



# Wood products & processing solutions

Specialist equipment and capability to ensure the place of wood in future markets.



## Wood-based products for every purpose

Wood products compete in a diverse and demanding market. These products, produced from planted forests, represent a renewable, energy-efficient and environmentally friendly option for consumers.

To maintain a competitive edge, industry needs to reduce processing costs, promote new applications such as multi-residential and light commercial construction, and expand the natural appeal of wood through better stability, durability and appearance.

Scion helps manufacturers respond to market opportunities through specialised research and development.

## Research across the value chain

Scion aims to maximise the value of products obtained from trees. Our collaborative research and development focuses on improving recovery of targeted products from sawing and drying to remanufacturing. Scion works alongside the wood processing and products industries to improve grade recovery, productivity, energy efficiency and trade access to meet the needs of future markets.

As an integrated research organisation that spans the entire value chain, Scion provides a feedback loop from the wood processing and forest growing sectors to ensure trees are produced with appropriate wood quality characteristics. Our expertise extends beyond radiata pine to include other forestry species.

Scion's capabilities include the following key areas:

- **Material knowledge.** We are working with wood processors to maximise grade recovery through identifying which wood is most suitable for specific end products. This knowledge leads to improved systems for segregating the resource both at the log yard and at the mill.
- **Timber engineering.** We offer engineering services for researching the use of timber products and non-wood products in structural and other engineered applications. This research underpins building standards and helps ensure market access.
- **Wood drying.** Wood drying plays a critical role in generating wealth from the forestry sector and transferring these advantages to industry. Scion leads the world in optimising the drying process for softwood timber from planted forests.
- **Wood protection.** A major challenge for plantation-grown softwoods and hardwoods is to ensure durability in exposed applications. Scion specialises in developing chemical and non-chemical wood protection treatments that are environmentally friendly and have minimal impact at the end-of-life.
- **Wood modification.** We are developing new technologies to improve the durability, appearance and stability of wood. In addition, wood can be modified in ways that make it more water repellent and fire resistant.
- **Engineered wood products (EWPs).** Scion has a long history of research collaboration with wood composites manufacturers focused on tailoring processes and products to meet changing consumer demands. By cutting and recombining wood in various configurations, improved

properties can be 'engineered' into these wood products. Scion has the capability to make, test and work with clients to optimise a wide range of engineered wood products such as laminated posts and beams, fingerjointed timber, CLT, plywood, LVL, particleboard, MDF and others. The adhesive used is critical to EWP performance, processing requirements and cost structure. Scion has developed a bioadhesive system (Ligate™) and is well set up to test and apply these for existing and experimental EWP's.



## Research to create higher margins from radiata pine

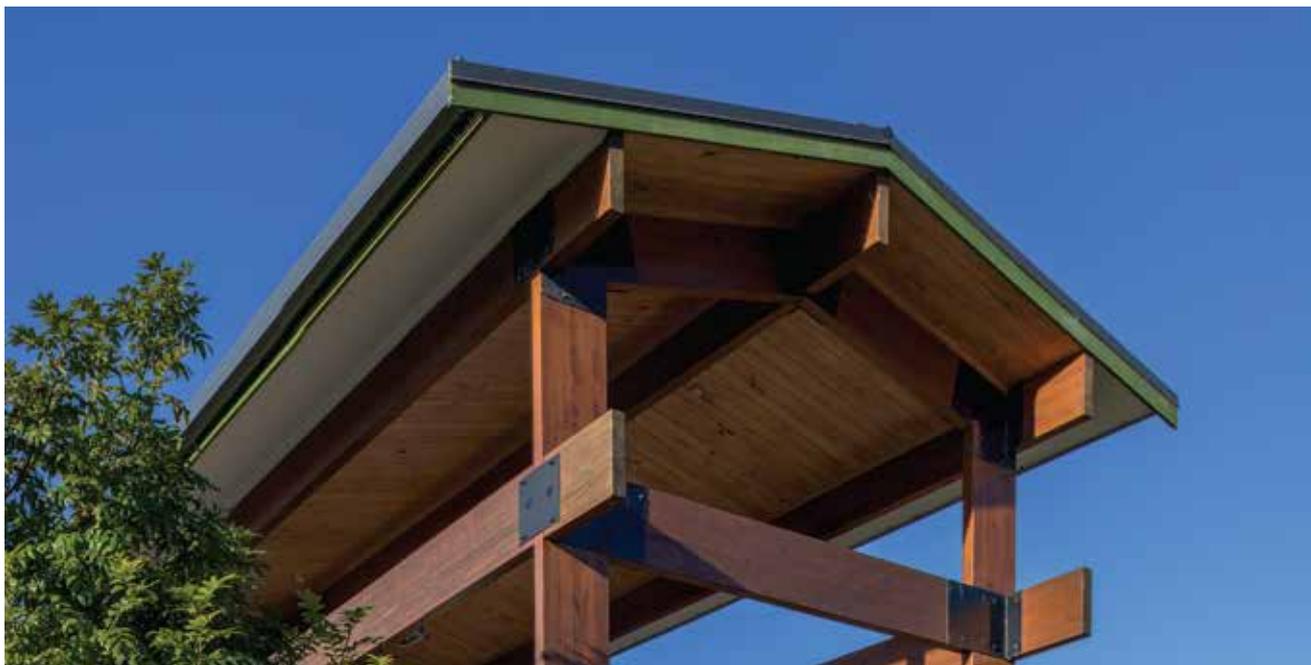
Removing water from wood cells enables the further modification of wood. Scion's dewatering technology is laying the foundation for the production of high-value, bespoke wood products from radiata pine. This could allow radiata pine to perform and sell at prices similar to high value hardwoods.

