

LOG QUALITY & CONVERSION

A variety of log types available from plantations gives the log buyer the opportunity to specify logs according to requirements.

WOOD QUALITY

The quality of plantation-grown trees is influenced by genetic selection, silvicultural practice, site selection and rotation age. Over the last 60 years there have been many changes in forestry practices which have resulted in greater control over the type of wood produced.

New Zealand pine forests are established with genetically selected stock and managed to provide a predictable, premium quality log resource for a wide range of world markets. Ideal growing conditions and appropriate management permit the harvesting of large logs (up to 80 cm diameter) on rotations of approximately 30 years. The logs are typically healthy, containing no decay, internal splits, or growth stresses.

Plantation grown New Zealand pine is sometimes referred to as a 'sapwood' tree because of the relatively small proportion of heartwood. At 30 years of age, 80% of the tree volume is sapwood, with a fresh moisture content of about 150%, measured as percentage of "oven dry"

wood weight. This results in an average weight of about 1 tonne/m³. If the logs are left too long without protection before processing they are prone to infection from bluestain fungi.

As with other softwoods such as Douglas fir, wood properties of New Zealand pine are influenced by geographic location and tree age. Basic wood density of the mature wood zone is, therefore, variable but averages between 400 and 420 kg/m³ at rotation age.

Within the tree there are defined quality zones which need to be recognised during processing. Juvenile wood (or corewood) is typical of the inner 10 growth rings and it can have an impact on stability. In addition to lower density, juvenile wood has wider growth rings, shorter wood cells, higher longitudinal shrinkage and increased spiral grain. Surrounding the juvenile zone, wood properties are more 'mature', i.e. higher wood density, narrower growth rings, and straighter grain.

New Zealand pine does not shed its branches when grown under the regimes of wide initial spacing, early thinning, and the 30 year rotation now common practice in New Zealand. However trees can be artificially pruned and the "knotty core" restricted to a small cylinder, around which defect free 'clearwood' is produced.



SOME LOG TYPES

Process & Product Options

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| Pruned Peelers | High quality, large, straight logs for sliced or peeled veneer, plywood and LVL manufacture |
| Industrial Peelers | Large, straight unpruned logs for knotty grades of plywood and LVL manufacture |
| Pruned Sawlogs | High quality, large, straight logs for sawmills to produce clear and appearance grade lumber |
| Small Branch Sawlogs (S) | Suitable for production of structural lumber, available in small, medium and large diameter groups |
| Large Branch Sawlogs (L) | Suitable for production of industrial and appearance lumber, available in medium and large diameter classes |
| Posts and Poles | Small to medium size, straight logs used for engineering and ground contact end uses, must be chemically treated to extend lifespan |
| Residual Logs (pulp and panel products) | Sound logs not fitting into any of the above categories |

Extensive research and

experience in plantation

forestry has provided a

good understanding of how

New Zealand pine log

quality can be influenced

by genetic selection,

silviculture and the

method of conversion.

Pruning is restricted to the butt log with variable heights of between 4 and 8 metres.

IMPACT ON WOOD UTILISATION

Adaptability of New Zealand pine to varying site and management regimes results in the production of a range of log types. Grades based on quality characteristics are used in New Zealand to allow buyers to specify the preferred quality. The key to the appropriate use of these logs is to recognise associated quality variations and to match them to the intended process and product.

Log quality is a function of size (diameter, length) shape (straightness, ovality, taper), and other external

(branching) and internal (wood properties) features which can affect the suitability for a particular end use.

The wood of New Zealand pine has medium density, even texture, and average shrinkage for softwoods. The logs yield the full range of lumber grades from long-length clearwood to industrial grades.

The strongest, most stable wood for structural uses is derived from the outer region of the log, while lumber from the juvenile zone is suited to packaging and similar products.

Contrary to popular belief, the wide growth rings typical of managed plantations of New Zealand pine are not a reflection of poor wood quality. Correctly graded, New Zealand pine conforms to grade requirements for structural lumber worldwide.

