
## Introduction

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 (spray or flood). 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.

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

My own introduction to Queensland's cane railways came in the late 1980s when I emigrated to Australia from Canada. While I had not been an active modeller for some years, the narrow gauge cane railways promised much the same attraction that the logging railways of Pacific Northwest had for me as a teenager—relatively small operations with unique equipment, funky and individualistic.

While there's a variety of information on Queensland's sugar cane industry (mill histories, locomotive and rolling stock plans, maps, photographs, etc.) the need for better modelling information, and a broader interest in cane railways worldwide, led to CaneSIG, the cane railway (tramline) modelling special interest group, and the first drafts of my modeller's notes.

This brief note and clinic will provide you with an introduction to cane railway modelling, particularly in Queensland (QLD). You can download and print a full colour modeller's handbook and other materials from the CaneSIG web site, as well as have access to over 1000 prototype images, drawings, etc.

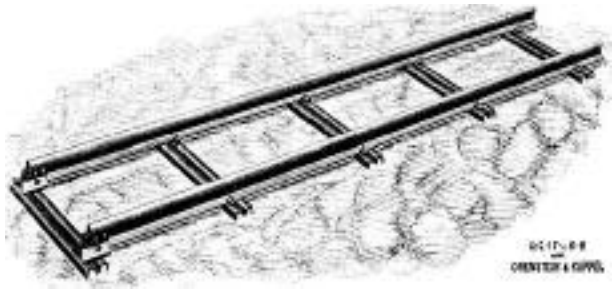
## Historical Background

1865: First Australian commercial-scale sugar mill (near Brisbane).

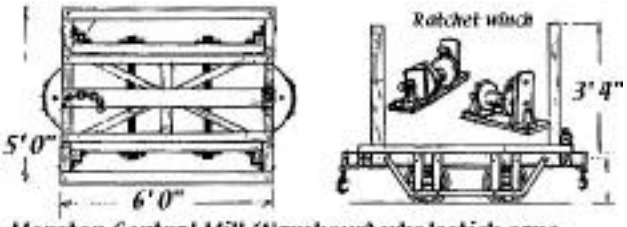
1885: 166 sugar mills in Qld, 102 in NSW; many of these tiny mills fail in pre-1900 depressions.

1888: First government sponsored cooperative mills begin operation. Subsequently mill ownership essentially divides into 'central' (cooperative) and CSR (Colonial Sugar Refining Company) mills with government control of many aspects of the industry.

1924: Australia produces enough sugar to begin exporting.

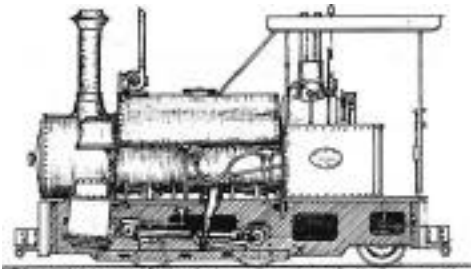


Portable track sections come in various lengths and radius for easy carrying by one or two people. A hundred years ago these tracks were laid in the field for man- and horse-power to move wholestick cane on 4 wheel wagons to a permanent line, barge collection point or mill.



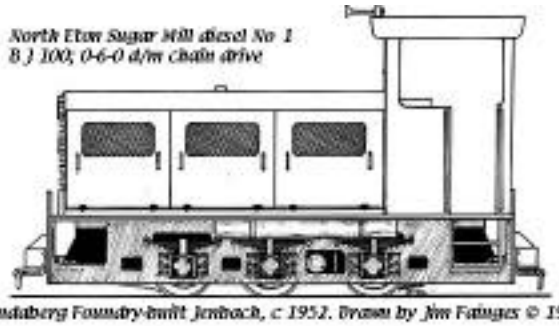

Moreton Central Mill (Nambour) wholestick cane truck. John Armstrong sketch for modelling purposes.

1952: 170 steam and 7 diesel locomotives in sugar industry use; sugar tramways continue to operate much the same as for the previous 50-60 years since steam had begun replacing horse- and man-powered lines.



Pleystowe Mill's John Fowler 0-4-2 saddle tank locomotive as rebuilt 1950s to end of service. Drawn by Jim Fainges © 1998

1955: First Australian-built diesel locomotive (Bundaberg Jenbach, below) for the cane industry.