The dewatering technology uses supercritical CO<sub>2</sub> extraction, enabling further modification to a range of exacting stability, hardness, colour and durability requirements.

Using CT and MRI scanners, scientists have also been able to gain a clearer picture of comparative moisture distribution patterns inside both dewatered and conventional kiln dried wood. These in-depth studies show the dewatering process has no negative impacts on the final wood quality.

The liquid extracted during this process contains a range of naturally occurring chemicals that can be used in industrial processes (in some cases displacing petroleum-based chemicals), pharmaceuticals and nutraceuticals.

The dewatering research underpins the development of new wood products and new approaches to wood drying and modification.



## Case studies:

### Building a more sustainable environment

Urban equilibrium is a strategy to address climate change by using timber-based building materials that sequester and store carbon, and help reduce greenhouse gas (GHG) emissions. This strategy allows for future urban development to be considered as a resource to mitigate emissions.

Using Auckland as an example, a Scion study evaluated the environmental benefits of using solid wood technologies and engineered wood products such as cross-laminated timber in construction. Comparing the city council's planned GHG emission mitigation rate with what could be achieved using urban equilibrium development principles, the study found that the council's emissions reduction target could be achieved 25% more quickly.

Using massive timber technologies also provided other benefits. For example, substituting building materials could reduce manufacturing emissions by 38 to 65%, and prefabrication would reduce construction emissions by up to 13%. Additional emissions savings would be made at end-of-life by landfilling the timber waste or using it as a substitute for fossil fuels to generate energy.

### Turning up the heat

Heating wood in that absence of oxygen (thermal modification) changes its appearance, mechanical and durability properties. The heating process causes permanent physical changes that prevent the wood cell walls and interiors from absorbing and holding water.

Working with a client, Scion has quantified the changes in mechanical and fastening properties of a modified wood

product, and compared them with the structural building code. Long term durability trials have also been established to determine its hazard class rating and thus which applications thermally treated radiata is suited for. The technology is also being applied to timber from other plantation-grown trees, and native trees.

### Bio-based wood preservatives

Some existing wood protection chemicals are now unacceptable to many consumers and their use is restricted in certain export markets. Scion is working to identify naturally-occurring compounds that can protect wood against decay. From these compounds, we can develop bioactive wood preservatives to achieve H3 hazard protection for wood used in window and exterior door joinery, cladding, decking and indoor/outdoor furniture.

Scion researchers have screened over 100 potential wood treatment substances, including a selection of essential oils and extracts from mānuka, kānuka and eucalypt. Two of these compounds have been fixed in wood so they do not leach out when exposed to water, providing resistance to wood decay. These preservatives will help New Zealand's wood exporters meet global demand for environmentally friendly high-value building products.

### Potential for cross laminated timber

Cross laminated timber (CLT) is a structural product suitable for loadbearing construction use in multi-storey buildings. Although more widely used overseas, it has applications in New Zealand and also opens up export markets. Scion studies investigating the potential for CLT in New Zealand found demand is growing and that it is most cost competitive in non-residential building construction.

## We provide

- **Product development services** including material and process analysis, troubleshooting and making prototypes.
- **Testing services** ensuring compliance with regulatory and non-regulatory standards, manufacturers' specifications, preservation standards, customer specifications, and codes of practice.
- **Product design capability** through partnerships with universities and design companies.
- **Networks.** Our national and international partners can help bridge gaps between ideas, research and technologies and commercial needs.
- **Funding opportunities.** Working with industry partners to pursue funding for research and development.
- **IP expertise.** Offering specialised legal advice to protect intellectual property.
- **Multi-disciplinary research teams** assembling the full range of skills needed for any given project.
- **Tailored relationships** to meet individual customer needs, including one-on-one confidential research, joint development partnerships and strategic multiparty alliances.



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## About Scion

Scion is the Crown research institute that specialises in research, science and technology development for forestry, wood and wood-derived materials, and other bio-material sectors.

Scion's purpose is to create economic value across the entire forestry value chain, and contribute to beneficial environmental and social outcomes for New Zealand.



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**Prosperity from trees** *Mai i te ngahere oranga*