Fact Sheet

1

Wood Products - sawn to engineered: a myriad of choices and applications

Forte – Australia's first CLT building constructed by Lend Lease

With such a range of wood products on offer the future for designing and building with wood has never been so exciting.

Wood – an, organic, renewable and naturally beautiful material is valued by all, but prized by designers, builders, craftsmen, and artisans.

Responsibly grown and managed wood is our only large scale renewable building material and arguably the most environmentally friendly.

Wood is valued by designers in a range of fields for its practical properties; versatility, flexibility, workability, its high strength to weight ratio and thermal bridging performance.

Wood also offers healthy living benefits, a warm, tactile nature and an inherent beauty.

Where does our wood come from?

Australia has 124.7 million hectares of forest covering about 16% of the continent. This represents about 3 per cent of the world's forest area on 5 per cent of the world's land area.

Australia's forests are classified nationally into three categories: 'native forest', 'industrial plantations' and 'other forest'.

- Australia's 'native forest' category is dominated by eucalypts (74% of the total forest area); - around 8% is 'multiple-use' forest of which around 1% per year is harvested, and regrown, for timber production generally for sawn structural and appearance products and pulp logs for high quality paper
- About half Australia's 'industrial plantation' area is exotic softwood species (predominantly radiata pine for structural products), the other half is mostly native hardwood species (predominantly eucalypts for pulp and paper)
- The 'other forest' category comprises a small area of mostly non-industrial plantations and planted forests of various types

(Source: Australia's Forest at a Glance 2014, ABARES)

Australia also imports over $4 billion of wood products annually.

What products are available?

Today there are a wide range of sawn and engineered wood products used in the building and construction sector, these include:

- Sawn softwoods (MGP-grades)
- Sawn hardwoods (F-grades & appearance grades)
- Hardboard - Masonite
- Oriented strand board (OSB)
- Particleboard
- Plywood and Formply
- Glued laminated timber (Glulam)
- Laminated veneer lumber (LVL)
- I-beams
- Plywood box beams
- Cross laminated timber (CLT)

WoodSolutions Facts Sheets contain information about all the above products.

New wood systems – new market opportunities

Traditionally, the residential sector has been the major building market for timber products, particularly sawn timber. However recent global advances in engineered wood products and engineered wood systems have seen an increase in the use of timber in to mid and high rise apartment construction and commercial buildings.

Australia's tallest modern timber building, Lend Lease's Forte apartments in Melbourne, completed in 2012 is ten storeys, 32m high and constructed predominately of CLT.

Mid-rise timber structures up to around 25m high constructed out of CLT or lightweight timber framing combined with fire and sound rated plasterboard are becoming more popular for multi-residential apartment blocks or commercial buildings.

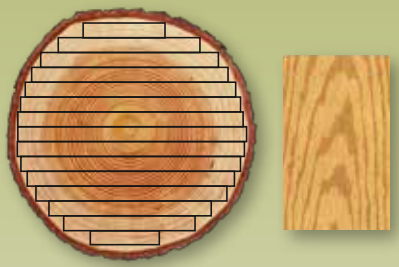
With such a range of wood products on offer the future for designing and building with wood has never been so exciting.

For more information visit woodsolutions.com.au

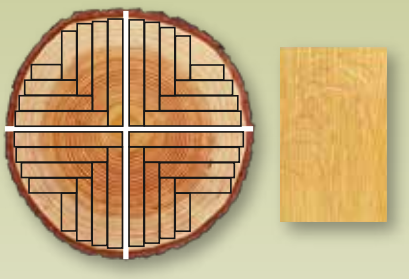
Fact Sheet

2

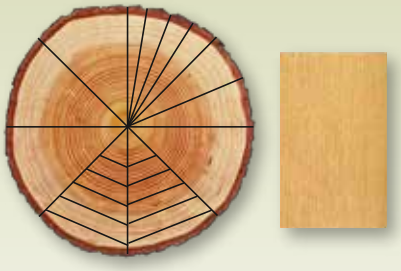
Timber processing – back, quarter or radial sawn; different looks for different applications



Backsawn



Quarter Sawn



Radial Sawn

"There are a number of ways that round logs can be sawn to maximise recovery and minimise waste and also to provide a desired look or grade."

Taking naturally variable round logs and turning them in to the multitude of beautiful and useful timber products people desire and use takes, experience, knowledge, skill, innovation - and passion!

There are a several ways round logs can be sawn to maximise recovery and minimise waste while also providing a desired look or grade. The three main options are to: backsaw, quartersaw or radial saw; each method delivers a different recovery and products of different stability and grain pattern - a key attribute for timber's selection in appearance grade applications.

Sawing Techniques

Backsawing allows wider boards to be cut, and more of the log to be used. It also gives variable and interesting grain patterns valued by appearance product manufacturers. However, backsawn boards are sometimes prone to higher shrinkage and cupping.

Quartersawing provides a more stable board, however by its nature smaller boards are produced and the grain patterns tend to be more straight and regular.

Radial Sawn Timber uses a different approach that works with the biology of a tree and is based on the principle of cutting logs into wedge-shaped pieces - much like a cake is cut. As a result, higher recovery rates are obtained, particularly from young lower quality logs; up to 40% to 80% of log volume compared to the 30% - 50% from conventional sawing techniques. Radially sawn boards do not distort as much as they dry and they have a distinctive appearance, making them a popular choice for a range of applications, from fencing and cladding to decking, skirting and joinery.

Moisture Content

Structural timber can be either 'unseasoned' (also called "green") with a moisture content greater than 15%; or 'seasoned' (also called kiln-dried (KD)) with a moisture content average between 10% and 15%.

Drying timber increases its strength, stiffness, stability, and capacity to hold fasteners.

Appearance timber is all seasoned. The moisture content varies depending on application but generally:

- Interior: not more than 14% and not less than 9%
- Exterior: not more than 18% and not less than 10%

Timber Grading

Sawn structural timber can be either graded visually, mechanically or proof graded. Hardwoods are traditionally visually graded to the F-grade system (i.e. F8, F17, F22, F27), while softwoods are predominately machine graded and use the MGP quality system (MGP10, MGP12, MGP15).

Appearance product grades for softwood include; clear, appearance, select, standard or utility. The hardwood products grades are; select, medium feature and high feature depending on the amount of natural characteristics (gum vein, knots, squiggly worm pin-hole, etc.) in the wood

Low Embodied Impacts

From an environmental perspective timber processing requires very little energy for production. Timber products have a very low embodied energy compared to alternative building materials.

Energy for drying timber often comes from, or is supplemented by, burning sawdust and off-cuts produced during the milling process.

Timber products are also greenhouse positive in that they sequester CO_2 as carbon for the life of the product. Timber is also renewable, reusable, recyclable and biodegradable.

For more in information on timber processing, drying and grading visit woodsolutions.com.au

Fact Sheet

3

Australian hardwood - strength and beauty, a proven performer structurally or aesthetically

Whether it's a high strength structural or a classically aesthetically beautiful application is desired – an Australian hardwood product will definitely fit the bill.

Renewable Australian hardwood provides a tried and tested resource, highly valued in a wide range of structural and appearance grade applications.

