

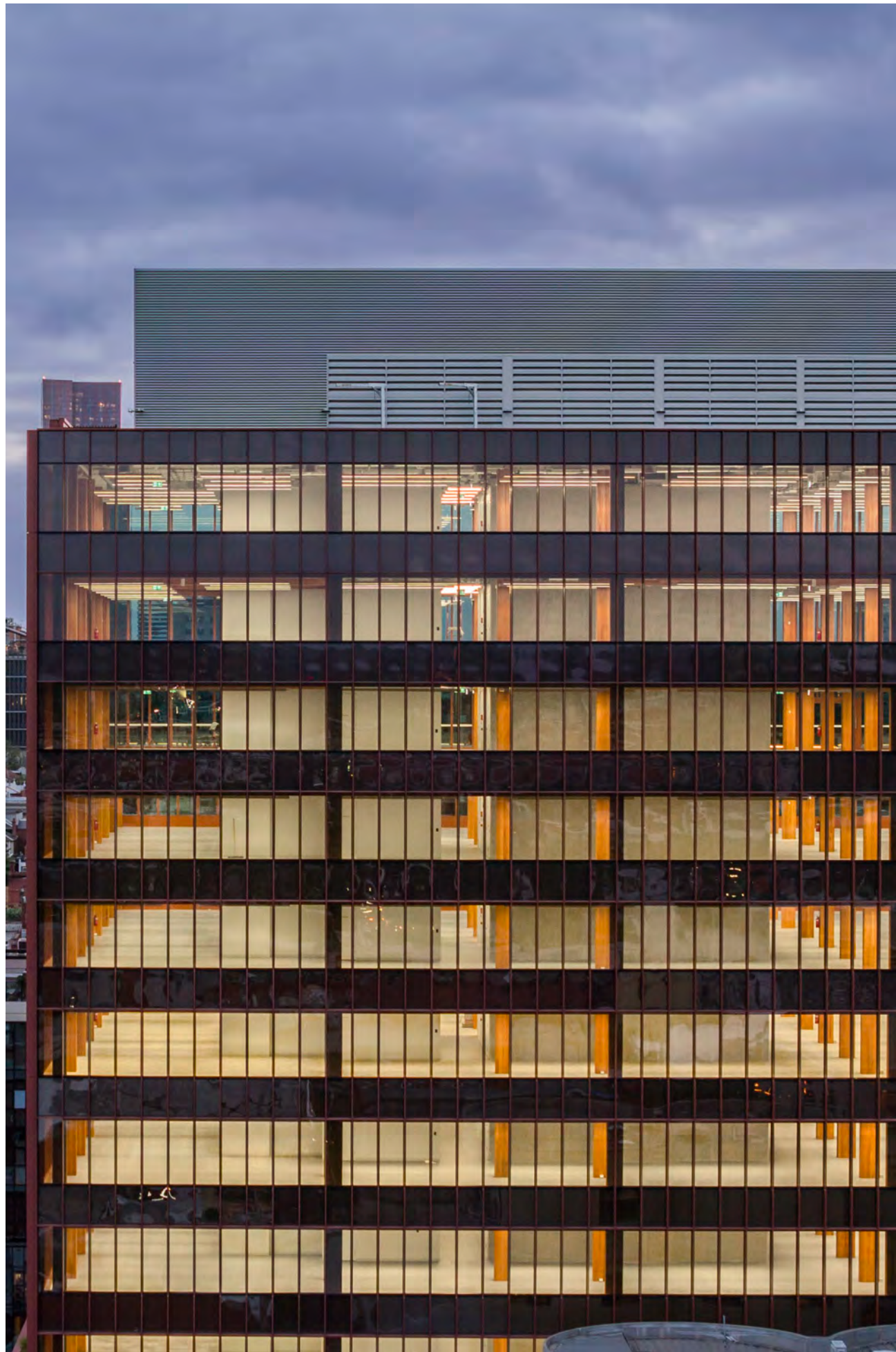
MASSLAM



**Your mass
timber solution**

CONTENTS

1.	INTRODUCTION TO MASSLAM	05
	1.1 What is MASSLAM?	05
	1.2 Why mass timber?	06
	1.3 The glulam specialists.	08
2.	BENEFITS OF PREFABRICATED MASSLAM	09
	2.1 Sustainability	09
	2.2 Cost Savings	10
	2.3 Speed	10
	2.4 Safety	10
	2.5 Accuracy	11
	2.6 Lighter	11
	2.7 Carbon calculator	11
3.	DESIGN FOR MANUFACTURE & ASSEMBLY (DfMA)	12
	3.1 A different way of building, a different way of designing	12
	3.2 Engage with your MASSLAM specialist early	13
4.	MASSLAM PROCESS / SERVICE	14
5.	MASSLAM APPEARANCE	17
6.	GLULAM AND CNC CAPACITY	18
	6.1 Connection Types	18
7.	COATING	19
8.	KEY CONSIDERATIONS	20
9.	APPLICATIONS	21
10.	ADVANCED TIMBER COMPOSITE (ATC)	22
	10.1 What is ATC?	22
	10.2 Why ATC?	22
11.	ADVANTAGES OF MASSLAM AGAINST TRADITIONAL MASS TIMBER	23
12.	FIRE RESISTANCE	26



1. INTRODUCTION TO MASSLAM

1.1 What is MASSLAM?

MASSLAM is Australian Sustainable Hardwoods' (ASH) range of mass-timber solutions.

Grown, owned and produced in Victoria, MASSLAM is a range of glue-laminated timber systems (including columns, beams and floors); intended for large domestic and commercial structures; designed and manufactured for assembly.