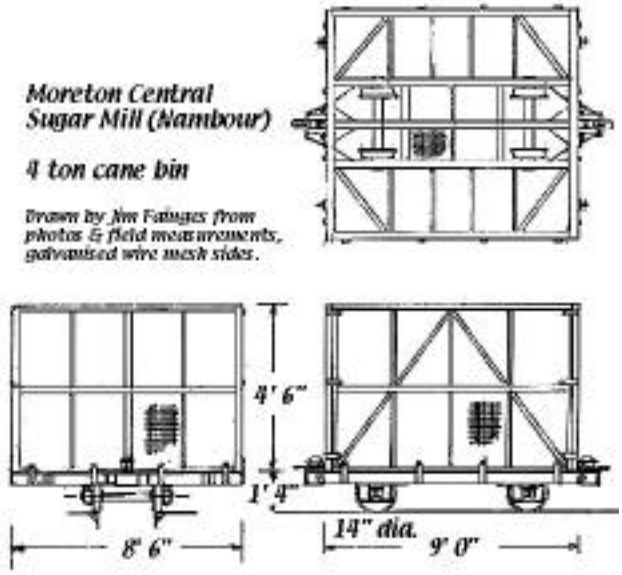



Bundaberg Foundry-built Jenbach, c 1952. Drawn by Jim Fainges © 1998

1960s: Mechanised harvesting and cut cane billets change the industry, leading to an increase in size of cane bins from 3-4 tons to 6 tons.

1970: 50% of cane carried in bulk bins, 50% wholestick.

1970s: Experiments with and adoption of radio-controlled remote brakevans to supplement locomotive brakes.




1975: Industry primarily converted from wholestick cane carried on open wagons to chopped cane in bulk bins.

1980: Sugar industry essentially 100% dieselised.

1990s: Mills using larger locomotives, often ex-mainline rebuilt and regauged, and upgrading longer lines for higher speed traffic (track standards often exceeding Queensland Rail mainline practice). Bins still primarily 4-6 ton unbraked 4 wheel but some bogie and 10-20 ton. World sugar prices very volatile, generally falling.

2002-3: Major industry changes likely with government, mill and growers reports proposing and reacting to deregulation, rationalisation, closure of tramlines, etc.

Australian railways are established by Acts of parliament; cane mill and shire owned tramways were established under lesser legislation. Today both come under common rail safety and other regulation and are referred to as railways.

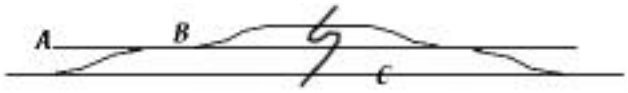
The cane mill tramway both carries the cane from farm to mill and serves as a storage system, holding loaded bins for up to 18 hours, to enable the mills to operate 24 hours per day during the crushing season (typically June-November). Growers are contracted to a specific mill and cut their cane under mill direction to ensure that all growers in the mill area share early and late deliveries equally in case of adverse weather, price fluctuations, etc.

In some areas growers own their own harvesting equipment but contract cane cutters are the norm in others, primarily due to the size of farms and the cost of harvesting and field transport equipment.

Low sugar prices, crop diseases, weather, and an aging grower population combine to make the future uncertain. Proposed solutions include rationalisation, deregulation and disposal of the cane tramways.

## Tramlines and their Mills

Tramlines often spread out in several directions from the mill, with a number of branches, sub-branches and bin pick-up points. Some runs are essentially mainline operations with a run of 50 km or more, others are slow speed runs through fields and along residential properties. Trains operate with train order, radio and GPS control.

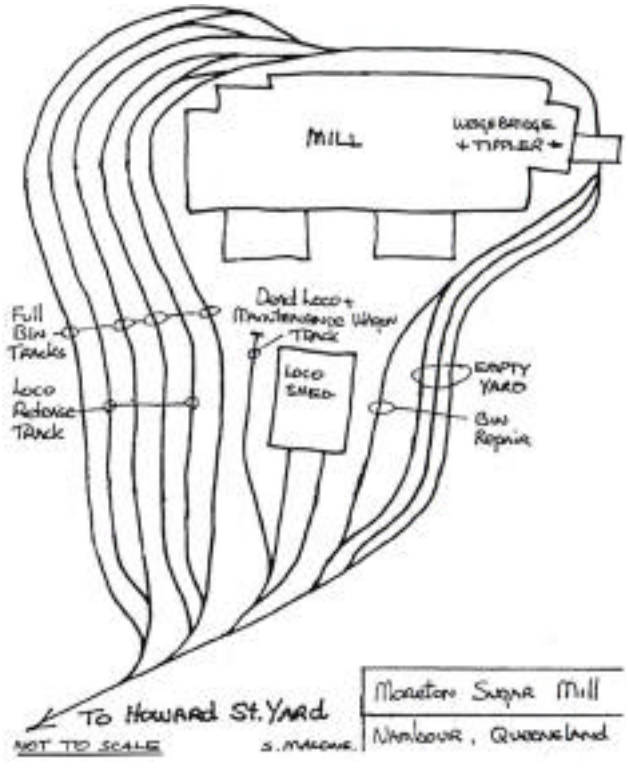



Simple farm siding (above), ~500 m long, in level country. Loaded bin delivery ramp A is roughly 450 mm above the through road C; B is roughly 300 mm above C, with the elevation falling off to the empty pick-up ramp at right (dug out) so that gravity assists the work of shifting bins.