There are many good reasons for using Australian hardwoods: they are among the strongest, most durable, versatile, robust and beautiful hardwood timbers in the world, and with such a wide range of species to chose from, there is plenty on offer.

Sourced from both responsibly managed native forests and plantations, Australian structural hardwoods are used extensively throughout the building industry in a wide range of structural and appearance applications.

Structurally, unseasoned wood is still used in many regional on-site framing applications including floor bearers and joists, roof rafters and ceiling joists. Seasoned hardwoods are used nearly everywhere, from general framing, large span floor joists, high strength structural beams and wall lintels, truss tension members and girder trusses, to stair stringers and treads or exposed beams, multi-storey residential timber framed construction (MRTFC) and in bridges and wharves.

Australian structural hardwoods come in a variety of species, grades and sizes. Unseasoned F8, or seasoned F17 and F27 product is widely available with typical seasoned sizes being 35 or 45mm in breadth, and depths of 70, 90, 120, 140, 190, 240 and 290mm. Lengths up to 5.4 are generally available in 0.3m increments. Seasoned product is often also glue laminated to make longer and deeper sections (Glulam).

In the words of Vince Hurley from Australian Sustainable Hardwoods, structural hardwoods are "strong, stable, straight and reliable - everything you want from a structural timber. Not only are Australian hardwoods one of the most versatile and durable structural materials, they are readily available Australia-wide and highly cost-effective, making them a sound choice for any building project".

Showcasing the beauty

Australian Hardwoods are also prized in appearance applications due to their natural beauty. Hardwood flooring, linings, windows, doors, cabinetry, joinery and furniture are specified widely by designers looking to showcase the natural and tactile nature of timber. Externally, durable and treated hardwood products are used extensively as cladding, decking, screens and landscaping materials.

Sustainable, renewable and recyclable

Like all timber, structural hardwoods have a low embodied energy, meaning very little energy is consumed in its conversion from log to timber. At the same time, wood locks in carbon as it is growing and once it is harvested, the timber becomes a carbon store for the lifetime of the product, which in the case of structural hardwood, is a very long time.

An often-overlooked advantage of structural hardwood is that it can be recycled easily, again with little embodied energy compared to other materials, and re-used in a range of innovative ways. Increasingly, architects and designers are factoring recycled hardwood timbers into their buildings and products, with all the elements of historical value, high aesthetic quality and structural strength that structural hardwood brings with it.

Building a better future

Structural hardwood is a product with a history of proven performance and consumer satisfaction. State and federal governments and the timber industry continue to invest heavily in the sustainable management of this vital and versatile native Australian resource.

For information on suppliers visit woodsolutions.com.au

Fact Sheet

4

Structural softwood timber - a reliable and versatile construction material

Structural Softwood is the most cost-effective, environmentally beneficial building material for house framing. Its ease of cutting and connection, as well as compatibility with other common housing materials, makes it ideal for this use.

Structural softwood ticks all the boxes when it comes to strength, ease-of-use, and cost-effectiveness, plus it is renewable, responsibly sourced and has a low carbon footprint - what more could you ask for?

Structural softwood is a readily available, easy to use and versatile timber with all the environmental benefits that go along with using wood as a construction material.

Predominantly produced from renewable pine plantations, structural softwood is an economical and reliable material that is used in both residential and commercial building framing, for studs, plates, joists, bearers, lintels, rafters, ceiling joists, roof beams and trusses amongst others. Structural softwood can also be used in the production of engineered and composite wood products, such as Glulam and I-Beams; as well as exterior applications when appropriately treated.

Geoff Stringer from Hyne Timber notes that, "Structural softwood is the most cost-effective, environmentally beneficial building material for house framing. Its ease of cutting and connection, as well as compatibility with other common housing materials, makes it ideal for this use."

Available predominately in three grades, MGP10, MGP12 and MGP15, structural softwood is thoroughly quality controlled to ensure that each piece of timber meets the specific design properties and characteristics for its designated grade. Structural softwood is supplied at a moisture content not exceeding 15 percent and comes in a wide range of sizes: typical breadths being 35 and 45mm and depths including: 70, 90, 120, 140, 190, 240*, and 290*mm (*available on order) with lengths up to approx 6.0m in 0.3m increments. Structural softwood can be easily altered on-site, making it one of the most adaptable construction materials in existence.

Lightweight, durable and cost-effective

Structural softwood timber is the preferred material for residential and commercial frame construction around Australia for a variety of reasons.

The most obvious are that it is widely available, easy to cut and fix and has a high strength to weight ratio, meaning it is light and strong; making it easy to transport and to handle and assemble on-site.

Using structural softwood, a building's components are simple and safe to erect, and far cheaper to deconstruct or reuse at the end of the building's useful life.

Structural softwood can be chemically treated to make it resistant to decay, insect and fungal attack, increasing its longevity and broadening its application.

All of this adds up to a building material with great credentials and the potential to be used more widely in industrial, commercial and multi-dwelling residential construction.

Adding to wood's low embodied energy

All wood has the natural advantage of renewability, in that it is made up of the most plentiful elements on earth - carbon, oxygen and hydrogen, and timber products, such as structural softwood timber, from sustainable environmentally responsible plantations are endlessly renewable.

One of the best things about timber in general, and structural softwood in this case, is that it has a low embodied energy, meaning it uses less energy in production than other building materials. Add to wood's low embodied energy the fact that it is a carbon store, capturing carbon from the atmosphere and storing it for the life of the timber product.

These positive environmental properties - low embodied energy and carbon storage - along with all the many other construction advantages of structural softwood, make it an obvious choice for architects, designers and builders who are committed to a sustainable built environment.

For information on suppliers and design assistance visit woodsolutions.com.au

Fact Sheet

5

Treated pine - building for the long term

Prepared with assistance from The Timber Preservers Association of Australia, www.tpaa.com.au.

Treating wood to improve its longevity or reduce maintenance is almost as old as the use of wood itself. Today, pine treated by one of a range of preservative processes is the material of choice for a wide range of internal and external applications.

The advantages of treated pine

Treated pine delivers a range of advantages, including;

- Increased service life – protects against decay, insect attack and other hazardous conditions
- Versatility - can be used outdoors, indoors, above ground or underground and in direct contact with fresh or salt water
- Design flexibility - to economically overcome difficult site situations
- A choice of finishes
- Cost efficiency

Applications

Treated pine is a versatile material with a wide range of load-bearing structural and other applications including:

- Stumps, sub-floor timbers
- Framing and roofing
- Wall linings, cladding, fascia
- Timber decking, pool surrounds
- Pergolas
- Fencing, landscaping, playgrounds
- Poles and posts, hay sheds
- Bridges, railings, marinas, piers
- Oyster farms, vineyards
- Railway sleepers, truck floors
- Water cooling towers

Type of treatments include

Fixed water-borne preservatives (ACQ, copper azole, CCA), which will not leach out even when in contact with running water, are most suitable for domestic buildings, posts, poles, landscaping fencing, cooling towers, decking, cladding, etc.

Light organic solvent preservatives are designed for timbers not in contact with the ground. They should be used for factory-assembled joinery, e.g. window frames, and for building elevated decking, pergolas and fascias. They are also used to make garden furniture.

Creosote, modified creosote, and other oil-type preservatives are most suited for heavy duty exterior work, such as railway sleepers, bridge decking, transmission poles, marine piles and fencing.

