## C. 100 box

## Driving Efficiencies With Software Tools and Automated Design

## Sustainability

## C. Thoolbox

## Sustainability



## C.CTOOlbox

## Sustainability

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## ChToolbox

## Sustainability

Australian buildings and infrastructure: Opportunities for cutting embodied carbon



25 King: Cred Lendlease


Latrobe St: Cred TTW

- 75\% Reduction on BAU (biogenic included)
- 74\% Reduction on BAU (biogenic included)


## Biophilia

## C. Toolbox

## Biophilia


https://www.woodsolution s.com.au/wood-at-work

## C. Toolbox

## Ethics Isn't Enough



## Driving Cost Efficiencies

## Bottlenecks = Key To Efficiency



## Toolbox

## Professionals



## C. Toolbox

## Professionals


2. Supply Chain Capacities

3. Land and Forest Utilisation


## C. Thoolbox

## Co-ordination and Shop Drawing



## C.aToolbox

## DfMA

Design for Manufacture


## C.ㄷ․ Toolbox

## DfMA



## C. Thoolbox

## Design Paradigms

Level 1 - The Shoehorn Approach

- Design paradigm of concrete construction



## 다Toolbox

## Design Paradigms

## Level 1 - The Shoehorn Approach

- Design paradigm of concrete construction


## Level 2 - Designing With Components

- Grids conducive for mass timber
- Square peg in a square hole
- Function follows form


## [1]Toolbox

## Design Paradigms

## Level 1 - The Shoehorn Approach

- Design paradigm of concrete construction


## Level 2 - Designing With Components

- Grids conducive for mass timber
- Square peg in a square hole
- Function follows form


## Level 3 - Designing with Scalability

- Designing with constraints in supply chain to alleviate bottlenecks
- Improves processes and most cost effective
- Replication eliminated in the supply chain


## Toolbox

## Design Paradigms

## Potential or Actual

Performance / Price


## Toolbox

## Design Paradigms



# Designing With Scalability 

## C. Toolbox

THE
ALMANACK
OF
NAVAL
RAVIKANT

## Toolbox

## Leverage

People

Henry Ford
Ray Croc
Sam Walton

## Toolbox

## Leverage

## People



Henry Ford
Ray Croc
Sam Walton

Money


Warren Buffet
George Soros
Carl Icahn

## Toolbox

## Leverage



Henry Ford
Ray Croc
Sam Walton


Warren Buffet
George Soros
Carl Icahn


Mark Zuckerberg
Larry Page / Sergey Brin
Reid Hoffman

## C. Toolbox

## Zero Costs of Replication



## Replication Costs in Construction



Nesting/Arrangement
Shop Drawings
Transport/Logistics
Price Negotiation Dispute Resolution Inventory Management Invoicing

## Supply Chain

Co-ordination Meetings
RFQs

Reinforcement/PT

## Quality Control




## C. Thoolbox

## Today



## C. Thoolbox

## Tomorrow?



## C든Toolbox



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## ChTroolbox



## Timber Demand Infrastructure



- Approx 1/300 Engineers Are Mass Timber Specialists
- It is difficult to become a mass timber specialist.


## Problem 1

This isn't taught at university. We need to provide the best education on the job.

## Problem 2

Engineers are reinventing the wheel doing the same tasks. We can provide the industry infrastructure to make it cheaper for engineer's on the job, and reduce project design fees.

## C. Toolbox

## Timber Demand Infrastructure

|  | Approach | Design Tools Development (Hours) | Design Learning (Htours) | Geelong - Post and Beam | $\begin{aligned} & 240 \text { Vic } \\ & \text { St -CLT Wall / } \\ & \text { CLT Floor } \end{aligned}$ | Pheonix Apartments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CLT Floor (Ambient) | Excel | 26.7 | 21.3 | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| CLT Floor (Fire) | Excel | 17.3 | 21.3 | $\bigcirc$ | 0 | $\boldsymbol{*}$ |
| CLT Wall (Ambient) | Excel | 26.7 | 21.3 | 0 | $\bigcirc$ | 0 |
| CLT Wall (Fire) | Excel | 16.0 | 21.3 | $\star$ | 0 | $\boldsymbol{*}$ |
| Mass Timber Beam (Ambient) | Excel | 23.3 | 4.7 | $\bigcirc$ | $\otimes$ | $\otimes$ |
| Mass Timber Beam (Fire) | Excel | 2.7 | 4.7 | $\bigcirc$ | * | $\boldsymbol{*}$ |
| Mass Timber Beam Penetration and Reinforcement | Excel | 10.0 | 4.0 | 0 | $\otimes$ | * |
| Mass Timber Column (Ambient) | Excel | 9.0 | 8.7 | 0 | * | * |
| Mass Timber Column (Fire) | Excel | 6.7 | 6.0 | 0 | $*$ | $\otimes$ |
| Mass Timber K-brace (Stability) | Excel | 1.3 | 5.3 | $\bigcirc$ | * | $\otimes$ |
| CLT Floor Point Load (Ambient) | Excel | 4.0 | 7.3 | $\bigcirc$ | $\bigcirc$ | $\boldsymbol{*}$ |
| CLT Floor Point Load (Fire) | Excel | 2.0 | 6.7 | $\bigcirc$ | $\otimes$ | $\otimes$ |
| CLT Lintel Design | Excel | 9.3 | 8.0 | * | $\bigcirc$ | $\boldsymbol{*}$ |
| CLT In-plane Strength (Shear Wall / Diaphragm) | Excel | 11.3 | 13.3 | $\bigcirc$ | $\theta$ | $\otimes$ |



Post and Beam


Light-frame Walls / Mas Timber


CLT Wall and CLT Floor

## C. Toolbox

## Timber Demand Infrastructure



506 Unpaid Learning Hours



466 Unpaid Learning Hours




|  | Cost | Design Fee | Net Profit |
| :--- | :---: | :---: | :---: |
| Full Journey | $\$ 160,100$ | - |  |
| Geelong - Post and Beam | $\$ 101,300$ | $\$ 80,000$ | $-\$ 21,300$ |
| 240 Vic Street | $\$ 101,000$ | $\$ 40,000$ | $-\$ 61,000$ |
| Phoenix Apartments | $\$ 93,200$ | $\$ 60,000$ | $-\$ 33,200$ |

Table 5


## CLT Floor Fire Calculator.

1. Overview.
2. Insert variables.
3. Review Calculations and Export.

## C. Toolbox

## Team



## C. Toolbox

## Partnerships <br> TIMBER LINK <br> Suppliers <br>  <br> New Yealand Timber Design Society <br> New to mass timber structures or the provisions or provision of the new timber Timber Design Centre and SESOC with CLIT Toolbox to provide technical su ...see more <br> $\mathrm{Timber}_{33 \mathrm{~S} \text { Dillowers }}^{\text {Sign Centre }}$ + Follow <br> The Timber Design Centre (TDC), New Zealand Timber Design Society (TDS) and Structural Engineering Society (SESOC), are all collaborating to provide technical advice and validation of the new design tools developed by CLT Toolbox ....see more <br> Associations <br>  <br> Investors <br> 

## Toolbox

## Partnerships



## Ch.TToolbox

## Thanks ©

