

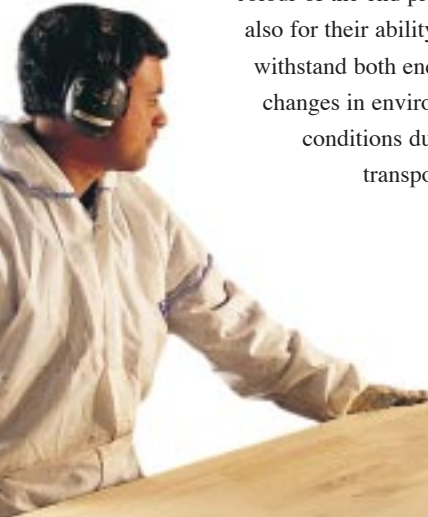
GLUING, FINGER-JOINTING & LAMINATING

GLUING

New Zealand pine can be glued with many adhesive types, provided that care is taken to establish correct process control of wood properties, adhesive formulation and pressing and curing variables. It is being glued and used extensively in a range of wood products from structural uses to high value furniture and interior fittings.

Adhesive types

Many different types of adhesives have been used successfully across a wide range of glued products, including furniture, joinery, wood panels, overlaid laminates, finger-jointed lumber for interior and exterior use and structural laminated lumber. Care should be taken to select adhesives appropriate to the production process, for the colour of the end product, and also for their ability to withstand both end use and changes in environmental conditions during transport. If



ADHESIVE TYPES USED WITH NEW ZEALAND PINE		
Exterior	Occasionally Damp	Interior
Resorcinol*	Melamine*	Urea
Phenol*	Aqueous Polymer Isocyanate*	Casein
Epoxy*		PVA
		Elastomeric

* A joint with good structural properties can be obtained using these adhesives.

preservation treatment is required the adhesive should be compatible with the chosen form of treatment.

Preservative treatment

Glue laminated products treated with appropriate preservatives either before or after gluing have very high resistance to decay – for example a bridge made from CCA-treated, glue laminated New Zealand pine has given good service since 1961. Preservative treatment of lumber after the gluing operation is commonly undertaken, particularly when using LOSP systems.

Wood preparation

Standard practices for gluing softwoods should be observed when gluing New Zealand pine. Its high permeability aids curing by allowing solvents to move out of the glueline. However, the wood will absorb moisture very quickly when dry.

New lamination &

finger-jointing technologies

are increasing the use of

New Zealand pine in a wide

range of products – from

small mouldings to huge

engineered beams.

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This is different from the hardwood species that many manufacturers are more familiar with. It is important that glue mixes are not too low in viscosity, otherwise the glue may migrate away from the joint. Likewise, standing times between applying the glue and pressing for cure should be shorter for New Zealand pine.

There are no known chemical problems gluing New Zealand pine because it has a low extractives content. With most adhesives, a wood moisture content of 10-16% is acceptable. For products that are to be radio frequency cured, moisture content must not exceed 15%. Care should be taken to ensure that the glued product moisture content is comparable with the equilibrium moisture content where the product is to be used.

The temperature of the wood must not be too low while gluing as some adhesives can be de-activated by cold, while others will not cure rapidly enough. Surface preparation by planing is the most effective method of obtaining a clean, flat surface for gluing. Due to surface de-activation with time, surfacing should be carried out as close to gluing as possible. 24 hours is considered a maximum time for preservative treated lumber and 72 hours for untreated lumber.

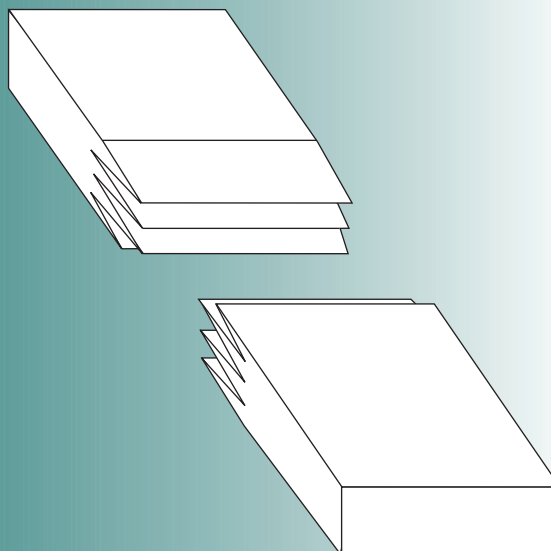
FINGER-JOINTING

New Zealand pine compares favourably with other softwood species for producing fingerjointed products. It machines well, producing smooth, clean cuts with a minimum of crushing or splintering at the cut surface or face. High production rates can be achieved and wear on the machine cutter knives is low. Machining quality and the uniform colour have led to its increasing acceptance for finger-jointing.