Utilising uniquely attractive timbers, chosen because they have some of the best strength-to-weight ratios of any timber species worldwide, MASSLAM has advantages that allow longer spans, higher ceilings, increased floor space, lesser beam depth and lower associated installation costs.

Better still, MASSLAM is cheaper to construct than concrete and steel, looks better, is safe, sustainable and efficient.





1.2 WHY MASS TIMBER?

Population growth and urban sprawl across major centres around the globe is placing increased pressure on the need for housing and infrastructure; demanding an ever-increasing appetite for resource and finite materials.

Traditional construction is responsible for anywhere up to 39% of the world's CO₂ emissions through embodied energy. In a sustainability conscious world, the construction industry is diverting its focus toward reducing the impact on waste and climate change. As our cities increase in size and height, our thirst for robust materials will continue to grow. As a result, a disconnect with nature and associated psychological impacts will intensify. Thanks to technological advances and continuous improvement in manufacturing, one material has emerged with the opportunity to reverse this trend and is gaining international recognition as the solution to our modern day needs: mass-timber construction.

MASSLAM utilises massive sections of glue laminated timber in structural applications –

replacing finite materials such as concrete and steel.

Having significantly lower embodied energy to produce a solution, combined with CO₂ sequestration during growth, mass-timber is truly 'better than carbon neutral'. The amount of equivalent CO₂ stored within one cubic metre of MASSLAM after embodied energy is deducted equals approximately 408kg. A 1,000 cubic metre project will store 408 tonnes of equivalent CO₂ and can be regrown in the forest within minutes. Sustainable forest certification ensures the forests are responsibly managed in perpetuity and with fewer lasting environmental impacts, the construction industry can now be the answer.

Better still, MASSLAM used in visual applications doesn't just look great but adds to biophilia in the built environment – helping humans feel more connected to nature and subsequently creating happier work places, increasing productivity and lowering stress.

INTRODUCTION TO AUSTRALIAN SUSTAINABLE HARDWOODS (ASH)

ASH is a privately owned Australian timber sawmill and manufacturer. Established over 30 years ago, the operation has grown to become one of the largest timber mills in Australia and operate the largest hardwood manufacturing facility. Automated manufacturing efficiencies, innovation and economy of scale allows ASH to compete with international markets.

ASH are at the forefront of construction innovation in Australia. ASH have a history of developing new markets and innovations while manufacturing to the highest standards possible; by utilising the latest and most efficient automation technology, innovative new glue and coating systems and passing independent tests against Australia's strict building standards.

ASH process the equivalent of 120,000m³ of Plantation Oak (*Eucalyptus nitens*), Australian

Oak and Glacial Oak sawlogs into timber feedstock per annum. This combined feedstock is used to supply ASH's 13 timber manufacturing lines and creates a competitive advantage.

The operation is based in Heyfield, Victoria and directly employs more than 200 people.

ASH is situated on two sites in Heyfield and process from regrowth log to finished component– true vertical integration.

Products include mass timber solutions, components for windows, doors, staircases, furniture and many other products including glue laminated timber panels, structural beams, engineered flooring and cladding. These products are distributed throughout Australia and the world.



1.3 THE GLULAM SPECIALISTS

ASH has produced glulam products since 1996 and is the largest and one of the most experienced producers in Australia. ASH now produce more than 100m³ per day.

The MASSLAM line extends on this experience by utilising the most advanced, automated finger jointing and laminating equipment available, the largest 4-side moulder in the world, the largest and most efficient new generation Hundegger K2i (CNC) available, two other state of the art robotic CNC machines, and production lines for pre-assembly, coating and packaging.

With our experience, technology and unique machinery, ASH can produce the best mass timber value proposition in the world.

ASH has built up an experienced and versatile MASSLAM Design Team made up of timber design professionals from a range of consulting, manufacturing and construction backgrounds. The MASSLAM team can guide you right through the entire process of estimating, designing, documenting, fabricating, delivering and installing your mass timber project all in the one place.

