

SUSTAINABLE
WOOD 
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WORLD



SW4SW Workshop
Wood products in the sustainable bioeconomy

Innovations with Engineered Wood Products in New Zealand

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10-11 December 2019
FAO Headquarters in Rome, Italy

Acknowledgments: Doug Gaunt (Scion), Jeff Parker (WPMA), and as referenced on each slide

SUSTAINABLE
WOOD **2014**
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Innovative approaches and opportunities with
engineered wood products



Inspire

**Design
R&D**



Demonstrate

**Products and
applications**



Enable

Case studies

New engineered wood product



© WET, Scion



Highly automatized manufacturing

Data-driven decision-making and real-time analytics

Structural material from low-grade wood, short rotation and thinning logs, short logs

Performing and stable product

© WET, Callaghan Innovations

References:

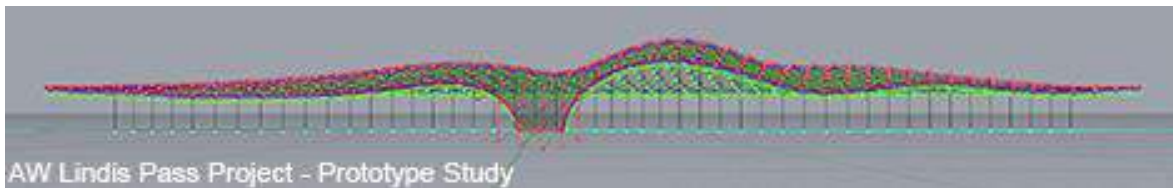


WOOD ENGINEERING
TECHNOLOGY

OEL™ Optimised Engineered Lumber



New engineered wood product



References: **Screw-laminated hardwood lamella**

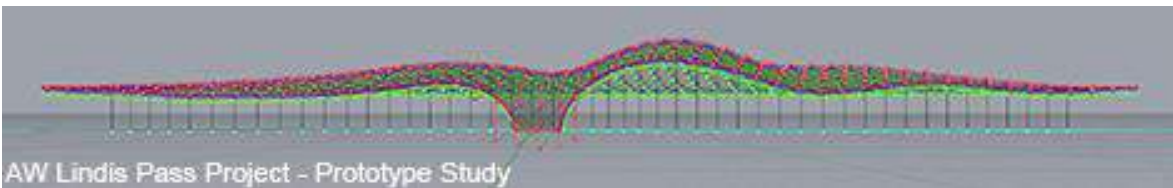
Product development: Christopher Kelly and Alsitair Cattenach

Architecture: Christopher Kelly, Architect, Architecture Workshop

Structure: Alsitair Cattenach, Structural Engineer, Dunning Thornton Consultants

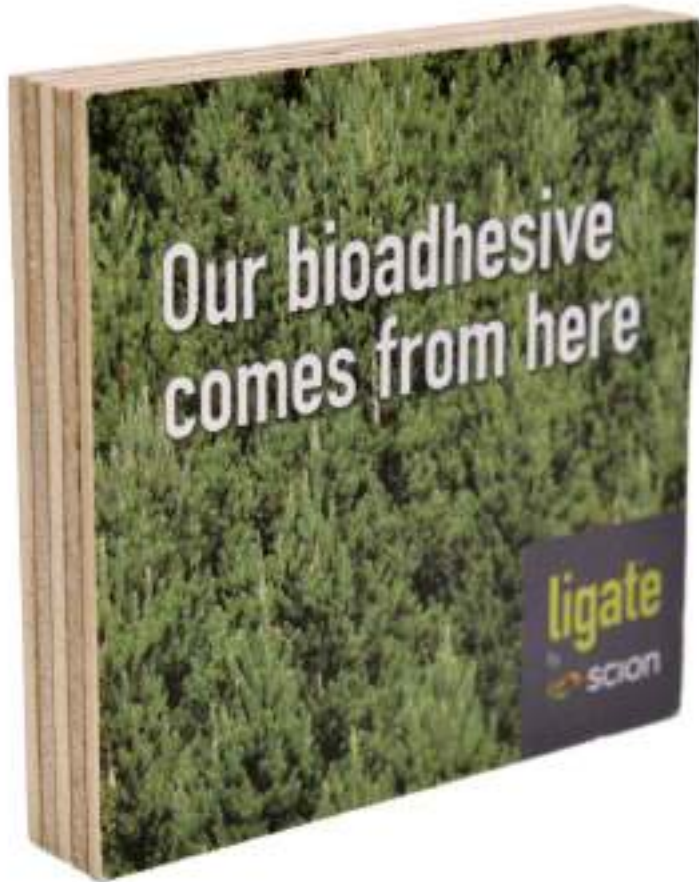


New engineered wood product



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New biobased adhesive for EWPs



100% biobased, renewable ingredients

Formaldehyde negative emissions

Non-toxic

Compatible with existing manufacturing processes

References:



