HIGH PERFORMANCE FLOORING
improved technologies, lifecycle

Presented by Daniel Wright  |  Australian Sustainable Hardwoods (ASH)
AUSTRALIAN SUSTAINABLE HARDWOODS (ASH)

Introduction
LARGEST AND MOST VERTICALLY INTEGRATED HARDWOOD PROCESSOR IN AUSTRALIA.

5 separate on-site manufacturing facilities (including robotic CNC for Mass Timber).
INTRODUCTION TO ASH

/ Furniture timbers
/ Veneers
/ Engineered flooring
/ MASS Timber
/ Profiling
/ Glue laminating
/ Re-processing + more
DANIEL WRIGHT

INTRODUCTION
DANIEL WRIGHT

/ 5th Generation timber miller
/ Supplied 50+ timbers from around the globe into all joinery / building / manufacturing markets
/ Product development
/ Specification
/ Marketing
/ Co-owner
ROLES INCLUDE

/ Product development: IRON ASH, Australian Oak, MASSLAM
/ Marketing
WHAT WE ARE COVERING TODAY

/ Understanding Timber
/ Definition of High Performance
/ Milling Timber
/ Movement in Timber

/ Engineering Stability
/ Wear Layer
/ Coatings
UNDERSTANDING TIMBER
# TIMBER - DIFFERENT IN MORE WAYS THAN ONE

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>GOODWOOD Victorian Ash</th>
<th>Back sawn Tasmanian Oak</th>
<th>American White Oak</th>
<th>Spotted Gum</th>
<th>Blackbutt</th>
<th>European Beech</th>
<th>Meranti</th>
<th>WR Cedar</th>
<th>Walnut</th>
<th>Merbau</th>
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<tr>
<td>(at 12% MC)</td>
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<td>Cut</td>
<td></td>
<td>Orientatio n</td>
<td>Quarter</td>
<td>Back sawn</td>
<td>Back sawn</td>
<td>Back sawn</td>
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<td>Back sawn</td>
<td>Back sawn</td>
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<tr>
<td>Density</td>
<td>Kg/m³</td>
<td>680</td>
<td>680</td>
<td>750</td>
<td>950</td>
<td>900</td>
<td>690</td>
<td>450</td>
<td>350</td>
<td>600</td>
<td>860</td>
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<td>Stability in width</td>
<td>%</td>
<td>3.5</td>
<td>6.5</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>4.5</td>
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<td>Straightness</td>
<td>Of supply</td>
<td>Excellent</td>
<td>Very good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
<td>Very Good</td>
<td>Poor</td>
<td>Very good</td>
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<td>BAL Rating</td>
<td>Alone</td>
<td>BAL-19</td>
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<td>-</td>
<td>BAL-29</td>
<td>-</td>
<td>BAL-12.5</td>
<td>BAL-LOW</td>
<td>-</td>
<td>BAL-29</td>
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<td>Durability</td>
<td>Above ground</td>
<td>Class 3</td>
<td>Class 3</td>
<td>Class 3</td>
<td>Class 1</td>
<td>Class 4</td>
<td>Class 4</td>
<td>Class 2</td>
<td>-</td>
<td>Class 1</td>
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</tr>
<tr>
<td>Average Length</td>
<td>Of supply</td>
<td>Very long</td>
<td>Long</td>
<td>Medium</td>
<td>Long</td>
<td>Medium</td>
<td>Long</td>
<td>Medium</td>
<td>Short</td>
<td>Very Long</td>
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<td>MoR</td>
<td>MPa</td>
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<td>110</td>
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<tr>
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<td>GPa</td>
<td>16</td>
<td>16</td>
<td>12</td>
<td>13</td>
<td>12</td>
<td>9.1</td>
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<td>12</td>
<td>18</td>
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<td>Strength Group</td>
<td>Seasoned</td>
<td>SD3</td>
<td>SD3</td>
<td>SD5</td>
<td>SD2</td>
<td>SD4</td>
<td>SD7</td>
<td>SD7</td>
<td>-</td>
<td>SD3</td>
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<tr>
<td>Janka</td>
<td>kN</td>
<td>4.9</td>
<td>5.7</td>
<td>6</td>
<td>11</td>
<td>9.1</td>
<td>6.4</td>
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<td>Impact resistance</td>
<td>Joules</td>
<td>18-20</td>
<td>18-20</td>
<td>-</td>
<td>24</td>
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<td>-</td>
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High Performance Flooring

/ Mitigating risk of movement

/ Not sacrificing quality attributes of flooring

/ Increased coating performance
MILLING

THE PROCESS
MILLING | THE PROCESS

PURPOSE

/ Round bits you can’t use
/ Stable bits you can use
MILLING | THE PROCESS

PURPOSE
MILLING | THE PROCESS

/ Log storage
/ Quality check
/ Stored under sprinklers

One of Australia’s largest hardwood operations
MILLING | THE PROCESS

CUTTING PATTERN

Thicknesses:
- 25mm (30mm)
- 38mm (44mm)
- 50mm (57mm)
MILLING | THE PROCESS

/ Racking
/ Air drying
MILLING | THE PROCESS

/ Kiln drying - how
/ Probes from timber to computer controlled temperature wind speed/direction humidity
MILLING | THE PROCESS

/ Free water
/ Bound water
MILLING | THE PROCESS

/ Volumetric scanning
/ Ultrasound scanning
/ Fault docking
/ Grading into Australian Standards
MILLING | THE PROCESS