The through road is lightly ballasted with gravel. The others are grass and trash covered, with standing water in the wet season. A Shire-maintained gravel road parallels the siding, separated from C by a shallow drainage ditch.

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

Empty bins are delivered to farm pickup points. Some are loaded on-line from in-field transporters. More commonly. the bins are winched onto trailers or transporters and hauled into the field for loading, then returned to the rail for movement to the mill. Mills are now experimenting with 10 ton or larger bins which will never leave the track, thus will not sustain the same damage as the smaller bins trucked into the fields.



The mill will usually have a number of nearby delivery points for cane trucked by road where in-field transporters and/or semi-trailers transfer their cane to waiting bins (from transporters), track (if already in bins), bins or directly into the mill. Loaded bins are identified and checked against delivery lists, weighed, moved through rotary dumps under automatic control (various pusher mechanisms), then out the other side to the empty yard.


Disease is a constant problem with any monoculture, and cane should not be carried across district boundaries.

The sugar mills themselves are large industrial plants with one or more highly visible stacks and, in Australia at least, are modern and efficient users of technology. The cane is crushed, the sugar syrup separated and processed, and raw sugar produced.

The mill ships its raw sugar to refineries in bulk carriers by rail or road, often via a short transfer to a bulk terminal at a nearby port. Molasses and 'mill mud' are other out-going products with their own unique vehicles. Maintenance and outdated locomotives and rolling stock can also be found near the mill and provide modelling interest.

## Loco Shed

The loco cum maintenance depot is an integral part of the tramway system to cater for the daily running and maintenance of the fleet. The depot is generally situated close to the mill; sheds can be terminal or run-through, or a combination of both, depending on the mill layout and operations. Moreton Mill, for example (plan pg 2), has two terminal loco roads with a third continuous track for bin maintenance.

Apart from the central facility, out-depots could be found at locations remote from the mill. Such installations played a particularly important role in the days of steam, with the diesel's greater endurance the importance of these remote facilities has declined. For modelling purposes however, smaller sheds independent of the mill complex may provide the most appropriate subject.

Historically a loco shed would have been a comparatively basic structure, maybe of 'timber and tin' construction with a packed earth floor. Over time the plethora of small local sugar enterprises were replaced by fewer and larger, more efficient, central mills. This led to extensions of the tramway systems and upgrading of locomotives and rolling stock. Substantial timber or steel sheds with concrete floors and suitable pits became an integral feature of the mill complex.

Adaptation and improvisation were always features of the narrow gauge tradition. Maintenance buildings would inevitably undergo modifications to accommodate changing mill requirements, and engineering and functional needs took precedence over architectural aesthetics. Records of additions and alterations, however, are difficult to trace (if they exist at all) and representation of structures relies almost totally on photographs, contemporary written material, and/or personal observation.

## Modelling

The unique nature of each individually-owned cane railway lends itself to modelling in any scale from HO to G. A small selection of steam, diesel and petrol locomotives, cane bin and harvester models or kits are available commercially as well as typical structures and engineering works. However, most modellers will scratch-build at least some models.

Queensland modellers seem to mostly model in HOn30/009 (3.5 mm) or On30 (1/4" or 7 mm) using track components based on N and HO respectively. While I am beginning to switch to On30, most of my current experience is with HOn30 and the CaneSIG web site modelling notes reflect this.

Many HO modellers use 9mm gauge track (*Peco*, for example, has track and turnouts with respectable HOn30 sleeper spacing). This adequately represents 2' gauge and allows the modeller to use N gauge mechanisms and other components, including wheelsets and couplers. 1/4" or 7mm modellers likewise can use HO components and track spacing, also roughly 30" to represent 2'.

Layout, trackwork, scenery and wiring will be the same for a cane layout as for any other layout in a similar scale. Obviously more scratch building will be required in some scales, but commercial models of buildings, etc., can be used where appropriate.

Typical Australian tree profiles: Gum, Fig and Palm.

Cane fields can be modelled with fine broom straw, etc., dyed or painted, with scale 'grasses' for individual plants. Some trees are commercially available in several scales but most modellers will construct their own from wire armatures and 'gap filler' with net and foam leaves as tropical trees often have a distinctive profile.

A cane layout will need a number of bins or wholestick trucks but the real modelling challenge will come from building unique locomotives, sprayers, molasses and water wagons, crew transporters, and ancillary maintenance equipment.