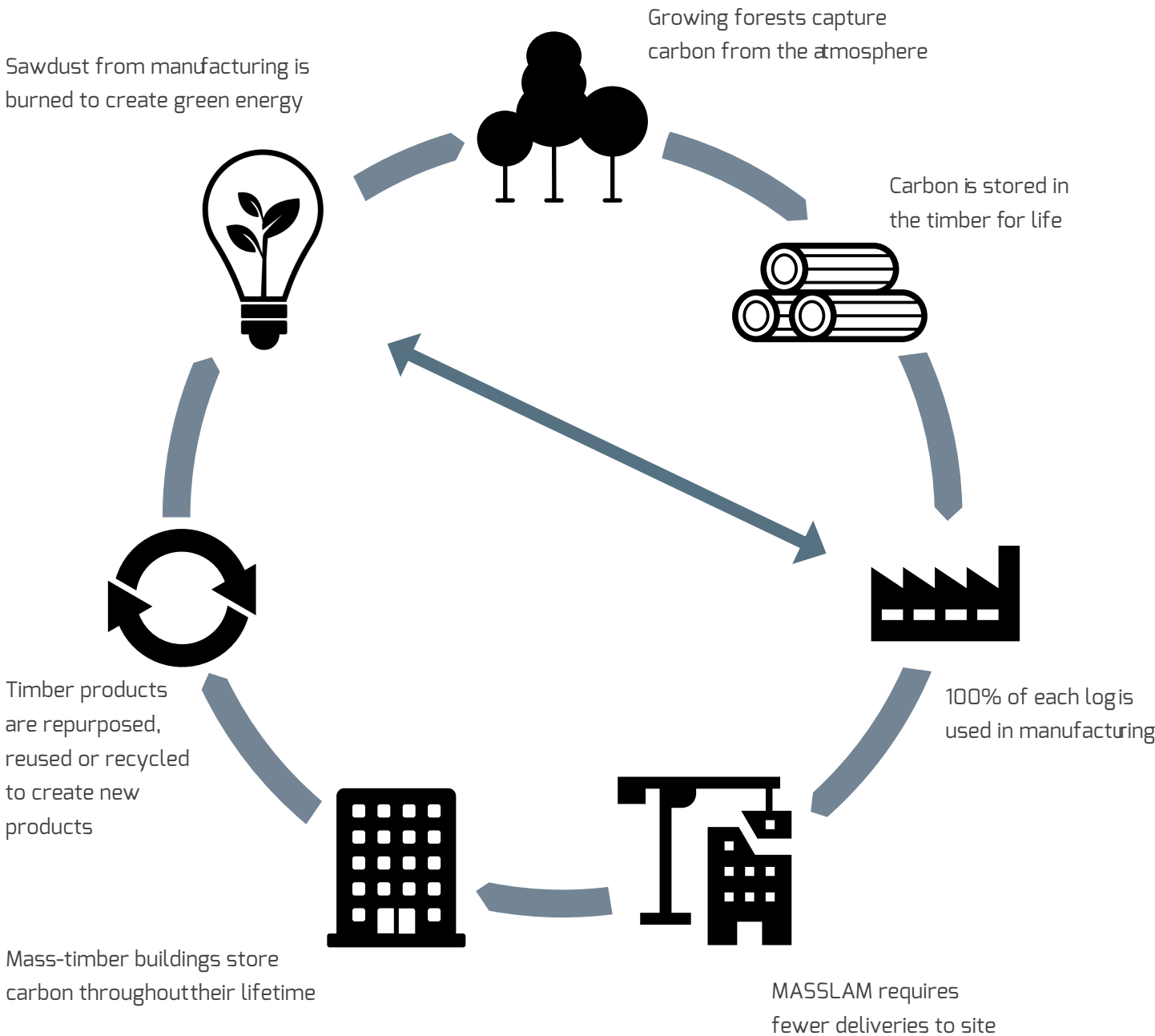
Demonstrating our commitment to sustainability and supplying high quality timber products, ASH is proud to be the only glulam manufacturer to be EWPA certified.



2. BENEFITS OF PREFABRICATED MASSLAM

2.1 SUSTAINABILITY

Timber is one of the few building materials with the ability to create a closed loop, circular economy. The very existence of sustainable timber production helps reverse anthropogenic climate change. No other commercially available building material boasts the renewable characteristics of timber. Timber is The Ultimate Renewable and MASSLAM is third party certified for sustainability by Responsible Wood.



2.2 COST SAVINGS

According to detailed studies by WoodSolutions, commercial structures built with mass timber offer cost savings over concrete and steel. Speak to your MASSLAM specialist for the detailed report.

2.3 SPEED

Consistently installing faster than traditional construction, recent mass timber case studies comparing multiple projects in Australia have shown up to 30% faster construction times. Much of this can be attributed to early services rough-in and assembly. This speed and efficiency comes from the fact that mass timber is lighter, easier, safer to handle and install than concrete and steel.

Speed of construction is a substantial consideration in cost assessment due to time related expenses such as crane and other plant hire; wages for on-site workforce; insurances premiums; permits and certifications. The reduced program offered by timber structures can also enable time critical projects to be realised. This can be a crucial consideration for many projects, including schools and student accommodation buildings, for which funding periods can be set and term dates fixed.

2.4 SAFETY

The constructability of mass-timber builders are safer in general. Tier 1 builders are reported as stating many projects show no Lost Time Injuries. Part of the reason for this is the elimination of on-site risks with prefabrication. Prefabricating or pre-attaching connectors in an automated assembly off-site before delivery reduces the need for working at heights as well as the time required to assemble. Smaller and easier hand tools are utilised, as are smaller crews. Additionally, there is less need for welding or hot works, easier anchoring of safety harnesses, the ability to pre assemble safety barriers and eliminate live-edges before craning.



2.5 ACCURACY

All MASSLAM members uniquely pass through the world's largest four-side planer to ensure clean surface and squareness before machining. ASH's Hundegger robots (CNC) then machine members to within +/-1mm accuracy to the parameters specified and detailed in the coordinated 3D model. With the ability to efficiently and automatically process up to 1,250 x 450mm end sections, MASSLAM does not need to be block laminated up to this section size. Block laminating requires two halves (or more) to be CNC profiled and then joined together – often presenting challenges with alignment of individual profiles and negating the millimetre accuracy of the CNC machines or four-side planer. ASH's process eliminates this risk. Given some MASSLAM products are ~40% stronger than international mass-timber, there's rarely a need to design with members wider than 450mm or to block laminate. However, when there is the need to design with wider sections, ASH can block laminate sections up to 1,200 x 900mm.

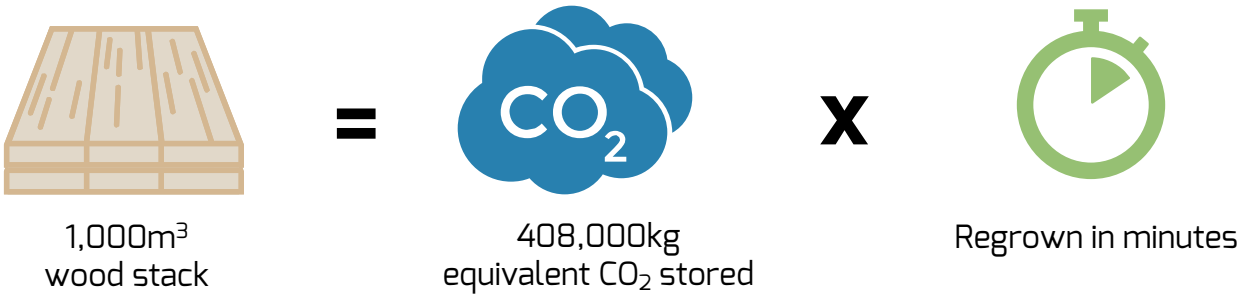
Comparatively, concrete and steel tolerances can be +/-15mm.

