Construction of Pres-Lam buildings

TDS Seminar – 12 October

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STIC Research consortium

Structural Timber Innovation Company Ltd

- Funding from Industry
  - CHH, NPI, PMA, BRANZ, Australia
- Matched by NZ government
  - 5 year programme
- R&D on timber buildings
  - U. Canterbury – frames & walls, eq, fire, CO$_2$
  - U. Auckland – long span roofs, fasteners
  - U.T.S. Sydney – floors, acoustics
Heavy timber – Wellington
Heavy timber – Auckland
LVL building - Germany
7 storey building - Berlin
7 storey building - Berlin
KLH – Katsch, Austria
CLT: 9 storey building - London

Murray Grove, London
CLT: 9 storey building - London

Murray Grove, London
What’s new in NZ?

Post-tensioned concrete systems transferred to wood
LVL glued into large beams and columns
NZ Wood
STIC
Research at UC, UA, UTS
LVL - Laminated Veneer Lumber

LVL changes Radiata Pine from a commodity to a top class engineering material

Could also use glulam or CLT in many cases

Veneers 3mm thick
Competing with concrete

Why not do this in wood?
Post-tensioned timber frames

Post-tensioning solves the problem of moment connections for heavy timber
Post-tensioned timber wall

Post-tensioning solves the problem of moment connections for heavy timber
Post-tensioned timber walls

Post-tensioning solves the problem of moment connections for heavy timber
NMIT – Arts and Media building

Aurecon engineers, ISJ architects
Testing at Canterbury University

Unbonded PT Specimen
(BEAM CONTACT SECTION)

Top-lateral Force [kN]

fp₀ = 0.4fpy
fp₀ = 0.6fpy

Unbonded PT Force [kN]

fp₀ = 0.4fpy
fp₀ = 0.6fpy

Drift

-0.03 -0.02 -0.01 0 0.01 0.02 0.03

-0.03 -0.02 -0.01 0 0.01 0.02 0.03
Controlled seismic rocking

Hybrid specimen 3 – HY3

$fp_0 = 0.6f_{py}$
5-storey shaking table test
Wood-concrete composite floors
Fire safety
6 storey timber design project

Timber alternative
• Structural design
• Fire and earthquakes
• Heating and cooling
• Carbon footprint
• Time and cost

University of Canterbury
Biological Sciences

PRES-LAM
Two-storey building at UC
Organisations involved

- STIC
  - UC, UA, UTS
- Contractors
  - Mainzeal, BBR
- Suppliers
  - CHH, NPI
- Fabricators
  - McIntosh, Hunter
- NZ Wood
Two-storey building
Two-storey building

Post-tensioning
Two-storey building

Earthquake Testing:

Frames

Walls

Post-tensioning
walls
beams

Energy dissipation
Multi-storey timber

- Rapid erection
- Light weight
- Low carbon footprint
- Earthquake resistance
- Value for money
Still to come:

- Video of construction
- Ross Copland’s feedback