Digital manufacturing and prefabrication



Plywood structural frame



Reduced manufacturing waste

Minimised metal fixings

Light weight and fast assembling

Designed for disassembling

References: X-Frame
Ged Finch, PhD Candidate,
Victoria University of Wellington
www.gerardfinch.com

Digital manufacturing and prefabrication



Plywood lattice structure



- Accelerated off-site production
- Reduced construction timeframes
- Carried in by hand to be assembled on-site
- Reduced cost of construction

© Thomas Seear-Budd , photographer

© Thomas Seear-Budd , photographer

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References: CLICK-RAFT system



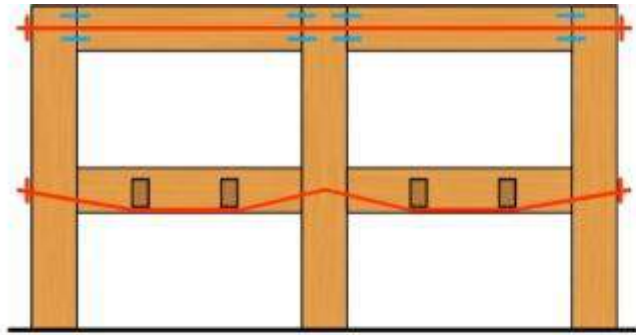
Architecture: Chris Moller Architecture + Urbanism

Structure: Dunning Thornton

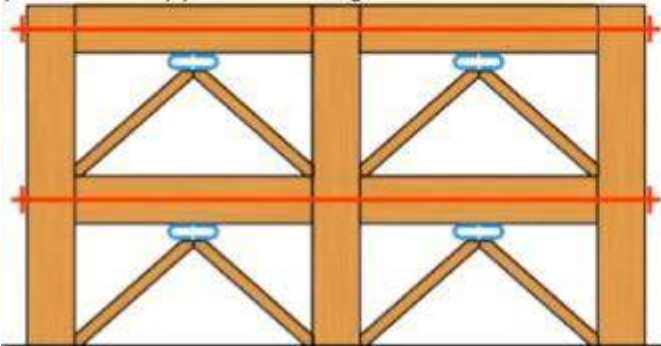
Construction: Makers Fabrication



Pre-stressed laminated timber structures



a) Pres-Lam frame with straight (top beam) and deviated (bottom beam) post-tensioning steel strands



b) Pres-Lam frame with dissipative bracing systems



c) Pres-Lam wall

Low damage seismic performance
Suitable for high-rise construction

50% less structural bracing required



References:



Pre-stressed laminated timber structures



2016 Kaikoura earthquake
Magnitude 7.8



The building was undamaged and
could be occupied by emergency
response group



References:



Folded timber shell structure



Earthquake resilient, light weight, folded-wave shell structure



Structural material minimisation through shell geometry
Structural architecture
CNC accuracy of 3mm over 30m

References:



Team:
Structure
Services

Chris Moller Architecture + Urbanism, MOTM Architects, Grant Douglas
Dunning Thornton Consultants
eCubed Building Workshop