The benefits of accuracy in MASSLAM are far and wide but can be critical for air tightness, installation, energy efficiency, constructability and overall building performance.

2.6 LIGHTER

MASSLAM is 33% the weight of concrete and 80% the weight of steel for the same structural requirement. This means there is less need for expensive foundations. It also means more material can reach site with fewer deliveries. Lifting is quicker and can be done with smaller cranes. Less noise, dust, vibrations and truck movements result in less disruption of neighbourhoods and existing activities or tenants.

2.7 CARBON CALCULATOR



3. DESIGN FOR MANUFACTURE & ASSEMBLY (DfMA)

3.1 A different way of building, a different way of designing

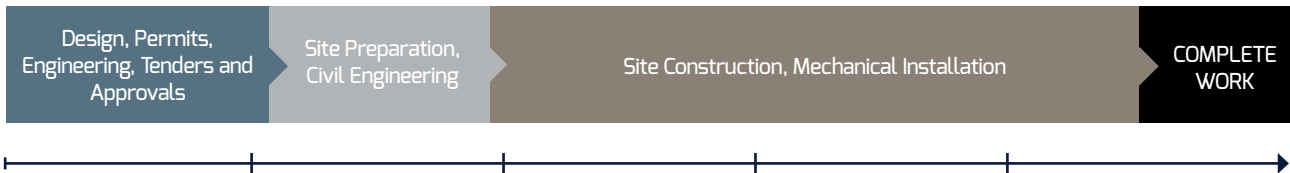
Prefabrication and off-site assembly will increase speed and quality of a build but requires a complete change in thinking. Design teams are required to put in more work up front so that the desired prefabrication and assembly efficiencies can be realised. Buildings cannot be partially designed before fabrication – prefabrication of each element is governed by the digital 3D design model. The building must be considered 100% complete before processing. There can be no change of design once manufacturing has commenced. An example of the benefits of DfMA is shown below.

The process begins with your plans where ASH offer a basic ‘reverse engineered’ guide of various products to narrow in on the best outcome for the clients’ needs. Once the MASSLAM products and system are selected, the MASSLAM Design Team create a digital

3D model detailing all of the chosen components with intricate details including connection types, sizes, screws, CNC requirements and the exact locations of every detail to level of development (LOD) 400. All details and design and interface challenges can be fully coordinated during this modelling and shop drawing phase – rather than being fixed on site by an expensive labour force or holding up the critical path.

Once the client signs off on the 3D model the project is considered ‘effectively built’ and cannot be altered. This information feeds the MASSLAM automated production and CNC line where coatings, attaching of connectors and labelling of each member ensures superior on-site installation efficiencies. With the necessary information from the installer and contractor, ASH will manufacture and delivery members in order of lifting/ installation sequence.

TRADITIONAL SITE BUILT CONSTRUCTION –CHRONOLOGICAL PROCESS



OFF-SITE CONSTRUCTION – SIMULTANEOUS PROCESS



3.2 Engage with your MASSLAM specialist early

Get in early. Do not design too far down the path before talking with your MASSLAM specialist.

