

Tree to timber

From pit sawing to powered sawmills, sawn timber has long been the backbone of our building industry.

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In the early days of European settlement, all readily available local building materials were used in construction, from raupo reeds, mud and sod to leaves from nikau palms. Local timber, such as kauri, rimu, totara or kahikatea, could also be split into slabs by reasonably skilled bushmen.

Imported materials such as corrugated iron, calico or canvas could be mounted on locally sourced timber frameworks and used for almost any purpose, from housing to entertainment. The Hotel Commercial in Collingwood, Golden Bay, for example, was built of coarse calico on a wooden skeleton. It reportedly had only one door 'so constructed to let in from its numerous crevices, light, heat and the sun.'

Local resources were soon in short supply, and interest turned to the production of sawn timber that could be transported to site. Sawn timbers were lighter, easier to handle and fix, wasted less wood and produced neater and more weathertight buildings.

Once felled, a tree needed to be sawn into lengths and cut into framing timber or boards by a saw powered by people or an engine. There were several ways to achieve this, including pit sawing and the use of sawmills.

Pit sawing widely used

Pit sawing could be carried out on site by two people. It had the important advantage of minimising the transport of unusable material, but although the concept was simple, the work was hard and slow. On flat land, a pit would be dug beneath the log, and on sloping land a trestle would be made to support it. One person (the 'top notcher') worked on top, guiding the blade, and the other worked in the pit and was bathed in a sawdust. Together, they pushed and pulled the 3 m long saw, producing the distinctive straight saw marks found in many early buildings.

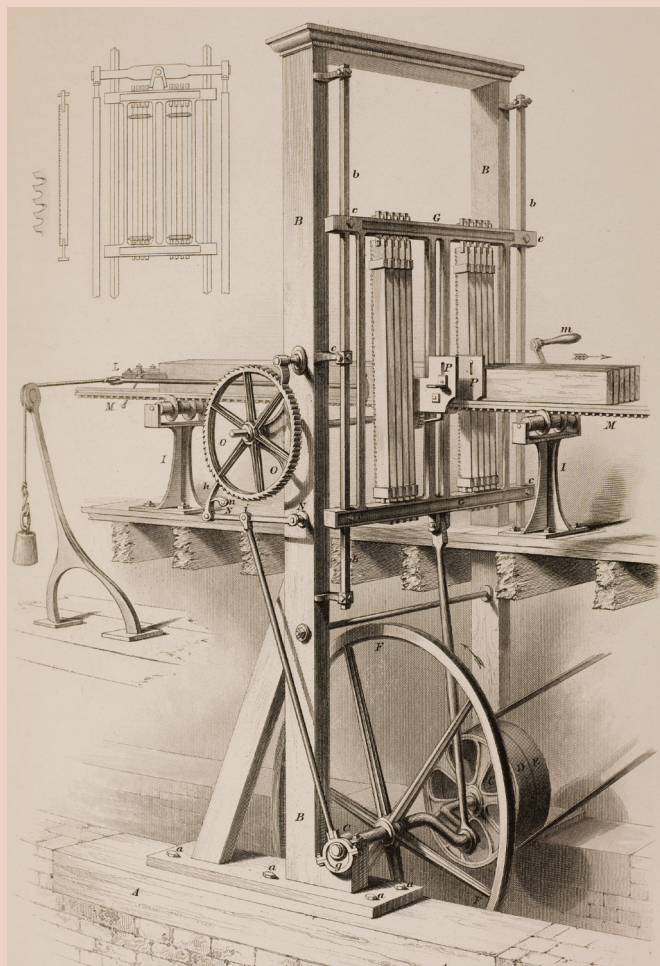
Kauri loggers worked six 10 hour days a week, but the money was good. In the mid 1840s, a pit sawyer was paid £1 15 shillings per 100 feet in Pigeon Bay, Canterbury, and in Nelson, a sawyer made £80 in 5 months – good incomes when average daily rates were 5–8 shillings.

The use of pit sawing continued even when steam-powered mills had become the norm and was still useful in isolated or difficult areas into the first decades of the 1900s.

Sawmills increase speed and accuracy

Other sources of energy offered more power, resulting in greater processing speed and uniformity of output. For example, water-powered sawmills were in Mercury Bay in 1838, Ngunguru in 1840, Hokianga in 1841, Horowhenua in 1842 and Nelson in 1845.

Steam-powered mills had the advantage of not being dependent on either water storage or a year-round flowing stream. They could also



Deal frame saw for cutting square fitches of timber into boards. Illustration from Charles Tomlinson's 1854 *Cyclopaedia of Useful Arts*.

use the waste from the timber processing to power the boiler to provide the steam. The first steam-powered mill was operating in Wellington in 1840, and from the 1850s, there was increasing use of steam-powered machinery, not just for cutting timber but also for shaping, turning and carving.

Several saw types in use

The three basic types of powered saw in use in 19th century New Zealand were the:

- flat saw, where the blade moves up and down (reciprocates)

- circular saw, with a rapidly spinning metal disc with saw teeth
- band saw, a continuous metal ribbon with saw teeth.