PRODUCTS INCORPORATING FINGER-JOINTED TIMBER

Structural uses	Appearance uses
Laminated beams	Door & window components
Wooden I beams	Door cores
Trusses	Interior trim, mouldings
Ladder stock	Exterior trim, fascia & siding
Decking	Flooring
Wall studs & dimensional lumber	Furniture components
Posts	Edge-glued panels
	Picture frames
	Table tops
	Banisters, stair treads & rails

EXAMPLE OF A HORIZONTAL FINGER-JOINT



Product types

Finger-jointed products supply two main market segments.

Structural wood products are produced with the joints designed to have high tensile strengths. Finger-jointing provides a greater degree of stability than single, large dimension lumber pieces which can in certain circumstances be prone to distortion. The structural joints for New Zealand pine use finger lengths of 10mm through to 25mm, though shorter finger lengths of 10mm are preferred. Adhesives used in structural jointing such as phenol resorcinol and melamine urea-based glues must meet strict exterior and exposure tests. New Zealand finger-jointed pine meets the requirements of New Zealand, Australian, Japanese, US and British structural testing standards. Extensive qualification to recognised national standards and in-house quality control tests are conducted by finger-joint manufacturers to verify the on-going strength and reliability of the timber joints.

Finger-jointed lumber is used for a wide range of products where appearance is important. For this end use the 4mm “micro joint” is offered by New Zealand manufacturers for Australasian markets as it is easily jointed, it provides a high quality finish and results in higher timber yields. When clear adhesives are used, unblemished lengths of fingerjointed timber can be produced for high value end uses.

Processing types

New Zealand pine can be jointed using either the face-to-face (vertical or European joint) or the edge-to-edge (horizontal or North American joint) machine types.

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The horizontal joint, where the fingers are oriented so that they can be seen on the edge or side of the board, are generally preferred in the US for moulding and millwork operations, and the vertically milled joint for structural applications.

Innovative technologies

In 1995 a new process was developed in New Zealand, allowing lumber to be finger-jointed before drying. This leads to significant savings to manufacturers through reduced processing costs and increased kiln drying efficiencies. Sawmill yields can be improved by recovering short, unseasoned lengths of sawn wood which would otherwise be chipped or wasted. In addition to producing a high quality, high strength joint, the new process produces a product that can be handled almost immediately (5 minutes) after jointing compared with up to 24 hours with conventional systems.

LAMINATING

The ease of gluing New Zealand pine has helped open many market opportunities for glue laminated products.

Product types

Structural uses: New Zealand pine has been used in structural building applications for nearly four decades in New Zealand and Australia. It has demonstrated excellent performance in service. Laminated products are finding increasing acceptance in markets such as Japan and Hong Kong. New Zealand-designed and fabricated wood structures have been erected in Africa, Hong Kong, Spain and throughout the Pacific. (see also the section on Construction.)

Edge glued panels: More rapid production techniques, such as clamp carriers and RF presses, are commonly used to produce high quality edge glued panels. By selecting the correct adhesive the resulting product is light coloured with colourless gluelines. The panels are used in products ranging from fine furniture to intricately routed decorative panels. The light colour and product quality have helped secure markets in Japan and Korea, as well as local use.

Face glued products: The successful face laminating of New Zealand Pine to produce posts, squares, rails and many other interior fittings has resulted in increased volumes being used in traditional Asian homes. Most of these products are non-structural and used mainly for decorative purposes. It is well suited for this application with its light colour and ease of gluing.

Laminated New Zealand pine is moulded and used as hand rails in both interior and exterior applications.

Processing types

Successful gluing depends on the full control of each variable in the process. Variables such as moisture content, climatic conditions, mix formulation, adhesive spread, standing times and method of curing (ambient

temperature, hot press or radio frequency cure) are specific to each glue type and often specific to individual manufacturing operations. Minimising the time taken between surfacing and gluing can be very important for some adhesive systems.

Fillers such as nut shell flours and extenders such as wheat flour can be used with advice from glue suppliers to control mix viscosity and moisture flow during cure. Glue line pressure during curing of a joint in solid New Zealand pine should be 700 kPa.

The press system to be used will depend largely on the adhesive and its nature of cure under ambient or accelerated conditions.

For a specific product, careful trials and consultation with an adhesive supplier should establish the base variables. On-going quality control is then needed to ensure that good bonds continue to be made.

Glued and laminated timber products with high strength, durability and quality finish can be obtained by selecting the correct adhesive type and preservative treatment for the desired end use.

Wide span laminated beams