Treatment processes include

Vacuum/Pressure Impregnation: Use water borne or oil preservatives to achieve deep protection for piles, poles, fencing, building timbers and many types of wood used in domestic and industrial construction.

Double Vacuum/Immersion: e.g. LOSP, is used to protect building timbers not in ground contact, e.g. cladding, decking and fabricated joinery components.

Dip/Spray: Typically use boron compounds that are applied to protect timber against insect attack in indoor or sheltered situations above ground. They are popular treatments for softwood house framing.

Treatment levels

Treatment hazard 'H' levels are dependent on application, exposure (inside, outside, in-ground, above-ground use), and biological hazard protection (insects or decay). Timber can be treated from an H1 to an H6 level depending on the above factors.

Standards

The main timber preservation standard is:

AS/NZS 1604 series: Specification for preservative treatment (5 parts). The use of products that meet this Standard is reccommended.

Properties

Treated pine has the same structural properties as untreated pine. Durability ratings are increased, however these vary according to treatment. Suppliers will provide details of treatments and their suitability for specific applications.

Finishes

Treated pine can be left to weather naturally, however for the best performance, including long service life, it should have a finish applied. Treated timber can be painted or stained just like untreated timber. If paint or stain is not used for the final finish, a water repellent is recommended.

For information on suppliers and design assistance visit woodsolutions.com.au

Fact Sheet

6

Masonite hardboard - innovation is the mother of invention

Image courtesy of Australian Hardboards

Playing a central part in the history of recycling timber waste into new and improved timber products, Masonite Hardboard continues to hold its own as an economical, versatile and sustainable building material.

With a lengthy history, Masonite hardboard has developed into a material that can't be ignored as a sustainable source of strong, weatherproof panelling for extensive building applications.

Arguably the original environmentally responsible timber product, the invention of Masonite hardboard is often credited to William Mason in the 1920s, an inventor from Mississippi, who wanted to find a use for the timber waste that was piling up on sawmill floors. Mason worked on his ideas for recycling sawdust and woodchips using a nineteenth-century steam letterpress, with the intention of producing insulation board. One day in 1924 Mason left the steam on while he went to lunch, returning to find that the overdose of steam had produced a tough sheet of hardboard.

The following year Mason established the Mason Fibre Company and manufactured the hardboard for general use in the USA. Twenty-five years earlier in the UK, in 1898, Daniel Manson Sutherland had patented what was known as 'millboard'; even earlier still a form of hardboard had been manufactured in parts of Europe.

Wherever it originated, what we now know as Masonite hardboard was one of the first of the mass produced engineered wood products. Its applications have expanded over the years with improvements in strength and resistance to weathering.

The many faces of Masonite hardboard

The high strength of Masonite hardboard, compared to the other fibreboards, is due to the inter-fibre bonding that occurs during the heating process because of the presence of lignin (a natural resin) in the raw wood material. These days, synthetic resins are added to some hardboards to improve their properties and increase the ways they can be used.

In Australia, there are currently four types of hardboard, each developed with specific degrees of density to meet a range of design and construction needs.

Standard hardboard is the ideal general purpose building board for a host of interior applications, from furniture to wall panels, cabinetry and beyond. Available in a range of sizes and able to be shaped or bent without splitting, splintering or cracking, standard hardboard offers excellent machining and working properties. A reduced density version, called standard hardboard type RD, has been specifically developed for use as a wall lining and floor underlay.

Tempered hardboard is a tough, high-density hardboard with superior strength and resistance to impact and water absorption. Designed to withstand the effects of high humidity or occasional wetting, or for use in applications where increased strength is required, tempered hardboard can be used as stage floor covering, wet area wall linings, exterior doors, bench surfaces, boat building and signage, to name a few applications.

Exterior hardboard is treated during the manufacturing process to ensure high resistance to weathering and long-term performance as an exterior wall cladding, and similar applications. A recent innovation in this area is ***Braceboard***, a high performance material designed for cavity bracing external wall frames in brick veneer construction, it is available in either 4.8mm or 6.4mm thick sheets. Braceboard is specially formulated to withstand atmospheric conditions, making it an ideal building material for high wind or cyclone prone areas, such as northern Australia.

Manufactured in Australia from sawmill waste and forest thinnings, Masonite hardboard is a sustainable, economical and durable building material, with the availability of different types adding versatility to the list. Manufacturers and suppliers can provide more information on the many applications of Masonite hardboard for the design, architecture and building industry.

For more information on Masonite hardboard and other timber products visit woodsolutions.com.au

Fact Sheet

7

Reorient your structural thinking with OSB

OSB has similar properties to plywood, yet is generally more cost-effective to manufacture, it can also be similar to, but stronger than particleboard.

Successfully manufactured and used in North America and Europe for decades, oriented strand board (OSB) is a relatively recent entrant to the Australian market.

Composition

An engineered wood panel product, OSB is produced by bonding thin strands of wood with adhesive. A wax may be added to the resin to increase moisture resistance if required. The strands are generally oriented inline with the panel length in the outer layers and across it in the inner layers to provide panel dimensional stability and to optimise structural performance. Once in place, the strands form a continuous mat that is then heat and pressure cured to create a uniform finish.

Wood fibre used in OSB includes softwoods (often pine or spruce) and some hardwoods.

Appearance

OSB usually has a variegated look, ranging from light yellow to medium or dark brown, depending on the species, resins and manufacturing process parameters. Typically OSB uses large wood strands that are easily visible. The orientation of the strands may be hard to determine in smaller pieces.

Although usually used in hidden structural applications, OSB may be painted or the distinctive appearance can be featured by sanding and clear finishing.

Properties

OSB has similar properties to plywood, yet is generally more cost-effective to manufacture, it can also be similar to, but stronger than particleboard.

Design properties for OSB are proprietary so it's best to consult the supplier for the relevant specifications. These can include grading, structural properties, bond classification and product application tables.

OSB is not currently produced in Australia.

Applications

OSB is a versatile material with extensive load-bearing structural applications including:

- Underlay
- Flooring
- Bracing walls and diaphragms
- Roof sheathing
- Internal panelling
- Stair treads and risers

OSB is also used for packaging, industrial hoardings and pallet tops.

Standards

There is no Australian Standard for OSB, the European Standard is BS EN 300: Oriented Strand Boards (OSB) – Definitions, classification and specifications.

BS EN300 defines four grades that relate to relative mechanical properties and moisture resistance. These are:

- OSB/1 - General purpose boards and boards for interior fitments (including furniture) for use in dry conditions.
- OSB/2 - Load-bearing boards for use in dry conditions.
- OSB/3 - Load-bearing boards for use in humid conditions
- OSB/4 - Heavy-duty load-bearing boards for use in humid conditions.

There are also OSB standards for product manufactured in other parts of the world such as the USA.

The advantages of engineered wood products

The popularity of engineered wood products (EWPs) is a result of their many advantages over other building materials.

Typically EWPs advantages include:

- Greater dimensional flexibility
- Improved structural design properties and performance
- Improved dimensional stability
- More efficient use of a valuable natural resource with less wastage

EWPs also have significant environmental advantages over building materials such as concrete and steel. Wood is a naturally renewable resource that has low embodied energy and also acts as a carbon store (up to 50% of the dry weight of wood is carbon).