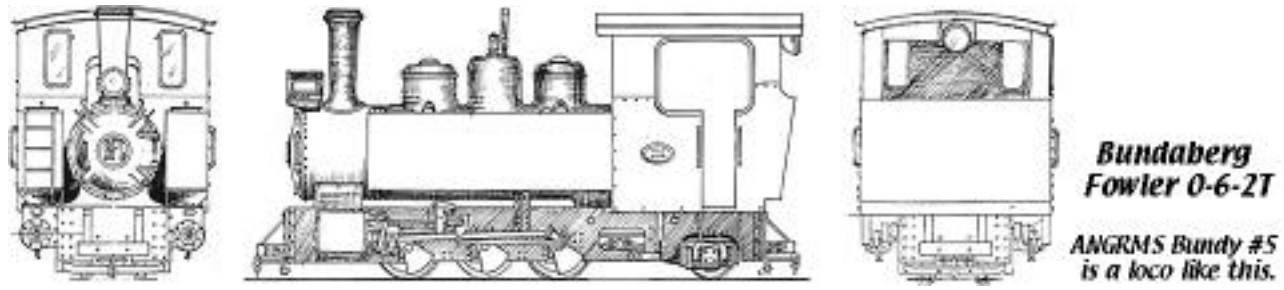
The growing popularity of On30 should be a real boost for cane modellers and model manufacturers but the availability of many models will remain problematic due to the part-time nature of the business and the use of low-yield rubber moulds. Current information on suppliers is available on the web, along with leads to magazines, books, and videos on the sugar industry.

## Acknowledgments

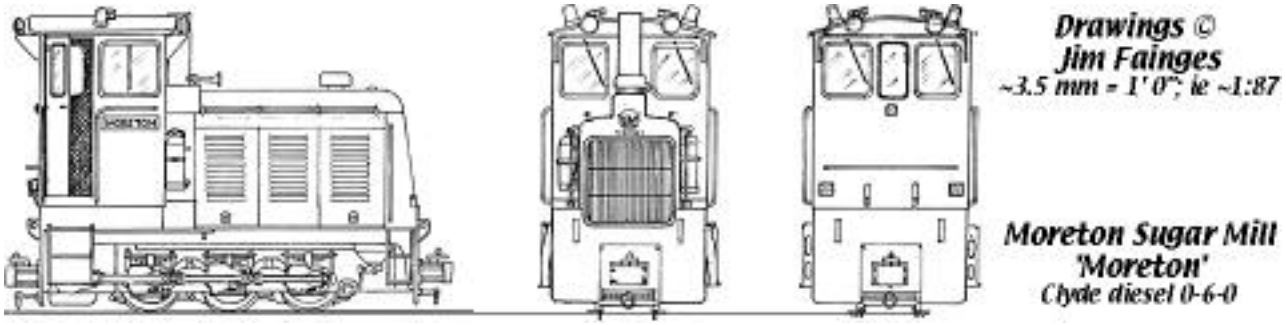
These notes are dedicated to the many modellers, rail fans and historians who have contributed so selflessly to the resources on the CaneSIG web site.

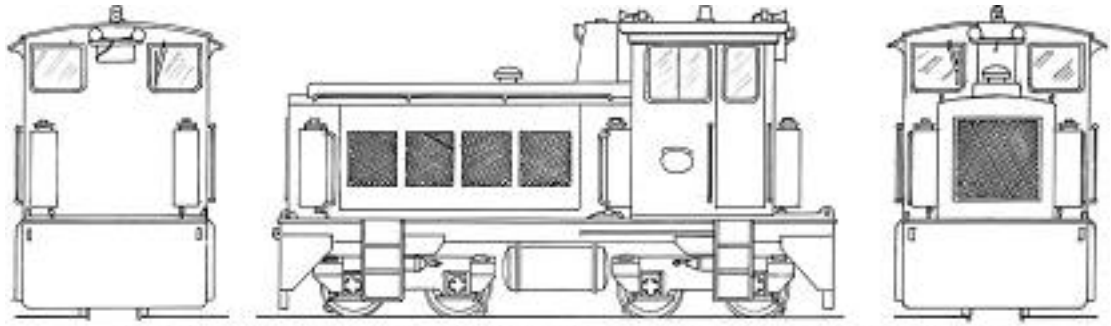
Moreton Mill map is courtesy S Malone (AMRA Journal 236, 1997); locomotive and cane bin drawings courtesy Jim Fainges; wholestick drawing courtesy John Armstrong; and Orenstein & Keppel drawing from O&K Catalogue Nr 600, c 1900, CQU Library. Loco shed information adapted, with permission, from Jim Hutchinson's clinic notes.

## Happy Modelling!




Australian built under license from Fowler, early 1950s (above) and first generation diesel, 1960s-70s (below).




Second generation bogie locomotive, 1970s-80s (above and third generation, rebuilt from mainline locomotive for fast, heavy hauling, 1990s (below).