Portable sawmilling

ABOVE left: Justin Wells (Logs2Lumber) band sawing *E. fastigata* pruned log grown at Tai Tane Forest. Right: Five-metre lengths of freshly sawn *E. fastigata*. Photos: Paul Millen

Portable sawmills provide a relatively low-cost entry into sawmilling. They are well suited to processing alternative species (also called specialty species) grown in farm woodlots and small plantations.

Portable sawmills have been used in New Zealand since the late 1800s, when bush sawmills were first used in native forests.

Today, some portable mills can be towed to site, and others can break down for transport on a trailer. In most cases, they can be set up to saw timber on farm or in the forest in less than an hour.

There are larger commercial models designed for semi-permanent on-site use. A loader, forklift, or farm tractor is needed to move, stack, and load out logs and timber.

Portable sawmilling has many advantages.

- Portable sawmills are cheaper to buy and run than other wood processing options.
- Portable sawmills can cut a large variety of timber sizes and species.
- Experienced operators can get maximum value from different types of logs.
- High-value logs can be economically sawn on-site.
- Milling on-site can reduce transport costs. Cutting logs into timber means only half the volume of wood needs to be loaded and trucked for further timber processing or sale.
- Timber storage costs can be very low if stacked for drying on the farm or in the forest. Some alternative species are naturally durable and store well without the risk of decay for months or even years.
- Portable sawmills have low environmental effects and a very small environmental 'footprint' compared to other wood processing operations.
- Sawmilling can supplement farmer or contractor income during seasonal lows.
- They are suitable for a family or whānau-based business.
- Some training is offered by sawmill manufacturers.
- You can increase production at any time by adding another sawmill.
- Small farm woodlots can be economically converted to timber for on farm use.

Portable sawmilling by Pāmu (Landcorp) at Edenham, Hawke's Bay. Photo: Paul Millen

Demand for timber

There's a big demand for timber in New Zealand and internationally. New Zealand imports some high-value specialty timber to meet demand for things like decorative timbers, flooring, wood panelling, and furniture.

Some of this demand is met by locally grown and milled timber.

Macrocarpa (*Cupressus macrocarpa*), Mexican cypress (*C. lusitanica*), redwood (*Sequoia sempervirens*) and various eucalypts are the most popular and widely produced New Zealand-grown timbers milled by portable sawmillers.

What you need to know

The success of a portable sawmilling business depends on things like the:

- likely local log supply
- ability, skill and experience of the sawmiller to get the largest amount of usable wood from logs
- sawmill type and model
- species, quality and dimensions of logs available to mill.

Roads and space

- Good roads and access tracks are important. Good access allows easier harvesting with smaller machines that have less impact on soils. Smaller machines also have lower running costs and emissions.
- One large milling site is often the preferred option, with logs brought to it from the forest.
  - Preferably the site has all-weather road access and is large enough to lay everything out.
  - The site should have enough flat land for the sawmilling operation, including an area for:
    - tailing out (removing the cut timber from the saw)
    - measuring and cutting logs to length
    - rolling logs into the mill
  - Log making is a critical step as the lengths of the logs need to match the standard lengths of timber for sale, and preferably the highest value by grade.
- Additional logs need to be stacked nearby, and timber stacked ready to be trucked out or moved to a storage area. This needs a circular area about 20 to 30 metres wide depending on the sawmill type and the number of logs to mill.
  - This amount of area can be difficult in steep country. If there are more than a few trees to mill, it's a good idea to excavate and level the site well in advance of sawmilling.
- You'll need extra flat land if drying and storing sawn timber on site.
  - Wooden bearers are needed to stack the logs on to keep them off the ground and allow airflow around them. Timber packs need to be covered with corrugated iron or stored in a large open drying shed for final seasoning. Some commercial operators using on-site mills invest in kilns for drying, including solar kilns.
- Larger forests on a large farm could have multiple sites to decrease the distance of felled trees to the mill site.

Machinery

Costs of portable sawmills in 2020

You can buy a variety of locally manufactured or imported portable sawmills.

- In 2020, small manual models range in price from around $6000 to $12,000.
- At the top end of the range, commercial multi-saw models with power feed and computer headworks cost around $20,000 to $25,000 (2020 prices).
- Commercial bandsaw models with power feed, computer headworks, and hydraulic log handling can cost between $60,000 to $120,000, depending on the model and whether you buy locally or import (2020 prices).

The amount of sawn timber you get from a log depends on the type of sawmill and the quality and dimensions of logs.