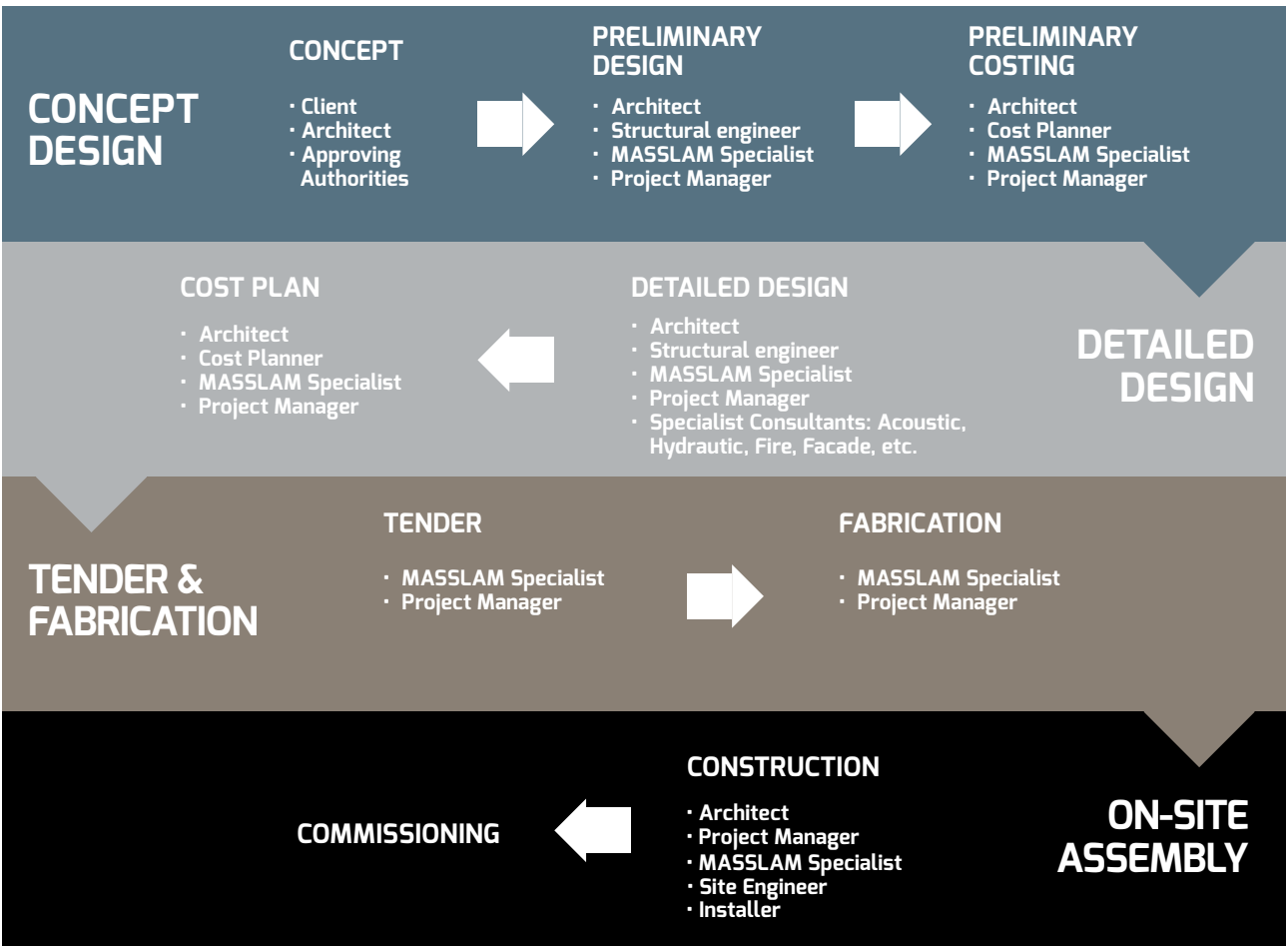
MASSLAM is available in uniquely high strength materials that can offer:

- smaller columns with increased usable floor space
- larger grids with fewer columns per floor
- alignment with basement parking (eliminating expensive transfer slabs) - ie – 9x9m
- shallower beams for additional floor to ceiling heights
- longer spans without lowering ceiling height
- additional joint strength for smaller and more competitive connectors
- less overall weight resulting in reduced foundations
- In some cases, additional levels
- better fire performance

All construction materials require unique consideration of their strength and weakness in order to maximise cost efficiency. MASSLAM can be the most cost effective of all systems but this may not be the case if you design for concrete or imported mass timber and hope to compare price.

It is for these reasons why it is imperative to get your MASSLAM specialist in early. See Design and Construction chain below.

3.3 MASSLAM DESIGN & CONSTRUCTION CHAIN



4. MASSLAM PROCESS / SERVICE

SCHEMATIC DESIGN	SHOP DRAWINGS	GLUE LAMINATE	CNC	COATINGS/FIXINGS	DELIVER
Initial (free) discussions with the MASSLAM team. Project specifies incorporated. Preliminary sizes/ species/ connections/ costing determined.	Completed Design used to create shop drawings. Building is considered 'complete' from a design perspective. Shop drawings determine prefabrication process.	Chosen species used as feedstock to create glue laminated components. Each species has its own unique strength and appearance.	Robotic CNC profiling performed on each member per design and fixing requirement The initial expense here is rewarded with great on-site savings later. Largest K2i in the world.	Temporary weather protection is applied to mitigate risk of damage from weather during construction. Where practical, bracketry and fasteners are pre-assembled in the factory for quick assembly on site.	Deliveries are performed in order of lifting sequence to greatly increase on-site productivity.





5. MASSLAM APPEARANCE

CHARACTERISTIC	MASSLAM SL33	MASSLAM SL35	MASSLAM 38	MASSLAM 45
Machine finish	≡ 60 grit	≡ 60 grit	≡ 60 grit	≡ 60 grit
Machine tolerance	As per AS2796	As per AS2796	As per AS2796	As per AS2796
Grain structure of feedstock	Quarter sawn for stability	Quarter sawn for stability	Back sawn	Quarter sawn for stability
Gum Vein – Tight	No Limit	No Limit	No limit	No limit
Gum Vein – Loose	No Limit	No Limit	No limit	No limit
Gum Pockets	No greater than 7mm wide and 4mm deep	No greater than 7mm wide and 4mm deep	No greater than 7mm wide and 4mm deep	No greater than 7mm wide and 4mm deep
Sound Knots/Burls	No limit	No limit	No limit	No limit
Loose Knots	Nil	Nil	Filled	Nil
Pinhole	No limit	No limit	No limit	No limit
Hobnail	No limit	No limit	No limit	No limit
Black Speck	No limit	No limit	No limit	No limit
Rot/Decay	Nil	Nil	Nil	Nil
Heartwood	Nil	Nil	Nil	Nil
Checking	No limit	No limit	No limit	No limit
Lamination size	Varied	Varied	Varied	Varied

Note: Appearance qualities relate to visual surface only. Surfaces marked 'non-visual' in shop drawings shall accept non-visual grade – which allows any visual characteristic.

6. GLULAM AND CNC CAPACITY

The MASSLAM line operates some of the largest and most efficient glulam CNC machines in the world. These machines can process sections up to 1,300 x 610mm with millimetre accuracy in one automated process. The Hundegger K2i has over 160 tools and 6-axis machining. Tools available include saws, chain saws, routers and drills – to name a few. The specific tools and machining strategies are chosen to optimise the processing time, increasing throughput. A full CNC Machining Capability Brochure is available for download on the MASSLAM webpage.