Maximised-timber design



Stiff-diagrid structure

Maximise the used of timber

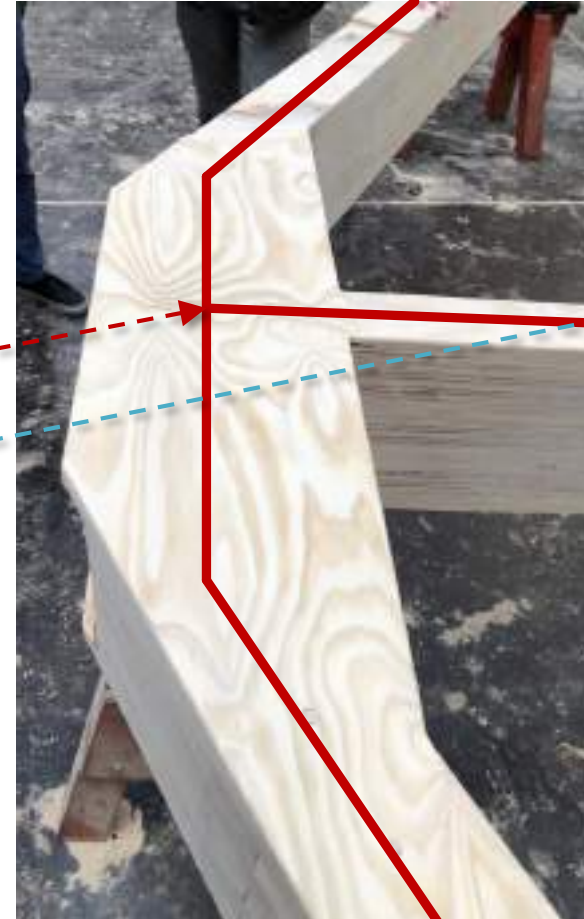
Combine engineered wood products

Use of biobased alternative materials

CNC precision and speed

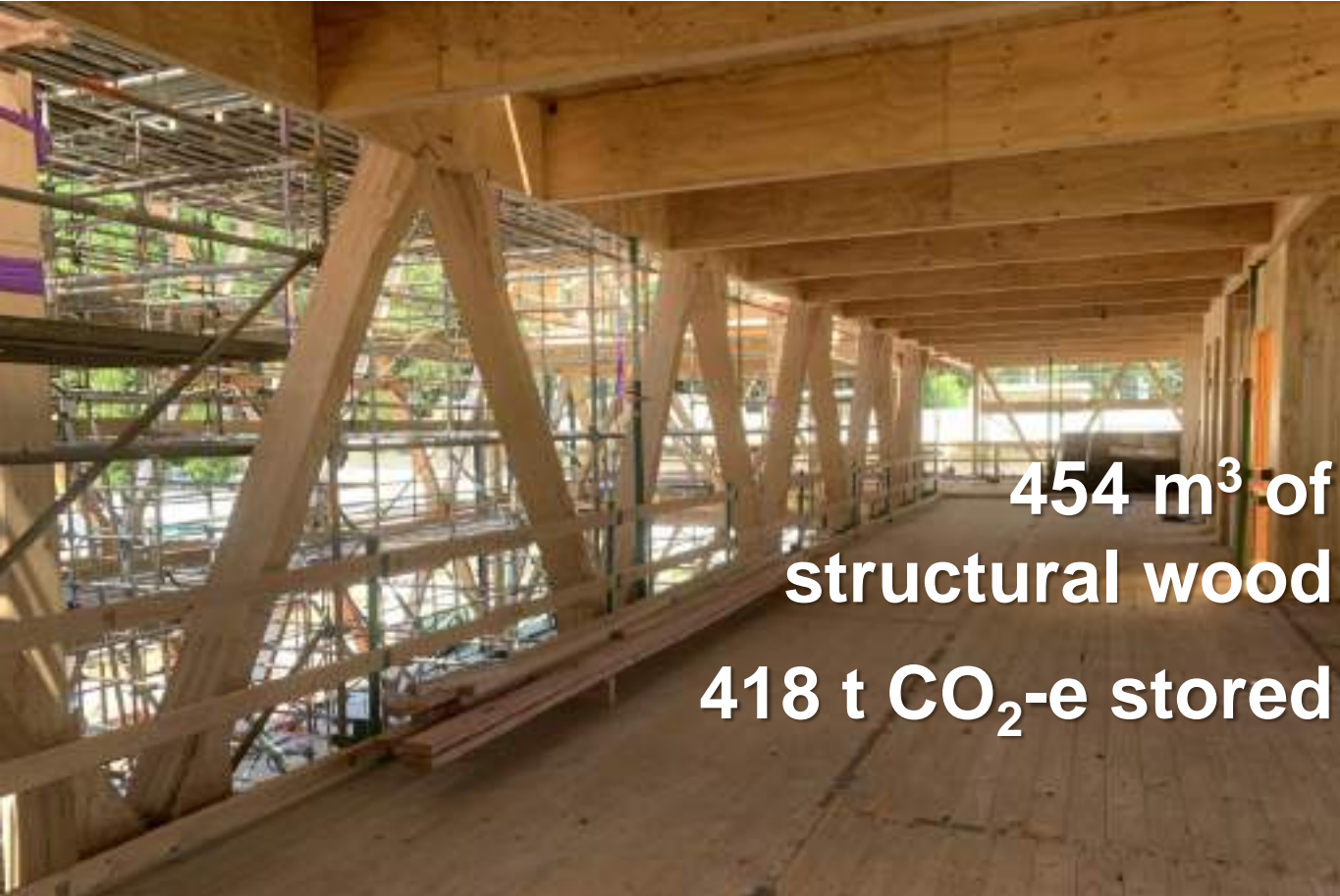
References: The Scion Innovation HUB
Architecture: Irving Smith Architects, RTA Studio
Structure: Dunning Thornton Consultants

Maximised-timber structural design



References: The Scion Innovation HUB
Architecture: Irving Smith Architects, RTA Studio
Structure: Dunning Thornton Consultants

Carbon Sequestration and Storage



**454 m³ of
structural wood
418 t CO₂-e stored**



**35 minute re-growth time
in NZ Radiata Pine forests**

References: The Scion Innovation HUB
Architecture: Irving Smith Architects, RTA Studio
Structure: Dunning Thornton

Take away messages



Innovation with engineered wood is happening by:

- Optimising the production, management and use of resources
- Innovating with Design (structural, architectural and circularity)
- Innovating with Manufacturing and construction (CNC, DfM, Prefab)

Innovation with engineered wood enables:

- Improved building performance
- Improved building resilience
- Improved sustainability



Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

SUSTAINABLE WOOD *for a* SUSTAINABLE WORLD



Working across sectors



Supporting a circular biobased economy



Thank you

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Prosperity from trees *Mai i te ngahere oranga*

Scion is the trading name of the New Zealand Forest Research Institute Limited