LOG QUALITY & CONVERSION

CONVERSION

Diameter and shape (sweep, taper, ovality) do not usually limit the kinds of processing systems which can be used. Sawing of logs is the most common processing method used. Peeling and slicing and the manufacture of a range of re-constituted wood products are increasing in importance.

Excellent results have been obtained with bandsaws, circular saws, frame saws and chipper canters in all the common sawmill configurations. New Zealand pine is similar to other medium-density softwoods in that more saw tooth side clearance is required than for hardwoods. A good surface finish can be achieved with appropriate feed speeds and sharp saws.

The full range of breakdown methods can be used with New Zealand pine and the conversion levels achieved are dependent on the log and product mix and the mill efficiency level. Cutting patterns are selected according to the machinery available, the log size and quality, and the products required.

CONVERSION PATTERNS

Most traditional conversion patterns can be used with New Zealand pine, provided the quality zones are recognised

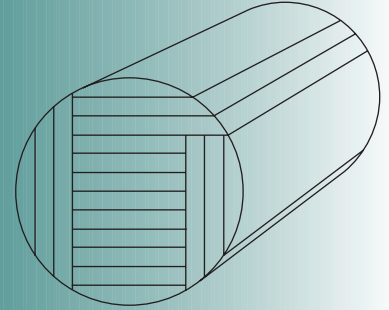
Grade sawing – commonly applied to high-value pruned logs. Boards are removed around the log to maximise the recovery of high-value clearwood

Cant sawing – commonly used to segregate the wood quality zones in unpruned logs. The juvenile wood zone is isolated in the inner boards. Suitable for small and medium-size logs

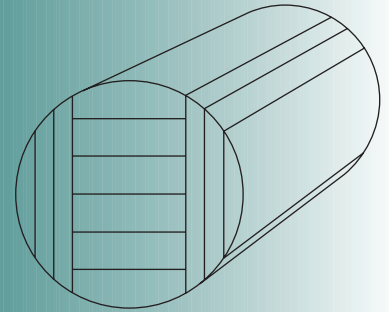
Live sawing – used where only basic equipment is available or when wide boards are needed. This pattern allows recovery of some quarter-sawn boards

Peeling – standard method for plywood and LVL production, used on pruned and industrial peeler grades.

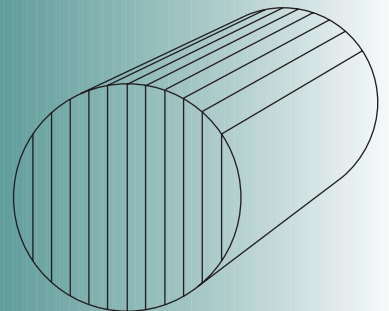
GRADE SAWING



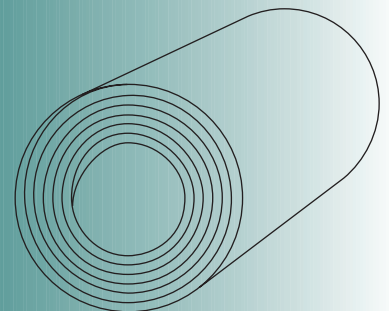
CANT SAWING



LIVE SAWING



PEELING



OUTERWOOD & COREWOOD IN NEW ZEALAND PINE

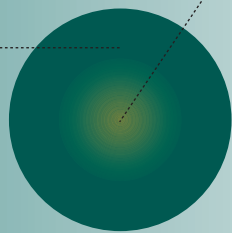
Mature wood

Properties:

- mainly sapwood
- higher density
- more stable
- fewer knots
- narrower growth rings

Uses:

- high quality structural
- clear lengths for furniture
- decorative boards
- preservative treated lumber



Juvenile wood

Properties:

- mainly heartwood
- lower density
- less stable
- many small intergrown knots
- wider growth rings around pith

Uses:

- industrial packaging
- decorative boards
- formwork
- knotty furniture
- low strength structural
- reconstituted products