What is SWI?

• SWI - Solid Wood Innovation is a private company owned by shareholding wood processors.

• SWI is managed by a CEO (Dr Keith Mackie) with a small administrative office, plus board of directors: 3 representing shareholders, and 2 independents

• It's mission is to provide value to shareholders through provision of R&D services.

• SWI does not conduct research itself, but contracts research from various providers. Although SWI does have some research management/planning capability (Objective Leaders).

• Funds provided by NZ Shareholders (25), plus research contracts to FWPA – representing Australian sawmillers, and Weyerhaeuser USA.

• Shareholders funds for R&D are matched 1:1 by FRST, through its ‘consortia’ programme.
Why Form SWI?

• WQI had proven successful in developing the Research Consortium approach to Wood Quality R&D:
  - Largely Forestry Companies
  - ‘Forestry R&D’ taken up by newly formed Future Forests Research
  - Some WQI activities, esp. stability, tending to be more ‘processing’ oriented
  - WQI had well developed ‘systems’ for R&D management
  - Proven track record

• Solid Wood Processing research had been allowed to run down in NZ (and Australia):
  - Share of government funds used for Wood Processing R&D had reached low levels
  - Wood Drying Multiclient foundering
  - Recognition by many processors of the need for R&D to move the sector forward

Opportunity to take the lead and revitalise Wood Processing R&D using the Consortium Model

Business Case for SWI Investors

- Export of appearance products
- Improved efficiency in manufacturing (structural and appearance)
- Greater energy efficiency and reduced water usage in wood drying
- Overlaps underpin synergy between NZ & Australian investment
- $60 million revenue p.a.
- $70 million saving p.a.
- $17 million saving p.a.
SWI Shareholding October 2009

<table>
<thead>
<tr>
<th>Company Name</th>
<th>SWI Shares</th>
<th>% of Shares</th>
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<tbody>
<tr>
<td>City Forests Limited</td>
<td>10,000</td>
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</tr>
<tr>
<td>Flight Timbers Limited</td>
<td>10,000</td>
<td>2.4%</td>
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<tr>
<td>Jenkin Timber Ltd</td>
<td>20,000</td>
<td>4.8%</td>
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<tr>
<td>Taken New Zealand Limited</td>
<td>20,000</td>
<td>4.8%</td>
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<tr>
<td>Le Grouve Corporation Limited</td>
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<tr>
<td>Nelson Management Limited</td>
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<td>New Zealand Forest Research Institute Ltd</td>
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<td>Niagra Sawmilling Company Limited</td>
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<tr>
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<tr>
<td>Taranaki Limited</td>
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<tr>
<td>T.L.C. Timber Company Limited</td>
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<tr>
<td>W.G. Olsen Group Limited</td>
<td>10,000</td>
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<tr>
<td>radiata Pine Breeding Company Limited</td>
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<tr>
<td>Rossam Sawmill Limited</td>
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<tr>
<td>Rose Vender Holdings limited</td>
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<tr>
<td>Stuart Timber Co Limited</td>
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<td>Taranaki Sawmills Limited</td>
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<td>Timon Limited</td>
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<td>Timberlands limited</td>
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<td>University of Canterbury</td>
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<td>Wads New Zealand Limited</td>
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<tr>
<td>Wella Forest Products Limited</td>
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<td>Wilmor Engineering Group Limited</td>
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<tr>
<td>Winstone Pulp International Ltd</td>
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<td>14.3%</td>
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<tr>
<td><strong>Total No of Shares</strong></td>
<td><strong>420,000</strong></td>
<td><strong>100%</strong></td>
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Research Contract Services

- Forest and Wood Products Australia Limited: 500,000 p.a.
- Weyerhaeuser USA: 100,000 p.a. for 3 yrs

Total: 920,000

SWI Research Programme

**Logs and Stems**
- L1: Stem and log segregation for warp
- L2: Automatic pith detection
- L3: Microshape for optimum log rotation

