ThermoWood®
Australasia’s first heat treatment operation for Radiata pine

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Wood Preservation 2012 - Rotorua/NZ - Melbourne/AUS

Content of Presentation

• Purpose
• Tunnicliffe Timber Company Limited
• Wood Modification Technology
• ThermoWood®
• ThermoWood® 230 Product Examples
Purpose of Presentation

• Sharing our experience
• We are no promoters, researchers or scientists

Tunnicliffe Timber Company Limited

• Long established small business
  Eastern Bay of Plenty, New Zealand since 1929
• Currently employing 17 permanent staff
• Re-manufacturing of RS Kiln Dried Radiata pine
• Finger-jointing core business
• We process on average 300m3 of timber per month
• Niche Markets
  • Timber Joiners
  • Door Manufacturers
  • Door Pre-hangers
  • Aluminium Joiners
  • Beekeepers
  • Custom Processing
**Wood Modification Technology**

**Permanent change of wood properties**

- Acetylation (Chemical)
- Furfurylation (Chemical)
- Thermal Modification (TMT)
- Others (Wood hardening)

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**TMT History**

- Vikings (700 – 1050 ad)
- Initial Scientific Studies USA – Germany 1930’s – 40’s
- Advanced studies in Germany during 1950’s
- Commercialisation in 1990’s
  - Finland
  - France
  - Netherlands
Structure of TMT Industry

**TOTAL PRODUCTION OF TMT WORLDWIDE**

<table>
<thead>
<tr>
<th>OTHER TECHNOLOGIES</th>
<th>THERMOWOOD TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 PROVIDERS AND SOME SELFMADE</td>
<td>2 (3) PROVIDERS AND SOME SELFMADE</td>
</tr>
</tbody>
</table>

- Appr 55 chambers
- TMT based to several technologies
- 120,000 – 140,000 m³ 2011

<table>
<thead>
<tr>
<th>THERMOWOOD® ITWA MEMBERS</th>
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<tbody>
<tr>
<td>Appr 55 chambers</td>
</tr>
<tr>
<td>TMT based to TW technology</td>
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<tr>
<td>70,000 – 80,000 m³ 2011</td>
</tr>
<tr>
<td>110,000 m³ 2011</td>
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Production statistics are available from ITWA only, other figures are estimates, based on interviews and information available from public sources compiled by Timo Tetri Järtek Oy.

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**TMT Markets**

- Europe and North America
- Replacement of
  - Tropical Timbers
  - Naturally Durable Timbers
  - Softwood treated with chemical preservatives
- TMT producers use local species
  - Main species: Spruce and Pine
  - Some hardwood flooring and furniture (colouring)
  - European market imports raw material other regions
- Main products
  - Cladding and Decking
- Focus on Environment
Main Products

Cladding  Decking

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ThermoWood®

- Originated Finland
- International ThermoWood Association
- Approx. 300,000 m³ TMT 2011
- Approx. 65% ThermoWood® technology

Thermowood® Production Update

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (m³)</th>
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<tbody>
<tr>
<td>2001</td>
<td>18796</td>
</tr>
<tr>
<td>2002</td>
<td>24815</td>
</tr>
<tr>
<td>2003</td>
<td>21831</td>
</tr>
<tr>
<td>2004</td>
<td>31146</td>
</tr>
<tr>
<td>2005</td>
<td>38124</td>
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<td>2006</td>
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<tr>
<td>2007</td>
<td>72485</td>
</tr>
<tr>
<td>2008</td>
<td>79367</td>
</tr>
<tr>
<td>2009</td>
<td>74258</td>
</tr>
<tr>
<td>2010</td>
<td>92089</td>
</tr>
<tr>
<td>2011</td>
<td>109757</td>
</tr>
</tbody>
</table>
ThermoWood® Process

• Thermal degrading of hemicellulose
• Purposely built kiln (230 degrees C)
• From Green or Kiln Dried
  – 25mm  18 to 22 hours (1 day)
  – 50mm  32 to 38 hours (2 days)
  – 75mm  45 to 55 hours (3 days)
ThermoWood® Modification Results

- Colour Change
- Increase in Stability (permanently lowered EMC)
- Increase in Durability (@230 comparable H3.1)
- Removal of Resin
- Improvement of Thermal Properties (insulation)
- Decrease in Density (brittle)
- Decrease in Strength (non structural)

Tunnicliffe’s ThermoWood® Beginnings

Competitive advantage

Problem solving existing problems
- Joinery – instability Radiata pine

Demand for new product
- Beehive Boxes
ThermoWood® Kiln for Sale 2008

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JARTEK

TekmaHeat
ThermoWood® Beehive Boxes

- Chemical free
- Dimensional stability
- Less weight
- Improved insulation

New Products
Building Compliance Exterior Use

• Above ground durability trial Scion Rotorua
• Results after 7 years
• Slightly more durable than H3.1 LOSP treated Radiata pine sapwood and Macrocarpa Heartwood
• NZS 3602:2003
• Requirements components minimum 15 year durability
  – Joinery
  – Weatherboards
  – Facia
• Paint Quality

Practical Benefits

• Makes wood more uniform
• Modification right through
• Very good machinability
• Not compromising durability when machining
• Removal of resin resulting in good paint finish
**Product Example Timber Joinery**

**Oversize Interior Doors**

- Over 1.2m wide
- Over 2.1m high

1. ThermoWood® 230
2. Alaskan Yellow Cedar
3. Western Red Cedar

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**Product Example Timber Joinery**

**Large Window Sills**

- Stability
- Machinability
- Paint adhesion

- Alternative to Native Hardwood
- Large dimensions
- High exposure
- No finger-joints
- No lamination
Product Example Timber Joinery

**Mullions**
- Solving production issue
- Straight
- Stiff
- Light

Product Example Timber Joinery

**Rebated Jambs**

ThermoWood® 230
- 97 x 22 mm

H3.2 Tan® Ecowood™
- 50 x 15 mm
Comparison

**Western Red Cedar**
- Imported Species
- Expensive
- Variable Pricing
- Variable Quality
- Machining Ok (chipping)
- Hard to paint

**ThermoWood® 230**
- Domestic Species
- Less Expensive
- Stable Pricing
- Consistent Quality
- Machining Good (less chipping)
- Easy to paint

Comparison based on practical Joinery customer feedback only

Conclusion

- ThermoWood® 230 well accepted by Tunnicliffe's customers
- ThermoWood® 230 has a place in NZ market

*With our Radiata pine we have a real option for Down Under to enter the world market with a new timber species*
Acknowledgments

• International ThermoWood Association
• Jartek Oy
• Scion
• Total Timba Joinery
• Westpine Joinery
• Rockfield Woodworkers
• Magenta Publishing – Joiners Magazine