For more information on OSB and other timber products visit woodsolutions.com.au

Fact Sheet

8

Floored for choice? Particleboard flooring has all the answers

Image courtesy of Carter Holt Harvey Woodproducts

Sustainable, cheap, easy to install, and readily available Australia-wide, there is every good reason to incorporate Particleboard Flooring into the design and construction of an array of building types.

Cost-effective, long lasting and easy to install; particleboard flooring is widely used in residential, commercial and industrial projects.

With cost and robustness being two most significant factors in what goes underfoot, it is not surprising that architects, engineers and designers choose particleboard flooring.

Well-established as a sub floor surface in the Australian home building industry, particleboard flooring is also used in larger projects, such as sporting and community halls, educational institutions, and light industrial and commercial areas.

Strong, hardwearing, and requiring very little time or effort to install, particleboard flooring is an ideal base for a range of floor coverings, including timber, vinyl, carpet, tiles, slate and parquet.

Particleboard is a wood panel product, made up of flakes of wood in a variety of sizes that are bonded together, under heat and pressure, with a high-strength resin.

The resin-enriched surface of the panels ensures that particleboard flooring can withstand exposure to the weather for up to three months, a huge plus given its use in platform construction, where the sub floor is built prior to the walls and roof being installed.

Particleboard flooring is tongue and grooved to ensure an easy and tight fit for adjoining panels. It is available in a series of thicknesses for specific flooring needs. Panels can be easily identified by a colour-coded wax (and tongue) around the edge: yellow/green indicating 19mm thick board, red/beige 22mm thick and blue 25mm thick product. Typical sheet sizes are 3600x900mm for 19 and 22mm board and 3600x600mm for 25mm board.

Whilst 19 and 22mm thick board is generally used in residential applications (at 450 and 600mm floor joist spacings respectively), 25mm thick is ideal for commercial, industrial and institutional buildings where heavier loads are the order of the day.

The benefits of particleboard flooring for architects, designers and builders are many, the fact that it is easy to install, requiring only the dry trades, is particularly important. This, of course, contributes to the overall cost-effectiveness of the installed product, as does the lightness of sub-floor construction and the subsequent reduction in the cost of foundations.

Also, by their nature timber sub-floors are more comfortable than concrete for people who are required to stand for long periods of time (e.g. doctors, nurses, teachers).

Particleboard flooring is available in Australia with a range of treatments that increase its dimensional stability and its resistance to moisture, fungus, termites and fire, adding to its versatility and durability for the building industry.

Unlike the particleboard used in furniture and cabinetry, particleboard flooring products incorporate a wax solution into the resin, meaning greater edge protection when the panels are cut.

Sustainable, cheap, easy to install

As far as environmental credentials go, particleboard flooring stands on its own as a flooring material. Like all timber products, particleboard flooring has low embodied energy, enhanced by the fact that it is manufactured almost entirely from recycled timber or timber waste. Particleboard flooring also has all the acoustic damping properties inherent in timber, and a low thermal capacity, making it an excellent choice in the design of buildings for passive heating and cooling.

Sustainable, cheap, easy to install, and readily available Australia-wide, there is every good reason to incorporate particleboard flooring into the design and construction of an array of building types

For information on suppliers visit woodsolutions.com.au

Fact Sheet

9

Structural Plywood - engineered for a myriad of panel applications

Project: Back Yard Pavilion
Architect: Sunny Wilder
Photographer: Andrew Wuttke

For those in the design and building industries, Structural Plywood represents a versatile, lightweight and efficient construction material.

Strength, durability, versatility and ease-of-use make structural plywood panels an ideal quality engineered material for any design or building project.

Plywood has the honour of being the oldest of the engineered wood products, with archaeologists finding traces of laminated wood in the tombs of the Egyptian pharaohs. Today plywood is one of the most widely used wood panel products available, utilised in a myriad of decorative and structural applications.

Structural plywood panels have all the properties that are synonymous with engineered wood - strength, durability, reliability - with the added characteristics of impact resistance, ease-of-use, and most importantly, stability when exposed to moisture and changes in temperature.

Superior strength and longer lasting

As the ancient Egyptians discovered, drying them, and then gluing them together with the grain of each layer oriented perpendicular to the previous layer, produces a wood panel with superior structural properties to products cut straight from the original log.

Structural plywood can be made from softwood or hardwood timber, and for applications where the panels are exposed to weather, it is treated with a preservative to ensure a long service life.

In the case of structural plywood, the glue used to bond the layers is a type A phenolic resin, making it resistant to both weather and stress over long periods of exposure (50+ years). At the same time, the types of veneer used contribute to the strength of the panels, with the cross-ply construction making structural plywood's shear capacity twice that of solid timber.

Plywood is available in a wide range of thicknesses, and several lengths and widths, however the standard plywood panel dimensions are: length: 2700, 2400 and 1800mm, and width: 1200mm. Other specific lengths are available for flooring and bracing applications. It is best to check what panel thicknesses and sizes are locally available before specifying the plywood in your project.

The veneer arrangement within structural plywood determines the section properties of the assembly. Specific plywood 'ID-codes' describe; the normal plywood thickness, the face veneer thickness multiplied by 10, and the number of plies in the assembly. For example, the ID code 17-24-7 describes a 17 mm thick plywood with face veneer thickness of 2.4 mm and seven veneer layers.

Structural plywood is available in a number of stress grades: F5, F8, F11, F14, F17, F22, and F27. The engineering properties of structural plywood are tabulated in both AS/NZS 2269 and AS 1720.1.

Five face veneer qualities are also available: appearance grades - A, S, B, and non-appearance grades C and D.

Cost effective & sustainable

For those in the design and building industries, structural plywood represents a highly versatile, lightweight and strong construction material, perfect for flooring, cladding, bracing, formwork and other panel applications. Its ability to be installed quickly with a minimum of tools, to cover large areas and to withstand high impact without damage, makes it an efficient and cost-effective building material.

As with all sustainable wood products, plywood is also a highly positive environmental choice compared to alternative materials; coming from a renewable resource that stores carbon and having manufacturing process low in embodied energy.

For more technical or application information for structural plywood (or other plywood types) visit www.ewp.asn.au

Fact Sheet

10

Formply - a revolution in formwork for residential and commercial construction

Image Courtesy of Carter Holt Harvey Woodproducts

Add ease-of-use to strength and stability and you have a construction material that can be utilised in buildings of any size, from DIY to large commercial projects.

Reduce, re-use, recycle - Formply meets all the criteria for a sustainable building material, with the added advantages of being waterproof, lightweight and easy to install.

The many benefits of using plywood products are well understood by designers and builders, with low cost, strength and sustainability at the top of the list.

Formwork plywood, or 'Formply' as it is known, is an integral material in the construction of multi-residential, industrial and commercial concrete buildings, offering a structurally superior, re-useable and economical alternative to traditional formwork materials. In fact, it is believed that the majority of all concrete formwork used in the Australian building industry today is Formply.

Strong, reliable and waterproof

Formply is structural plywood overlaid on both sides with a heavy-duty phenolic resin-impregnated film that is then fused into the surface veneer under heat and pressure. It is made up of either hardwood or softwood veneers, or a combination of both, and has all the properties of strength, durability and reliability that are synonymous with structural plywood.