Versions of each saw type could be obtained with horizontal or vertical blades. Each had its advantages and disadvantages, but the slower horizontal reciprocating saw was suggested for better control of cutting hardwood. The reciprocating saw reproduces the action of a manual saw, with from 1–11 individual blades. In the United Kingdom, reciprocating frame saws were well developed by the 1850s. Such machines made from 100–120 strokes per minute, each 44–50 cm long, requiring only 5–10 minutes to turn a prepared tree into thin timber boards.

Circular saws had long been used for cutting the teeth of water and clock wheels, and by 1791, they had been patented for timber by Samuel Bentham. The idea was further developed by Isambard Kingdom Brunel's father, Marc Brunel, in his patent of 1805, which described how several pieces fitted together by screwing them to a large flange forming part of the axle of the saw. The speed of the circular saw was established by the strength of the metal, the need to remove waste and to ensure the blade did not overheat.

In 1842, a sawmill at 'Kai Warra Warra' (modern Kaiwharawhara) near Wellington used a water wheel to power several circular saws. On the Manukau Harbour, a 14 hp Cornish Beam Engine was used to power both frame and circular saws, as well as a shingle cutter and turning lathe.

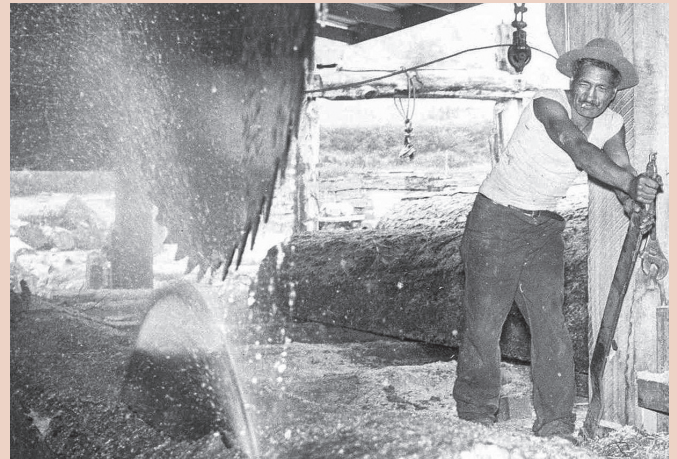
By 1874, the Kauri Timber Company mill at Mercury Bay was powered by steam, used a vertical breakdown band saw capable of handling logs up to 30 ft (9.1 m) in circumference (2.9 m in diameter).

Transport to site

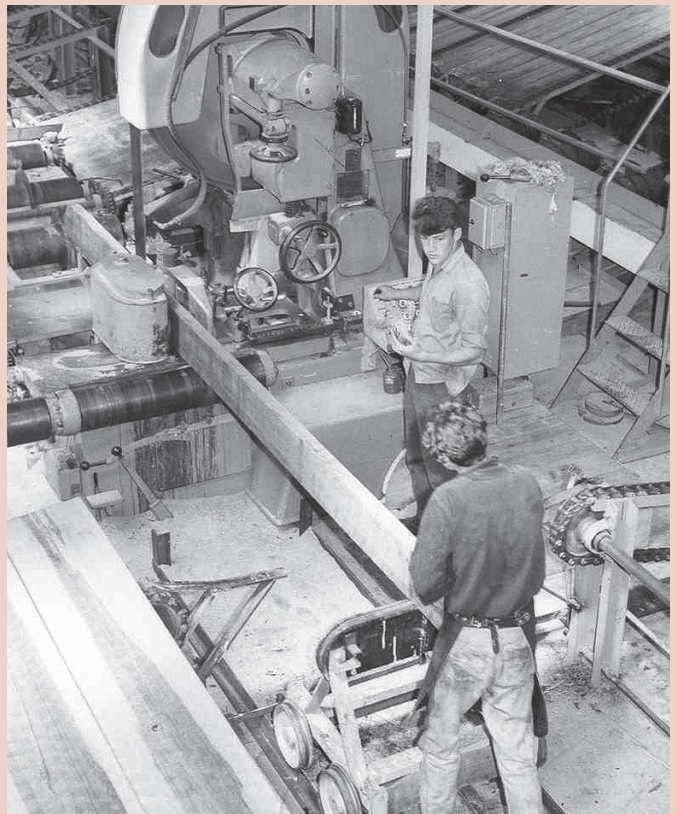
In the early days, logs were pit sawn where they fell, but bullock teams were soon used to bring the often huge logs out of the forest to a nearby powered sawmill. Mechanically based capstans and tackles were also used, and any of these methods could shift logs to the nearest water course or stream where they could be floated to makeshift mills or waiting boats for transport to market.

In Northland, streams were dammed, and up to 12,000 logs were flushed down to the sea. These were then formed into rafts of 2,000–4,000 logs to be floated to the processing mills. The overall process was far from efficient, with up to 20% of logs being lost between felling and processing into timber. It was reported that kauri logs were found as far away as the beaches of Chile and the Kermadec Islands.

The rapid cutting and use of these ancient trees was clearly not sustainable, but it was not until the middle of the 20th century that *Pinus radiata* started to take the place of many indigenous species and become the ubiquitous timber we know today. ♦



Ruatahuna Mill traction bench, 1957. (Photo courtesy Fletcher Challenge Archives, Ref. 9104P/40.)



Odlins Stillwater Mill – recutting band saw inside mill, 1967. (Photo courtesy Fletcher Challenge Archives, Ref. 6259P/157.)