).

A 6 ton bin is the same height and width as a 4 ton bin, just longer. Three 4 ton bins will fit into a mill's rotary dumper in the same space as two 6 ton bins. Bins normally have safety reflectors or reflective painton each side to make them more visible to motor vehicle drivers.

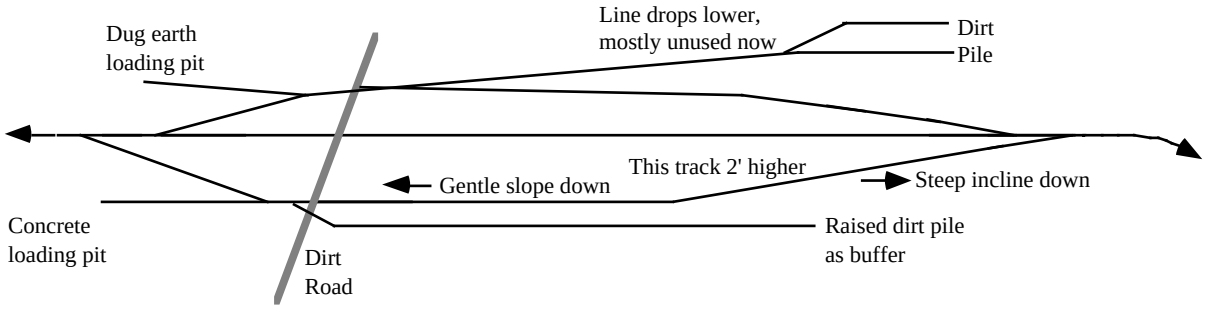
The mills are now experimenting with 10-12 ton bins which will never leave the track, thus will not sustain the same damage as the smaller bins trucked into the fields.

Engineering and Operations

Contrast the well-maintained through line on the right with the pickup point and loop. The through line is at least as well engineered as the nearby QR mainline. The loading ramp is on the rise to the left of the old tire (upper left). Empty bins are left on the almost hidden line to the left, full bins roll down the center track. Note the wye point and the slight down grade to the through line.

Manual switch levers are the norm on cane railways, typically painted white for visibility. Wooden ties are increasingly being replaced by precast concrete.

Farm siding schematic (below, not to scale) with storage for perhaps 25 bins each on the two working tracks (bottom). A farm tractor shifts two bins at a time from their trailers.



A mill in the early 1990s (above)… weigh scale and rotary dump (centre); billets go up the conveyor belt to the crusher; traffic officers in the elevated office (upper left) schedule bin deliveries. Locomotives are fuelled and serviced (right).

Malcolm Moore locomotive (above), similar to locomotives at the Woodford Narrow Gauge Museum railway and likely used for maintenance work. Note that even it has a yellow flashing light on the roof (not the original roof).

One Mill

In 1992 the Marian Mill transport system operated 26 shifts/day (engine crews), with a net tonnage of 14-15,000 tons/day (approximately 24,000 gross tons) to supply a 5 days per week (23 hrs/day) crushing schedule. The Mill has approximately 270 kilometres of 'main line' track, a maximum grade of 1:37, and uses both 4 and 6 ton link and pin connected bins. Bins are handled automatically within the mill and rotary dumped onto a conveyor belt to the mill.

Prior to 1981 45% of the cane came to the Marian Mill by road transport or QR (Queensland Rail); now only 20,000 tons comes direct to the mill (from a few farms just east of the mill). Some of the farmers on the far ends of the system deliver their cane to the rail system by road transport, however this cane is then transported to the mill via the rail system.

Burnt cane must be harvested reasonably quickly, usually the next day. Cane yields are approximately 30 tons per acre, and a single small farmer would perhaps be allowed to deliver 100 tons in a day, thus daily burnings are small.

The hilly sections north of the mill have grades to 1:37, the flatter route west through Cattle Creek has maximum grades of 1:80. Normally the maximum curvature on the mainline is 100-150 metres radius, although again, the sections to the north are through much hillier country and some non-mainline sections can be as tight as 130' (2 chains or approx 40 m). Speed(10 or 20 km/hr) and load restrictions are common.

A 40 ton EIMCO engine at 740 HP can haul approximately 75 cars up the grade on the northern line. A 24 ton loco can haul 300 4 ton bins on the flat (trailing 1500 tons). The newer, heavier, locomotives were acquired when the lines were extended after 1990—prior to 1968 the average haul was 13 km, now it is 21 km. The newer locomotives are also able to work with slave units (computer controlled, driverless locomotives), with the slave placed back in the train to assist with both braking and hauling.

Selected References

These references, from the author's collection, have been selected because of their availability. A wide variety of industry material are available as well as a number of books and videos on overseas cane railways (Fiji, Cuba, etc.).

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