6.1 CONNECTION TYPES

CNC Machining makes for efficient and attractive profiling of members but they also cater to an infinite number of connection possibilities. These include concealed dovetail connections, birdsmouth connections, steel plates, mortise and tenon joints,

pilot screw holes, char plugs and processing for all proprietary connection types. Talk to your MASSLAM specialist about preferred connection types specific to your project.



7. COATING

MASSLAM members can be coated or stained to meet the design intent. Critically, coating is required to protect members from damage due to variations in humidity or exposure to UV and weather.

Final coats are required after installation for adequate protection. For more detail, see the MASSLAM Design Guide and MASSLAM Coating Guide – available for download on the MASSLAM webpage.

Below are some examples of the colour range available for MASSLAM. Talk with a MASSLAM specialist to get the right colour for your design.



8. KEY CONSIDERATIONS

Clients should also read the following MASSLAM documents for long term satisfaction of MASSLAM solutions and design considerations. All are available for download on the MASSLAM webpage:



MASSLAM Design Guide



ATC Design Guide



MASSLAM Machining Capability Brochure

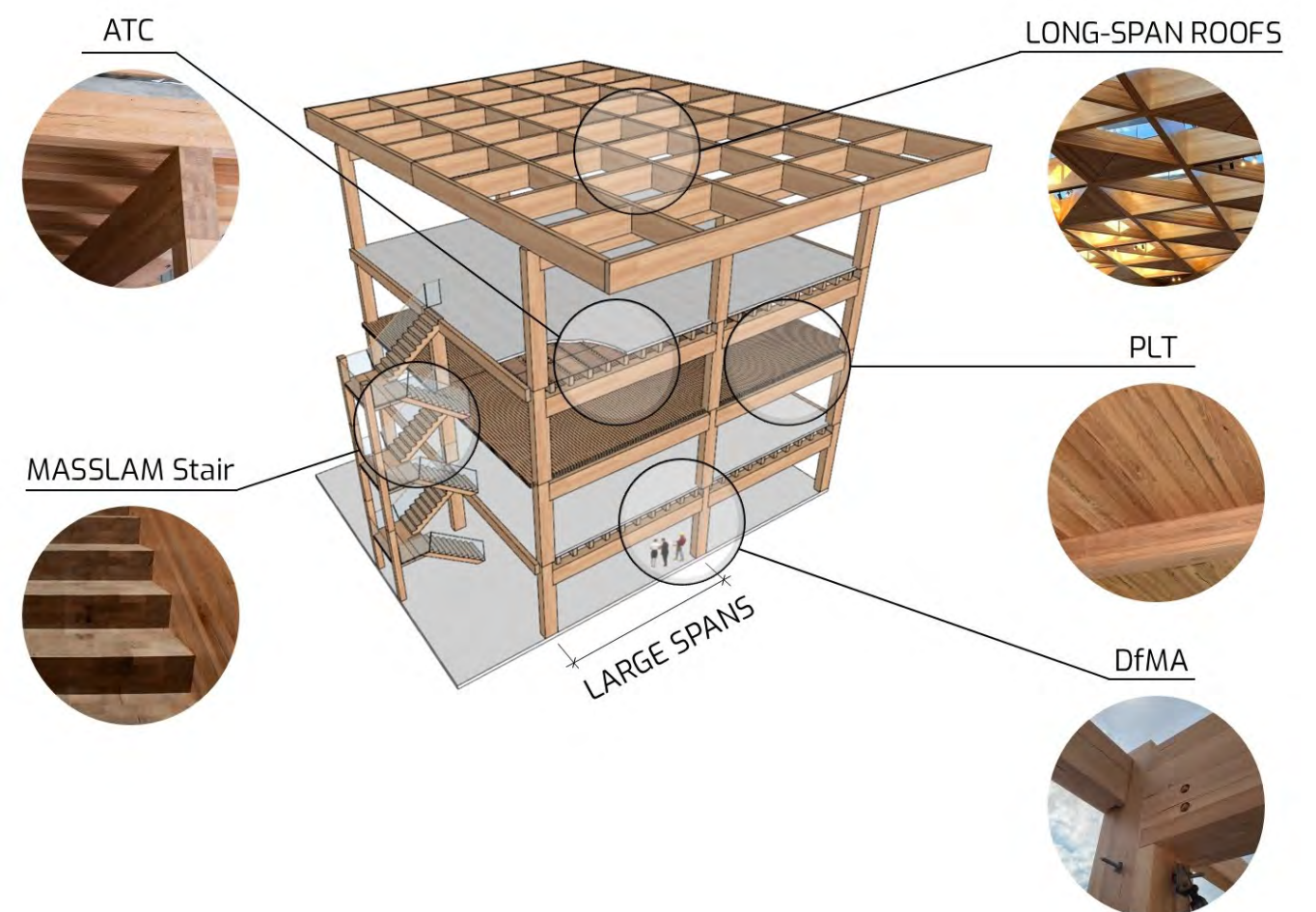


MASSLAM Coating Guide



9. APPLICATIONS

- a. Columns
- b. Beams
- c. Advanced Timber Composite (ATC) Floors
- d. Parallel Laminated Timber (PLT)
- e. Stairs



10. ADVANCED TIMBER COMPOSITE (ATC)

10.1 WHAT IS ATC?

Our Advanced Timber Composite (ATC) solution combines sustainably sourced hardwood glulam and structural plywood to create efficient, prefabricated panels that expedite installation, while reducing logistics costs. Durable green concrete is poured onsite providing the required FRL.

This lightweight, composite system increases span lengths, improves moisture management, and enhances vibration and acoustic performance.

