How to prefabricate the timber structures of tomorrow? What we can learn from Europe.
Specialist Services for the New Zealand and Australian Timber Industries

Coming up:
How to prefabricate the timber structures of tomorrow? What we can learn from Europe.
Presentation Sept 7th, 2011 at the BNZ Forest Industries Conference, Rotorua

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‘Heavy’ timber structures
A few points up front

• Not what is technically possible, but what makes most sense for the NZ/AUS industry.

• ‘Digital prefabrication’ and its potential

• NZ timber fabricators are doing a very good job, but...!

• Why this talk? Implications of ‘digital prefabrication’.
Prefabrication of timber structures – an evolution

⇒ 3 distinct waves
⇒ 3\textsuperscript{rd} wave hasn’t reached NZ!
1st Wave: Hand tools
2nd Wave: Power tools
3rd Wave:
Information technology (digital prefabrication)
‘Digital prefabrication’ in NZ/AUS today
CNC equipment - the options

CNC beam processors

CNC gantry routers
Complex vs repetitive geometry
Trap I: ‘just another power tool’

- CNC equipment ≠ another power tool!
  - CAD/CAM integration!!!
  - ‘Digital prefabrication’ will affect ALL aspects of your business!
Trap II: Machine => product

• “Asset obsession!”
• Instead: Product => process/machine!
• Three stages:
  1. Product analysis/quantity/quality => Vision!
  2. Project feasibility/machine selection/plant layout/Capex...
  3. Project implementation
The importance of sound ‘project engineering’

Planning stages determine ~70-80% of overall project cost!!!
Misconception: Digital prefabrication = zero sum game?

Digital prefabricators typically:

⇒ Tackle more complex/different projects
⇒ Add sidelines (see below for ideas)
⇒ Scale up faster!
⇒ Prefabricate to tighter tolerances, more accuracy...
Traditional post and beam construction
Log construction
CLT structures
Centre Pompidou Metz - France
Source: Design to Production
Nine Bridges Golf Club - South Korea
Metropol Parasol - Seville
How do you get into ‘digital prefabrication’?

• Acknowledge it’s an evolutionary step! => When? How?
• Systematic engineering approach required!
  – 3 stages from product to process!!!
• Strategy required
  – Long lead times
  – ‘Lining up ducks’
  – Disruptive technology
• Barriers
  – Misconceptions
  – Market size/volumes required!?
  – Capital investment
  – In-house skill & resources to tackle the project
**What if...? Fast forward to 2020***

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| Productivity of the industry | Fabrication cost  
(for certain structures and under certain conditions) |
| Market size | |
| Number of employees in wider industry (especially skilled jobs) | |
| International competitiveness of NZ fabricators (exports) | |
| Possibilities in timber structure design and timber architecture | |
| Quality/ precision | |

* In case digital prefabrication is adopted by a critical mass of NZ timber prefabricators
Conclusion

• Integration of design and production will dominate the coming decade in this industry in NZ/AUS!
  => towards a continuous digital chain and digital prefabrication!

• Once ‘digital prefabrication’ is adopted by a number of fabricators:
  – Productivity of the industry will go up
  – More complex/innovative design solutions are possible
  – NZ fabricators will catch up internationally
  – Fabrication cost will come down (for certain types of structures)
  – There will be winners and losers due to disruptive nature of technology
  – Cut-to-order operations may emerge long term

• Government needs to understand importance of this manufacturing concept to NZ economy and support industry in the transition process

• Business opportunity ‘panelised timber frame elements’, but thorough project engineering approach is required!
  => There are no shortcuts!
Finally: Let’s rethink what wood can be used for!
Thank you.

js betz consulting ltd
design to production of timber structures