If you're sawing a log larger than 50cm in diameter then conversion from log to sawn timber is likely to be:

- 40–50% for multi-blade saws (quarter saws)
- 50–60% for swing saws
- 55–65% for bandsaws.

Multi-blade (quarter saws)

Multi-blade (quarter saw) and swing-blade sawmills are:

- efficient for sawing large logs of medium to low grades
- particularly suited to sawing large softwood logs including cypresses and redwoods.

The swing blade circular saw in horizontal cutting position. Photo: Paul Millen

Advantages of multi-blade saws include:

- They are easy to learn to use and can be operated by one person.
- Low maintenance makes them well-suited to farm foresters.
- They saw large logs, some as much as 1.5m in diameter with high production rate.
- A single swing-blade sawmill can use a smaller motor than a quarter saw running with two or three blades.
- Less blade and machine maintenance than bandsaws.

Disadvantages of multi-blade saws include:

- More sawdust (waste) due to the circular blades making a wide cut compared to band saws, especially if cutting 25mm thick boards.
- It's not possible to accurately saw logs less than 30cm diameter.
- Logs can't be easily turned or positioned for optimal sawing during the sawing process.
- Quartering of eucalypts (to reduce splitting and warping when cutting, processing and drying the wood) is not possible.
- Swing-blade sawmills can't cut wide boards or large dimension stock.
- Multi-blade sawmills can't cut wide slabs from logs.

Bandsaws

Bandsaws offer greater flexibility.

- They saw any alternative species (including hardwoods).
- They can produce high quality boards from good quality pruned and knotty logs of high value species. This increases the value of the sawn timber output.

Advantages of bandsaws include:

- Less sawdust (waste) because the thin saw blade makes a narrow cut.
- Small logs (minimum 2.1m long and 15cm small-end diameter) can be cut so recovery of sawn timber is possible from smaller trees.
- You get about 20% more timber cut from a log than circular saws. This is a significant advantage for sawing larger valuable pruned logs.
- Large models can roll and clamp logs during sawing and allow for precision sawing to the size you need.
- Capable of quartering logs to maximise the amount of straight and stable timber from eucalypts and other hardwoods.

Disadvantages of bandsaws include:

- The operator needs to be skilled to ensure optimum sawing conditions at all times. Bandsaws need sharp teeth, correct tooth setting, correct tension and correct feed speed. If any of these are not right, the flexible band will cut uneven wavy boards.
- Even large models are not capable of sawing very large dimension logs more than 1m in diameter.
- The bands need frequent sharpening, and replacement costs are high.
- There is a high level of maintenance needed to ensure these mills operate accurately and efficiently.

Other machinery

- A suitable machine is essential for moving logs and loading packets of timber.
- For smaller blocks you can use a farm tractor to load logs into the mill. Stack sawn timber directly on to a trailer. Or fillet stack, strap and lift with a front-end loader and move to a storage area.
- For high value native and exotic timber some parts of New Zealand use heli-logging (helicopter logging). This can be flying the mill into the forest and the packets of timber out, or flying the logs to a central mill site.

Left: A Wood-Mizer band sawmill in action quartering a pruned blackwood log. Right: A large pruned macrocarpa log being sawn with a Wood-Mizer. Photos: Paul Millen

Te Uru Rākau New Zealand Forest Service

Things to think about

It might be hard to find a small logging crew prepared to work at the scale and rate to suit portable milling operations.

Options available to farm foresters or forest growers include:

- owners buying suitable harvesting equipment and get training to use it
- hiring a portable sawmilling contractor to do the logging and sawmilling
- a small harvesting crew of two people plus one medium-sized machine could fell and log trees directly to the portable sawmilling site.

Any person or business conducting a portable sawmilling venture needs to comply with the Health and Safety at Work Act 2015.

There is no specific licensing or regulation of commercial portable sawmillers except for native timber milling. Temporary portable sawmilling operations on a farm or in a forest may be undertaken within a rural zone as a 'permitted activity'. Get advice from your local district or regional authority before you start.

Any permanently set up mills need to follow local government-permitted activities for the zone they plan to operate in or will need a resource consent.

Macrocarpa boards fillet stacked for drying. Photo: Paul Millen

Felling and moving logs to the milling site is the most dangerous part of forestry. Training and experience is essential. You must follow health and safety legislation to ensure the safety of everyone on and around site.

Want more information?

Read the report – **Portable sawmilling of locally grown alternative timber species: A report on the potential for a sustainable small-scale regional industry in Hawke's Bay Region**

Tirohanga Ngahere | Canopy: **www.canopy.govt.nz**

One Billion Trees: **www.mpi.govt.nz/1BT**

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