Formply has the additional advantage of being highly waterproof, the overlay acting as a barrier between the wet curing concrete and the timber surface of the plywood. This resilient overlay also allows re-useability and the associated cost savings of being able to recycle formwork.

Formply's tough surface is also more resistant to abrasion from concrete aggregates than is raw wood, and the large sheet sizes with their consistent surface quality means the off-form concrete has an excellent architectural finish - smooth and ready for painting.

Formply comes in a range of stress grades and thicknesses including:

- F11 - 12 & 17mm
- F14 – 17mm
- F17 – 17mm
- F22 – 17 & 25mm
- F27 – 12, 17, 19 & 25mm

Available sheet sizes are: 1800x1200mm and 2400 x 1200mm.

Lightweight and easy-to-use

Formply manufactured in Australia meets the stringent load bearing and dimensional stability requirements for structural plywood, making it ideal for concrete construction work. Add ease-of-use to strength and stability and you have a construction material that can be used in buildings of any size, from DIY to large commercial projects.

Requiring nothing more than standard carpentry tools, Formply can be cut to exact shapes or bent to tight curves, making it an excellent material for innovative architectural and design projects. It is also relatively easy to dismantle, a big plus in terms of time and cost-effectiveness.

Some of Formply's more innovative construction applications include high-rise buildings, silos, the Sydney Opera House, freeways and power stations, to name a few.

Above all, the fact that Formply is so much lighter and easier to handle than other formwork materials makes it the perfect resource for tradespeople across the industry, reducing overheads and labour costs. When you add in that all structural plywood products manufactured in Australia are sourced from renewable and sustainable sources - there seems to be every good reason to use Formply in your construction projects.

For more technical or application information for Formply (or other plywood types) visit www.ewp.asn.au

Fact Sheet

11

Glued laminated timber (Glulam) - versatile, strong, beautiful and sustainable

Versatile, strong, beautiful and sustainable, Glulam provides structural capacity, visual appeal and environmental responsibility in the one product – a perfect choice in any building from a home to a large commercial project.

Beautiful to look at, comparable in strength to steel, versatile and easy to work with, glued laminated timber (Glulam) is a product of stature.

Originating in Germany in the early 1900's, Glulam is one of the oldest engineered wood products and one of the most resource-efficient.

Like many engineered wood products, Glulam has a high strength to weight ratio meaning it is strong but light, making it easy to transport and work with on-site. It has low variability in properties, it is available in almost any length (limited only by manufacturing, handling and transport requirements), and it has the additional element of a high aesthetic finish if needed.

Glulam is used widely in residential construction for high strength structural beams, such as: exposed roof support beams, lintels over wall openings, in-plane floor bearing beams, garage door opening beams, roof beams, roof truss members; and in large span commercial and industrial portal frame and post and beam columns and rafters.

The beauty of exposed Glulam makes it the perfect material for buildings where the structural framework is part of the overall aesthetic. This dual quality - beauty and strength - makes Glulam a timber product with limitless potential for innovative architecture, design and building projects.

Size, shape and length - it's up to you

Glulam consists of graded, kiln-dried laminations face bonded and finger-jointed together with adhesives. Elements can be manufactured to practically any length, size or shape; beams are often manufactured with a built in camber to accommodate dead load deflection or curved for aesthetic appeal.

A range of GL Grades are produced or imported depending on the different species of timbers used in manufacture: GL10 (cypress), GL13 (radiata pine, Oregon), GL17 (slash pine, merbau), GL18 (Tas oak, Vic ash), GL21 (spotted gum) – the GL descriptor refers to the element's modulus of elasticity (E) e.g. GL10 describes a Glulam member that has an E-value of 10GPa.

A wide range of depths are available in increments from 90mm to over 1000mm; and widths from 40mm to 135mm, with 65mm and 85mm being two commonly used. Lengths up to 18m are available in 0.3m increments from traditional suppliers and up to 27m in length from specialist manufacturers.

As a mass-timber material, Glulam also has an inherent fire resistance. As timber burns, a layer of charcoal forms enclosing a core of solid unaffected timber whose structural capacity remains intact. In general, it is significantly cheaper to increase the dimensions of Glulam slightly in order to provide the required fire rating if needed, than to enclose the member in fire resistant material.

Cost-effective, aesthetic and sustainable

It is universally accepted that an exposed Glulam structure adds warmth and beauty to a building. Glulam is commonly used as the finished product, whereas other structural building materials are generally enclosed or hidden. As a finished, in-place structural material, Glulam is cost competitive with structural steel. However, like all timber products, the benefits to the environment of using Glulam are significant - it stores carbon and reduces CO_2 emissions, it is naturally insulating, renewable and recyclable.

The Glulam sector is represented by the Glued Laminated Timber Association of Australia (GLTAA).

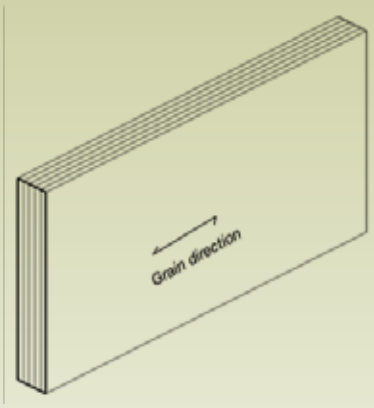
Further information on manufacturers and products visit the GLTAA website, gltaa.com.au or woodsolutions.com.au.

Fact Sheet

12

LVL - a high-strength engineered wood productwith an unlimited range of design and building applications

Finished exterior and interior during construction, AV Building, Alpine MDF Industries Pty Limited



The biggest advantage of LVL is the fact that it is manufactured continuously, meaning it is available in almost any length.

A versatile, sustainable and cost-effective modern engineered wood product, laminated veneer lumber (LVL) is a great choice for a wide range of residential and commercial building applications.

Laminated veneer lumber (LVL) is made from plantation-grown softwood veneers that are bonded together with a waterproof adhesive. Developed in the 1970s for the general market, LVL's popularity has grown in recent years, as its potential as a structural material has become more widely recognised. One of the biggest advantages of LVL is the fact that it is manufactured continuously in wide 1.2m sheets, meaning it can provide deep sections beams in long lengths, limited only by the ability to transport it.

Length, strength and durability

Through the process of laminating thin timber veneers together the strength of the product is virtually tripled compared to the parent material. LVL has structural properties greater than the individual veneers from which it is manufactured because the manufacturing process effectively carves up and distributes the weak points of a log, the knots. The maximum effect of a single defect in an LVL laminate is very small as the laminates are so thin compared with the thickness of the whole member. The properties of LVL show much less variation than those of sawn timber.

As LVL is normally used in a beam application, the grains of the veneers are all oriented in the same direction. The panels are manufactured under heat and pressure as sheets, or 'billets', usually 1.2 metres in width and in a variety of thicknesses depending on the manufacturer (usually up to 75 mm) and, of course, in any length, though lengths up to 12m are typical in 0.3m increments.

While 'off-the-shelf' LVL conforms to standard structural member sizes, special sizes can be ordered from the manufacturers.

Large sheets of LVL can be ripped or crosscut into curves and angles, increasing its potential uses for the Australian architecture, design and building industries.