It adheres to validated performance pathways for structural, fire, vibration, and acoustics, offering cost-effective solutions with optimised floor-to-ceiling dimensions without needing transfer slabs.

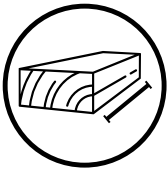
10.2 WHY ATC?

ATC builds on the range of now readily available engineered wood products (EWPs) with the same concept; to get the best out of the inputs with technology, manufacturing, and design to create the best possible solution and minimise waste by bringing together the advantages of each material used. It's about using the best materials in the best function in true composite action:

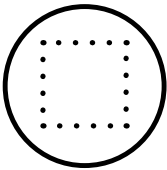
- sustainably sourced PEFC-certified local hardwood glulam for the joists,
- visual grade, structural plywood for construction stage and soffit finish, and
- green concrete for durability to the finished floor, removing material from low efficiency areas.



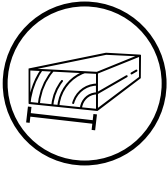
11. ADVANTAGES OF MASSLAM OVER TRADITIONAL MASS TIMBER



Longer spans/grids



Can match basement grid - 9x9m



Smaller sections with same structural strength – additional floors, higher ceilings or less wood fibre



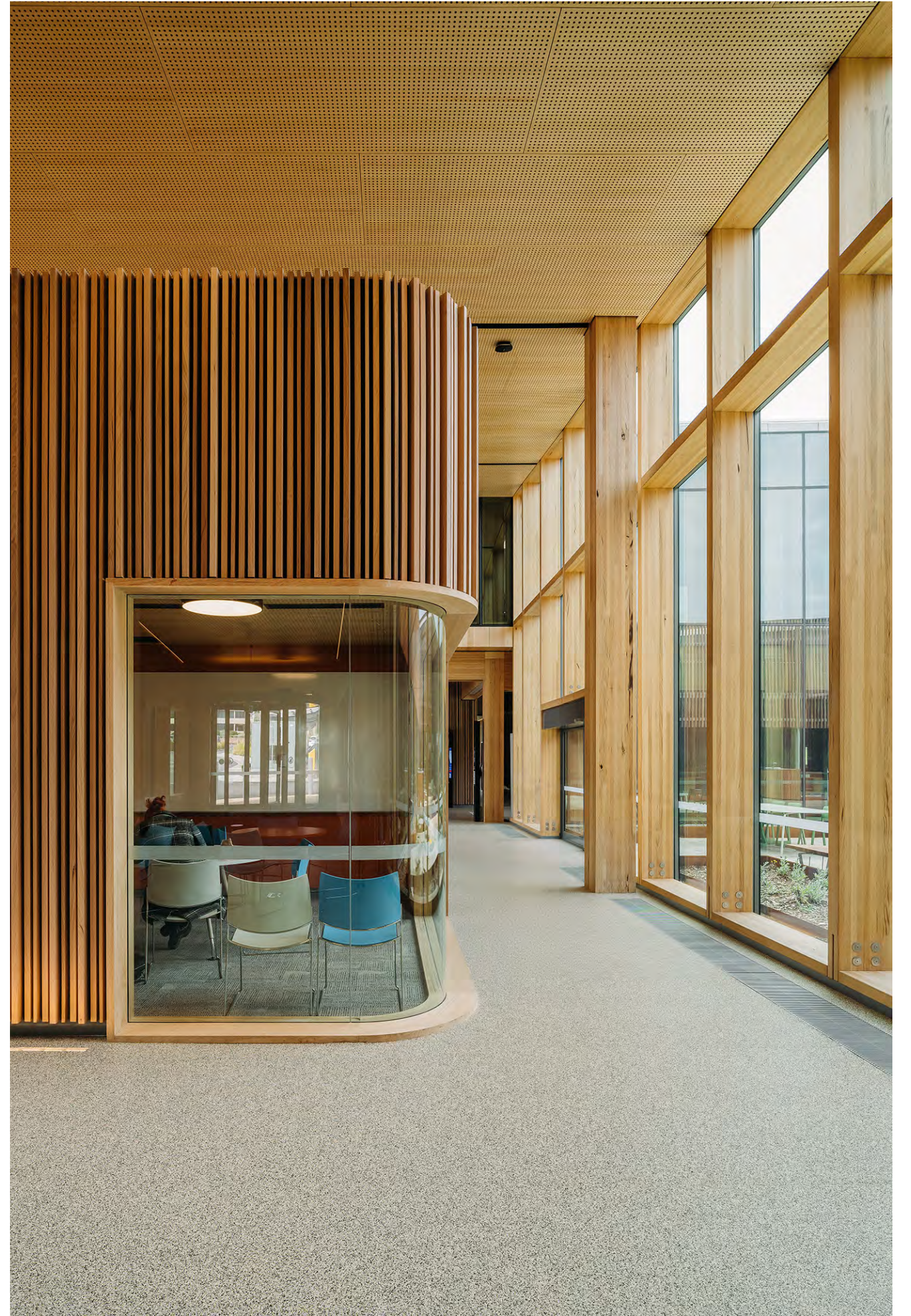
No misaligned profiles



Validated performance pathways

ADVANTAGE OF LOCAL	LOCAL	IMPORTED
No hidden costs such as fumigation	✓	✗
No shipping damage	✓	✗
No additional transport and insurances	✓	✗
No stamp duty and exchange rates	✓	✗
No cost of tying up money	✓	✗
No risks of poor communication or reaction times	✓	✗
No international law commercial risks	✓	✗
No blown out lead times or priority as an international customer	✓	✗





12. FIRE RESISTANCE

Mass timber buildings can be safer than traditional builds under fire, particularly sprinklered buildings. Large sections of timber are very hard to burn. Imagine trying to start a fire with a large log!?! (You can't).