/ Sizes produced
/ Grades produced

/ Standard Grade

/ Select Grade

/ Structural Grade
MOVEMENT IN TIMBER

SUMMARY
MOVEMENT IN TIMBER

WHY? - Timber is Hygroscopic

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>5%</th>
<th>10%</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
<th>35%</th>
<th>40%</th>
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<td>0</td>
<td>1.4</td>
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<tr>
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<tr>
<td>20</td>
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<tr>
<td>30</td>
<td>1.2</td>
<td>2.4</td>
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<tr>
<td>40</td>
<td>1.1</td>
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<td>3.2</td>
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<td>5.7</td>
<td>6.4</td>
<td>7.1</td>
<td>7.9</td>
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</table>

Relative Humidity - Major Centres

- Brisbane - Ave Ext EMC 12%
- Sydney - Ave Ext EMC 12%
- Canberra - Ave Ext EMC 14%
- Melbourne - Ave Ext EMC 14%
MOVEMENT IN TIMBER

/ Kiln drying - why
/ Maximum stability

Axial (Length):
Green to dry = 0%
Dry = 0.25% per 1%MC

Radial:
Green to dry = 3.5%
Dry = 0.25% per 1%MC

Tangential:
Green to dry = 7%
Dry = 0.5% per 1%MC
MOVEMENT IN TIMBER

CUTTING PATTERN

/ Back sawn or quarter sawn
**Appendix F – Installation checklist**

### Assessing Packs of Timber Flooring

**Flooring Manufacturer:**

**Species Mix:**

**Cover Width:**

**Grade:**

Wrapping is in good condition and there are no signs of the product getting wet.

- **Yes**
- **No**

Boards should be checked for:

- **Cupping**
- **Cover width** (should not vary by more than 1mm between boards)
- **Tongue and groove tolerance** (Sing fit to slightly loose)

**Installation in Floor Area**

**Note:** Cover width variation exceeding 3mm or 3% TEG ft. signs of moisture or cupping may indicate possible problems.

### Site Conditions and Installation Environment

**Site Location:**

**Average fiam RH:**

**Average edd EMC:**

Note: If the external EMC is greater than 3% higher or 1% lower than the estimated average moisture content then additional provision for future expansion or shrinkage needs to be considered (refer Section 3).

If applicable, are subfloor conditions dry, ground levels beneath the dwelling not lower than external ground and graded to prevent ponding? Ventilation to recommendations and ground sloping away from dwelling?

- **Yes**
- **No**

Note: If yes these issues may need to be attended to or other measures taken prior to installing the floor.

If the floor is laid on joists ensure the joists are sufficiently level.

If the floor is over a concrete slab or sheet subfloor, are the subfloors adequately level, dry and in good condition?

**Slab moisture contents or checks undertaken with the following results:**

**Slab level checked and within ±mm in 1.5 m throughout (plywood or batter system).**

Note: Maximum a 3mm

If sheet subfloors have become wet prior to or during construction and may not have sufficiently dried then moisture contents need to be checked. Moisture contents are as follows:

- **Treated subfloor:**
  - **Edged:**
  - **End-grain:**

Note: Physical and penetrative moisture contents need to be determined with oven drying. Sheet subfloors should be within 2% of the timber flooring moisture content being laid over it. Slab moisture assessed in accordance with Appendices A3.

If the floor is over a concrete slab then check it for construction joints and determine whether it has a moisture membrane beneath the slab.
ENGINEERING STABILITY IN FLOORS
Manufacturer's warranty over in slab heating
WEAR LAYER
TRADITIONAL FLOORS
Require sand before polishing

ABOVE TONGUE
- 19mm floor = 6mm
- 13mm floor = 4mm
ENGINEERED FLOORS
Do not require sand and polishing

ABOVE TONGUE
- 19mm floor = 6mm
- 15mm floor = 4mm
TRADITIONAL FLOORS
- Sanded flat

ENGINEERED FLOORS
- Bevelled edge (varying degrees)
- Sanded flat
COATING
COATING

/ Prevent cupping, movement, splits.

/ Increase aesthetic longevity and performance
**Hardness to Wear Resistance Relationship**

The following diagram shows that there is an optimum hardness for maximum wear resistance. As hardness increases, the wear resistance also increases, until it reaches a point that further increases in its hardness result though a decrease in wear resistance.

**Diagram 2**

The above could also be explained by tyre tread rubber on a car. The hardness range for optimum treadwear resistance is 60 to 70 shore A units. Below this the tyre wear will be rapid (although traction will be improved). Above this hardness, tyre wear will also be greater due to brittle failure wear mechanisms.
Soft (oils/waxes):
- Pro's: easier to repair, less scratches
- Cons: Scuffs easier

Harder (2Pak/etc):
- Pro's: More stain and wear resistant
- Cons: harder to repair, scratches easier
NEW COATING TYPES
LED CURED HARDWAX OILS

/ Hard wearing
/ Repairable
/ VOC Gold rating
/ Cure instantly when required
/ Save manufacturing costs
/ Food safe
/ Increases life cycle assessment
NEW COATING TYPES
Repairable / sanding and re-polishing

/ Sanded and re-coated overnight
/ Open for business next day
/ Saved 5 days of closure
NEW COATING TYPES
Repairable / sanding and re-polishing

/ Supplied 2mm veneer with micro bevel edge but wrong colour
/ Sanded and re-coated
/ Installer accidentally spread glue EVERYWHERE
/ Cut back and re-coated
/ Micro bevel still visible (0.5mm removed in total)
THANK YOU

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