The imagination is the only limit to LVL's applications. Andy McNaught of the Engineered Wood Products Association of Australia (EWPAA) says that LVL is widely used in "beams, lintels, truss chords and formwork because of its reliability, strength and section sizes". It is this combination of properties that makes LVL a product of great significance for the industry. Although LVL is generally used in structural applications, it can also be sanded and painted if exposed, increasing its applications as a design element.

The future of LVL

LVL is today being utilised widely in commercial applications, which have traditionally relied on steel and concrete, with the attendant impact on the environment of these materials. LVL, as with all sawn timber and engineered timber products, has a much lower impact on the environment compared to alternative materials. The embodied energy in production is far lower and trees take CO2 out of the atmosphere as they grow and the wood products from these trees store this carbon for the life of the product. This makes LVL an obvious choice for architects, designers and builders who want a sustainable and cost-effective alternative to traditional materials.

LVL is manufactured in a range of sizes by a number of companies. Span tables and product information is available from their respective web sites.

For information on suppliers visit woodsolutions.com.au

Fact Sheet

13

I-Beams - a high-strength, long-span composite timber beam with endless applications for the residential and commercial building industry

Images above courtesy of Carter Holt Harvey Woodproducts

I-Beams are the ideal product for floor joists, roof purlins and wall girts, with all the savings in cost and to the environment that using an engineered wood product implies.

The I-beam is a high-strength, low-cost and reliable engineered wood product with applications as a long-span beam for most residential and commercial building projects.

The advantages of using composite wood products in construction couldn't be clearer than with the I-beam, which can be used in a wide range of structural applications in both the residential and commercial building sectors.

The I-beam is composed of top and bottom flanges that are made of graded solid timber or laminated veneer lumber (LVL), they are separated by a vertical web of structural plywood, oriented strand board (OSB) or hardboard. These combinations create a structurally efficient, lightweight timber beam section.

The many advantages of I-Beams

Reliable, uniform and cheap, the I-beam is an excellent resource for an industry where ease-of-use, cost-effectiveness and performance are key product selection criteria.

While the I-beam has many uses, Rex Glencross-Grant, from the School of Environmental and Rural Science at the University of New England, points out that I-beams are ideal for floor joists in residential or commercial applications They are "lightweight, yet strong, making them easy to install and saving construction time, while at the same time providing floors that are more uniform, more rigid and that don't 'bounce'". That said, I-beams are equally applicable as rafters, purlins and wall girts, spanning distances up to 12 metres and with the additional advantage of allowing easy installation of services through the web, such as waste pipes or utilities.

While I-beams are not generally used for their appearance, largely due to the visibility of the glue lines on the surface, they have the potential to be used as exposed structural elements if they are coated with an opaque finish, again increasing their architectural and design applications.

Sustainable, flexible and cost-efficient

I-beams are manufactured from engineered wood products, meaning they are not only natural carbon stores but are approximately twice as efficient as solid wood in terms of optimisation of resources. This adds up to more sustainable building practices and huge savings to the industry in both the short and long-term.

According to Rex Glencross-Grant, I-beams have the potential to be used in ways that are yet to be fully explored, with their "greater design flexibility, including the ability to span further, to eliminate piers or floor bearers and load-bearing walls, providing a wide range of building design options".

I-beams are proprietary products and vary in dimensions depending on the manufacturer. Specific accurate product specifications and design guidelines should be sourced from I-beam manufacturers.

Typical depths are: 200, 240, 300, 360 and 400mm and lengths are available up to 15m.

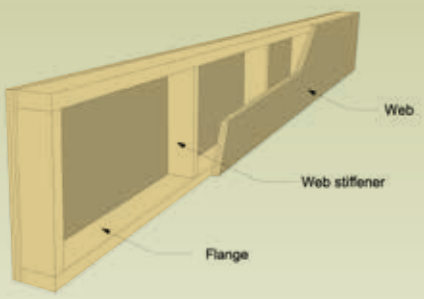
Note: Care should be taken if on-site product substitution occurs to ensure structural design performance criteria are met.

For further information on timber I-beams or suppliers visit the woodsolutions.com.au.

Fact Sheet

14

Plywood box beams: a flexible and strong solution – thinking outside the box



The fact that the beams can be prefabricated off-site, or constructed on-site with no need for a crane, props or welding, and that they are so easily transportable, adds to their appeal for the industry.

Flexible and lightweight, plywood box beams are a high-strength timber product that can be used in a vast range of residential, industrial and commercial design and building projects.

Plywood box beams are finally getting the recognition they deserve as a long span, high-strength timber product that can be used in almost any building context. They provide a versatile, flexible, strong and lightweight alternative to steel beams and other engineered wood products.

Simon Dorries, General Manager of the Engineered Wood Products Association of Australasia (EWPAA), says "the fact that the beams can be prefabricated off-site, or constructed on-site with no need for a crane, props or welding, and that they are so easily transportable, adds to their appeal for the industry".

Plywood box beams use plywood sheets on either side of the horizontal flanges, forming a box structure; deep beams can be manufactured up to 1200mm in depth. The top and bottom flanges are made from solid timber, LVL, or from Glulam for very large beams, and vertical stiffeners are provided for increased stability. The box shape of the beams means that they have a high torsional stiffness and resistance to buckling, making them perfect for use as long span portal frame rafters or floor beams; services can also be run through the inside of the beam, adding a cleaner finish to the overall look of a structure.

Structural engineer Tim Gibney who uses box beams regularly in his designs says: "you can also use walls, clad with plywood webs, to form and act as deep box beams to save space and avoid height restrictions". In one project Gibney clad an existing stud wall in plywood to create a box beam to provide open space under an existing first floor extension, and in another he designed walls at ground floor level so they could span between pile foundations without needing stumps or concrete footings. "The exterior walls were the only load bearing elements on the system", says Gibney.

Thinking outside the box

There is really no limit to the ways plywood box beams can be specified as structural members in the building industry. Andy McNaught of the EWPAA highlights the beams' "ability to span long distances and ease of transportation as a key to their potential for use in remote building projects. Similarly, the fact that most beams are customised on-site means that they are perfect for one-off projects, including the potential to be tapered, curved or pitched to suit a particular application, which opens up the possibilities for innovative architecture and design".

For large projects, such as warehouses, indoor sports venues or industrial buildings, plywood box beams provide a economical and versatile solution to the need for long span members, with the additional element of architectural freedom that their customisability allows.

Above all, as an engineered wood product plywood box beams not only represent huge savings in terms of labour, time and tools, they are carbon stores and sustainably sourced, so your next building or design project can contribute to a sustainable built environment.

Information on plywood box beam application and design is available from the EWPAA website. WoodSolutions also has available a technical design manual Plywood Box Beam Construction for Detached Housing. The guide provides information on design, fabrication and installation. It also includes span tables for a range of residential applications including lintels, bearers, ridge beams, strutting beams, hanging beams and counter beams. The design manual is available from woodsolutions.com.au.