Even under extreme fire, MASSLAM has calculable performance and maintains structural adequacy. As MASSLAM is exposed to fire, a level of char is created on the fire-affected surface while maintaining structural strength behind this 'char layer'. The structural strength is directly proportionate to the unaffected wood. Concrete with steel connections will buckle under the same heat.



MASSLAM is independently fire tested under load in accordance with AS1530.4 for up to 120 minutes. With the char rate being predictable and quantifiable, designing for fire to meet the code and performance requirements is typically as simple as ensuring the effective residual section (charred section) has sufficient capacity for the design fire loads.

The image above highlights the benefit of MASSLAM's superior char rates. All three sections

started as the same size with the two MASSLAM sections (left and centre) having significantly larger residual sections compared with a radiata pine section on the right.

In the majority of cases, MASSLAM members required for serviceability and ultimate limit state load cases in ambient conditions, have sufficient residual sections for design fire requirements.

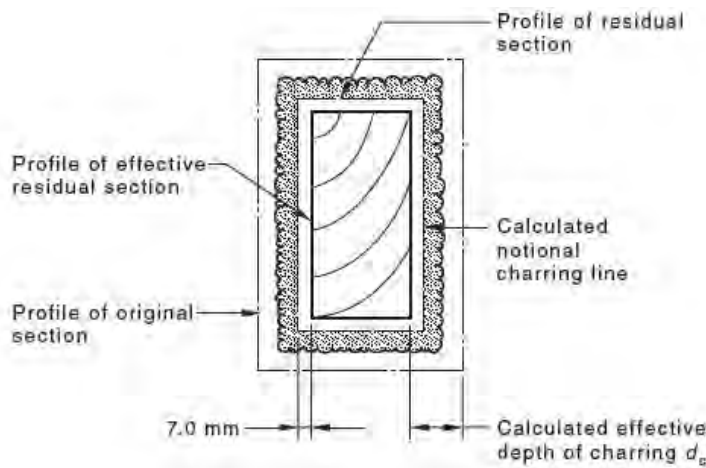


Figure 2.7 — Loss of section due to charring

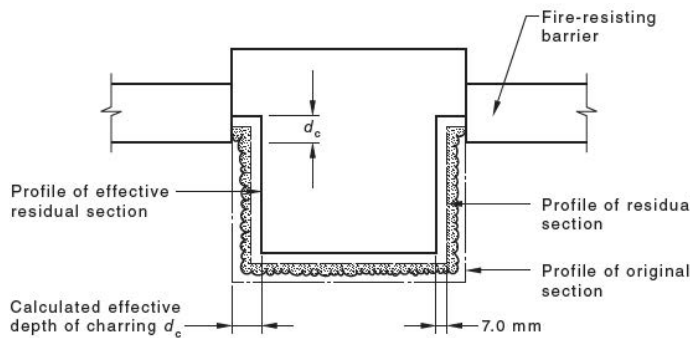


Figure 2.8 — Example of charring details at junction with fire-resisting barrier

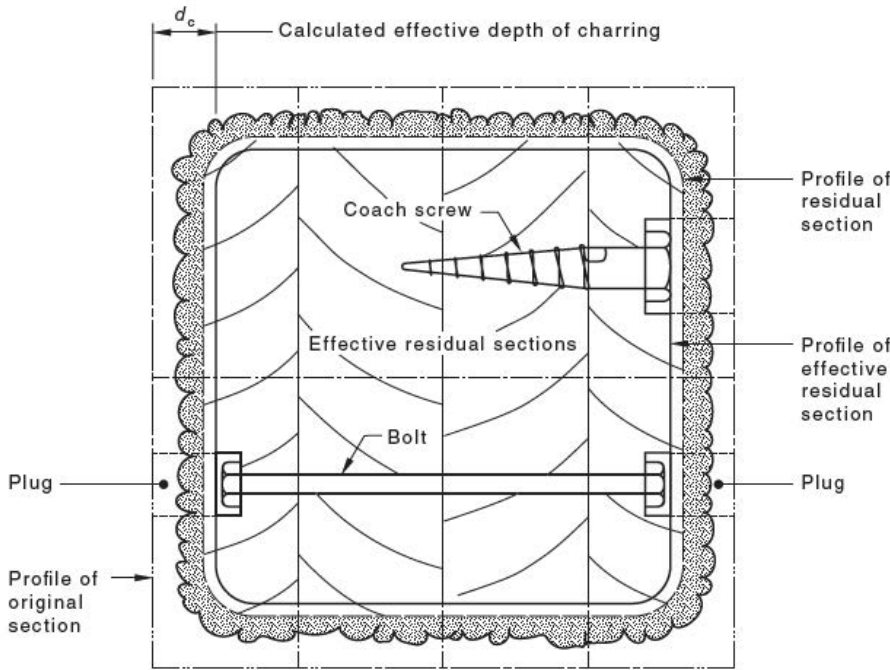


Figure 3.2.2 — A method of protecting metal connectors

For more detail around how to design for fire, refer to the MASSLAM FRL certificates or contact your MASSLAM specialist. Above: Copy of diagrams from AS1720.4 showing the charring effect of fire.

What should you do now?

To place an order for MASSLAM speak to one of our specialists on **03 5139 7000**

- To find out more about the MASSLAM range, head to ash.com.au/application/mass-timber
- To discuss an application or project, please email our project advisory specialists at masslam@ash.com.au

Your request will be treated confidentially.