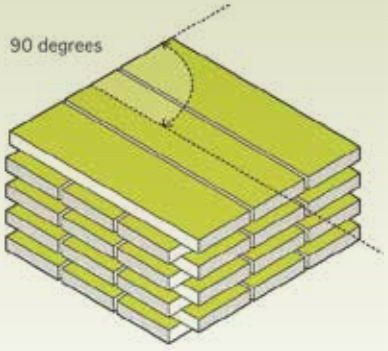
Fact Sheet

15

Cross laminated timber (CLT) - an engineered wood product of the future

Forte – Australia's first CLT building constructed by Lend Lease

CLT wall panel installation at the Forte project in Melbourne



Cross laminated timber (CLT) is an engineered wood product for the future, making the construction of entire mid to high rise buildings from timber a reality - an elegant solution for the building industry as it pursues more sustainable building practices.

First developed in Switzerland in the 1970s, CLT has evolved as one of the most exciting and innovative engineered wood products available. Its potential as a sustainable building material is rapidly being realised around the globe.

CLT is an extension of the technology that began with plywood, and the recognition that cross-laminating layers of wood, improves the inherent structural properties of the element in both directions. CLT comprises planks of timber 12 - 45 mm thick and 40 - 300 mm wide face glued together, each layer at 90 degrees to its neighbouring lamella; effectively 'jumbo plywood'.

CLT panels are typically

- 57 mm - 320 mm thick
- 3, 5, 7, or 8 layers depending on application
- 2.2 to 2.95m wide
- up to 11.9 m in length (dictated mainly by shipping and cartage requirements. Other sizes may be available.

Three grades of finish are typically available: Domestic Visual Quality (DVQ) highest possible quality, Industrial Visual Quality (IVQ), medium quality but still visual, or Non-Visual Quality (NVQ) for unexposed panels.

CLT can be used to form complete floors, walls, ceilings and roofs, amongst other building elements.

In combination with other engineered wood products, such as I-Beams, laminated veneer lumber (LVL) and structural plywood, CLT can be a crucial element in the construction of buildings made entirely from timber, with all the positive attributes of reduced carbon emissions and carbon storage that sustainably-sourced timber products represent.

Forte - Australia's first CLT building

In 2012, Lend Lease completed Australia's first CLT building the ten storey Forte apartments in Melbourne, the tallest modern timber residential building in the world at the time at 32.17 m high.

Lendlease cite the benefits of CLT construction as including:

- improved safety standards particularly the elimination of manual handling and high-risk trades,
- reduced embodied CO_2e emissions (with Forte: 700 tons CO_2e stored and 700 tons avoided by not using concrete and steel),
- reduced on-site worker needs, truck movements and OH&S issues,
- higher precision, design flexibility and customisation,
- reduced impact of construction on neighbouring communities, and
- significantly shortened construction times meaning a more cost-effective overall build.

A new way of thinking about building

One of the main differences with CLT structures is that they are a fully prefabricated system that requires a new way of thinking about the building process.

Using CLT requires thorough planning, structural design and detailing integrated with the overall building fit-out 'up front' - before the panels are physically fabricated. All openings, service penetrations, routed electrical grooves, etc. are made in the panels during fabrication - so once the panels get to site the elements are simply placed and quickly and efficiently screw fixed together.

Today the advantages of CLT are recognised in an increasing range of iconic commercial buildings, such as Sydney's award-winning International House and many mid-rise residential and other projects.

For information on suppliers and design assistance visit woodsolutions.com.au

Fact Sheet

16

Discover new design and construction flexibility with SIPS solutions.

SIPS incorporates a core of expanded polystyrene (EPS) sandwiched between two oriented strand boards (OSBs).

An example of a SIPS prefabricated home

The combination of the two materials used in SIPS panels combine the advantages of both; the structural strength of the OSB is complemented by the thermal and acoustic properties of the core of EPS.

Combining the structural stability of oriented strand board (OSB) with the insulating properties of polystyrene, structural insulated panel systems (SIPS) are a fast, flexible design and construction option.

Composition

SIPS incorporate a core of expanded polystyrene (EPS) sandwiched between two oriented strand boards (OSBs). The combination of the two materials combine the advantages of both; the structural strength of the OSB is complemented by the thermal and acoustic properties of the core of EPS.

Species used in the OSB are generally softwoods and occasionally hardwoods, depending on the area from which they are sourced.

Appearance

When not erected, SIPS appear like a sandwich, with the darker OSB flanking a thick inner section of lighter coloured polystyrene.

When installed, the only part of the SIPS that is visible is the OSB. OSB is made of compressed fragments of wood and so appears as a large sheet of wood in which can be seen moderately large timber fragments. As SIPS are typically large sheets, the wood strands are much more visible than in small pieces of OSB.

The colour of OSB, depending on the species of timber and the resin used in its creation, usually ranges from light yellow to medium or dark brown.

Applications

SIPS are designed for structural uses, particularly project applications that require large sheets of material. As such, SIPS can be suitable for:

- standard walls
- bracing and shear walls
- roofing
- flooring
- tall walls

Standards

There is no specific Australian Standard for SIPS. In the US, APA – The Engineered Wood Association has published ANSI/APA PRS 610.1: Standard for Performance Rated SIPs in Wall Applications, and the International Residential Code (IRC) adopted SIPS under IRC Section R614.

SIPS do not come in defined grades, due to the lack of prescriptive standards, but can be manufactured in a range of densities to provide specific levels of thermal and acoustic performance.

The absence of Australian Standards means that individual suppliers can produce SIPS that may significantly differ in their structural properties.

Before you choose SIPS panels or systems, you should ensure that that they meet the National Construction Code (NCC) in addition to any local building requirements.

The advantages of engineered wood products

The popularity of engineered wood products (EWPs) like SIPS, is due to the many advantages they have over other building materials.

Typically, the benefits of EWPs include:

- Greater dimensional flexibility
- Improved structural design properties and performance
- Improved dimensional stability
- More efficient use of a valuable natural resource with less wastage
- Faster construction times
- Reduced onsite OH&S risk

EWPs and associated building systems also have environmental advantages over alternative building materials such as concrete and steel. Wood is a naturally renewable resource that has a low embodied energy and also acts as a carbon store (up to 50% of the dry weight of wood is carbon).

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Fact Sheet 17




Mid-rise Insurance

WoodSolutions Fact Sheets are introductory guides to wood products and associated topics and services. For more information, please visit woodsolutions.com.au.

The rapid growth in the use of engineered wood products (EWPs) in Australia for mid-rise construction has been supported by the National Construction Code (NCC), which since 2016 has provided Deemed-to-Satisfy (DTS) solutions for fire-protected timber construction up to an effective height of 25 metres. All building materials have associated risks, and it is important to understand how EWPs may be different.

Compartmet Fire Test, FP Innovations

Fire Safety

One of the perceived risks for timber mid-rise construction is fire safety, as timber is a combustible material. However, timber construction achieves the required performance under the NCC through:

- The DTS Provisions in the NCC provide simple, practical solutions which achieve the required fire safety performance with design and construction documentation supported by the series of WoodSolutions Technical Design Guides; Guides 37R (residential buildings), 37C (commercial and education buildings) and 37H (healthcare buildings).
- A Performance Solution which requires a fire engineer to provide design solutions beyond the DTS Provisions. As with all fire engineered building designs, the fire engineering is based on sound engineering principals and full-scale testing.
- Fire Safety during construction which needs to be considered regardless of the building material used. Timber construction has benefits due to no site welding or heat applied components, the use of cordless, low-voltage tools, low amount of construction waste, along with construction sprinkler protection.

International Studies

International studies, including the following, demonstrate that timber mid-rise buildings, with appropriate fire safety precautions, perform very well with low rates of incidents, and cost-effective repairs when required.

Fire Safety in Modern Wooden Houses - Mapping of Fire Incidents in Sweden
http://lnu.diva-portal.org/smash/get/diva2:1142235/FULLTEXT01.pdf

Structure Fires in British Columbia
https://www.surrey.ca/sites/default/files/media/documents/StructureFiresBritishColumbiaMay2019.pdf

Rehabilation of Mass Timber Following Fire and Sprinkler Activation
https://cwc.ca/wp-content/uploads/2021/03/Rehabilitation-of-Mass-Timber-Following-Fire-and-Sprinkler-Activation2019-Ranger-.pdf

Construction Safety

Timber mid-rise construction has demonstrated high levels of safety on-site due to:

- Fewer workers on live deck
- Large work platforms & pre-installed edge protection
- Simple anchoring for safety harness
- No trip hazards from cables or reinforcing bars
- Easier handling and fixing with lightweight tools
- No hot works or welding
- Scaffolding can be limited or avoided

Construction Program

Timber construction uses off-site prefabrication which results in reduced construction times and associated costs, thereby reducing risks and increasing efficiencies with:

- Quicker lift cycles may use bundled material, smaller cranes & shorter equipment rental times
- Shorter program times result in reduced cost of temporary works
- Floors stable and load-bearing at time of installation with no curing required
- Fewer deliveries to site
- Tighter construction tolerances

Procurement

EWPs are generally prefabricated elements and the risks associated with procurement are similar to other prefabricated elements. Quality assurance is high for EWPs as they are produced using automated processes.

If you would like more information about mid-rise buildings, EWPs or site or project insurance, please contact info@woodsolutions.com.au

Click on the images below to find out more about these WoodSolution resources

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Fact Sheet 18

Wood Encouragement Policies

WoodSolutions Fact Sheets are introductory guides to wood products and associated topics and services. For more information, please visit woodsolutions.com.au.

In Australia and internationally, Wood Encouragement Policies (WEP) are adding impetus to the growing use of timber construction systems, especially in mid-rise residential and mixed-use buildings. Adopting a WEP is an acknowledgement of the social, environmental and financial benefits of building with wood, the material referred to as The Ultimate Renewable.™

Changes to the National Construction Code

Timber construction systems have delivered high-quality residential housing throughout Australia for generations. In 2016 advancements in the National Construction Code, introduced Deemed-To-Satisfy provisions to use timber structures up to 25m effective height (8-9 storeys, depending on the floor-to floor height). Since the changes came into effect there have been more than 30 mid-rise timber projects completed or started in Australia.

Experience and capacity

As demand has grown, so has the design, supply and build chain's capacity and knowledge. From developers, architects and engineers to suppliers and contractors, systems and processes are being optimised to ensure the full value of timber building systems are realised.

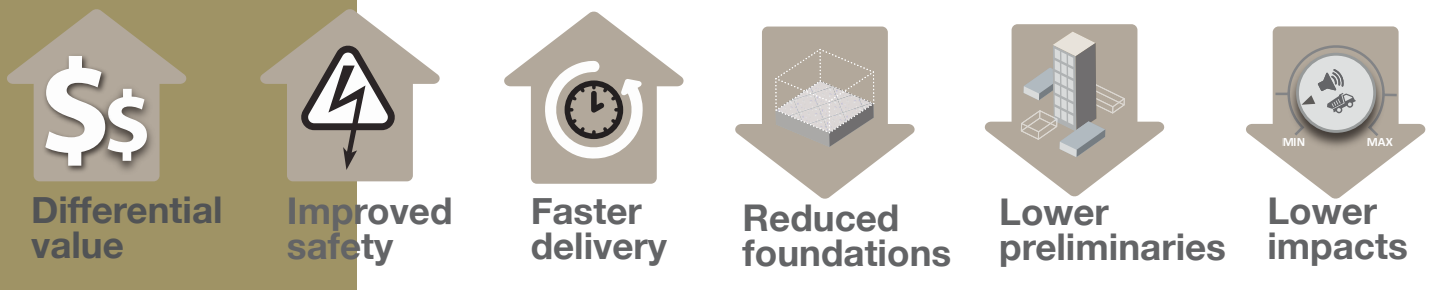
The benefits of mid-rise timber

High quality prefabricated timber structures, built efficiently and effectively, are delivering significant benefits in site safety, cost, quality, and local and broader environmental advantages, including:

Local and social
- Reduced disruption and noise
- Shorter build time
- Smaller on-site teams
- Less site waste

Cost savings
- Lower preliminaries
- Faster build
- Reduced foundations

Environmental benefits
- Low embodied energy
- Carbon sequestration (approximately 50% of the dry weight of wood is stored carbon)
- Substitutes for emissions intensive materials



Government associations and councils that have adopted Wood Encouragement Policies

Meet the growing WEP community

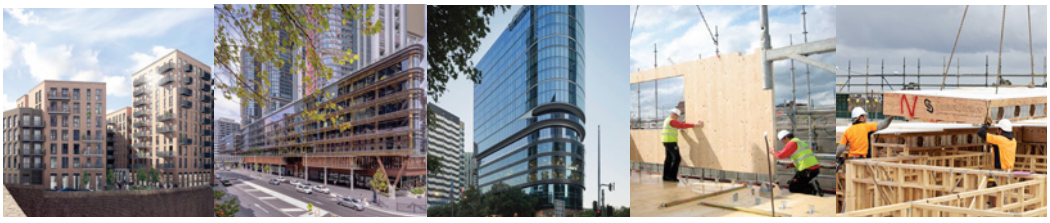
In Australia, Western Australia has joined Tasmania to become the second state government in Australia to adopt a state-wide WEP. In addition, two. local government authorities (LGAs) and eighteen local councils have also adopted a WEP.

The adoption of similar policies around the world is growing steadily, including New Zealand, Canada, Japan, France, Finland, Switzerland and the UK, who are all encouraging the use of natural, timber-based products in construction.

Discover how your council can adopt a WEP

For more information about wood encouragement policies and mid-rise timber buildings, please contact info@woodsolutions.com.au

Case Notes



1. Dalston Works, a mid-rise timber apartment project in London's busy borough of Hackney recorded 80% fewer deliveries to site than an equivalent concrete-based build.

2. Workers in offices adjacent to Lendlease's timber buildings in Barangaroo, Sydney reported reduced construction noise when compared to a traditional site.

3. Offices at 55 Southbank Boulevard, Melbourne remained fully operative, with nobody complaining, while an 11 storey CLT hotel was added on top of them. This was primarily due to the lack of concrete pumps and machinery and the almost exclusive use of battery powered hand-drills and drivers.

4. A survey of 26 mid-rise timber buildings around the world showed they required on average just 7 workers to complete the structure, compared to 20-40 on a typical reinforced concrete project with similar floor plates.

5. A 10-storey aged care facility in Sydney experienced a 70% reduction in total on-site waste through the use of a timber structure.

If you would like more information about mid-rise buildings or WEPs, please contact info@woodsolutions.com.au