**Appearance**
- A1: Green Lumber Segregation
- A2: Reduced Surface Checking
- A3: Reducing Resin Bleed
- A3.3: Resin showthrough
- A4: Random Width Ripping / 2-out splitting
- A5: LOSP Solvent Assessment
- A6: Sawmill simulation for pruned logs
- A7.1: Cant opening face scanner - Trachied Effect
- A7.2/7.3: Cant opening face scanner - Resin and visual defect scanning
- A9: Variation in treatability of wood
- New: Finger-joint products problems
- New: Checking in outdoor applications
- New: Pinholes in finger-joints.
### Year 1 of SWI; an overview

- Rapid start–up due to existing systems (ex WQI), and agreed research projects (agreed in consultation in prior 18 months)
- Of 16 projects proposed only 2 have not got underway. Rest going well.
- Call for further projects made in December 2009—good industry response and suite of additional projects added and now getting underway
- Utilised $690k and $1.79 million committed to R&D. Have accumulated some cash reserves (Income is $1.8 million p.a.):
  - “Accelerate” key projects
  - Scope for expanded scope of projects
- Engagement with shareholders has been excellent and good feedback being received.

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**Structural**
- S1.2 Stability of green lumber
- S1.3 Using acoustics to determine structural cutting patterns on cants
- S1.4 Value proposition for green lumber warp prediction
- S1.5 Green lumber segregation for warp & MoE
- S1.6 Cant tool (GNS)

**Energy and Water**
- E1 Dynamic kiln control
- E2 Optimising final steam conditioning
- E3.1/3.2 Kiln emissions, treatment & re-use
- E3.3 Vent heat exchangers
- E4 OSS - optimise energy generation & use
- E6 CDK - drying technology

**Best Practice**
- OTH 2.1 Trouble shooting guidelines - Kiln drying
- OTH 2.2 Best Practice guidelines - Gluing & Finger joining
- OTH 2.3 Best Practice guidelines - Priming & painting
- OTH 2.4 Best Practice guidelines - Timber machining
- OTH 2.5 Best Practice guidelines - saw doctoring
- OTH 2.6 Best Practice guidelines - others

**Other**
- OTH 3.1 Enhanced operator performance
- New Material tracking/Chain of custody
**Wood Manufacturing 2010**

### Why is the SWI model successful?

**Objective leaders**
- Tony Haslett
- Wayne Miller, Tenon
- Keith Robertson, Windsor
- Marco Lausberg
- Andy McNaught
- John Gifford, Verda
- Jeff Parker, Lockwood

Use the most appropriate provider: skills, expertise, delivery, cost-effective
Encourage collaboration/team building

R&D Providers
- SCION
- Windsor Weyerhaeuser Company
- Tratek/Lulea University, Sweden
- Shareholder Companies
- CamSensor
- Windsor
- Weyerhaeuser Company
- Others

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### Achievements to date

- Waste treatment plant for treating kiln condensates
- Simple route to reduce resin bleed in LOSP treated exterior products
- Tool and protocols for rapidly measuring residual LOSP in timber
- Kiln drying energy optimisation software developed - yielding up to 5% energy saving. Currently under commercial test.
- Head rig operator performance study – 1st study of its kind
- Best practise guidelines and trouble shooting guides; Kiln drying, gluing and finger-jointing, etc.
- Stem and log ‘selection’ technology for optimising sawing for stable lumber*
- Full sort (near dry) lumber segregation for stability in service*

* Continued from WQI
Stem and Log Segregation – Structural and Stability Properties

- Conducted an individual stem/log trial – 650 logs, 3800pc lumber!

Objective: Factor in Wood Quality along with shape/sweep data to improve stem bucking/log making and lumber cutting decisions (saw patterns)
- Maximise stable, stiff lumber

Production of Warp Stable Structural Lumber

Users consider straightness and stability the most important attribute – strength and stiffness are a given

Technology has been developed to enable structural lumber to be classified on the basis of its stability in service

Value Proposition:
- Able to satisfy demanding customers: mechanised truss plants, DIY stores – ’cherry picking’ customers.
- Reduction of call-backs, claims
- Product differentiation
- Better able to compete with other materials, e.g. Steel
- Reduction in kiln drying time and costs
  - dry to higher final MC
- Significant price premium for Stability Guaranteed timber

This is commercial reality now!
Performance of Headrig Operators in Sawmills

- The study aims:
  - identify and understand factors and conditions that affect head-rig operator performance;
  - determine a range of interventions to help sawmills optimise the ability and performance of headrig operators in these tasks;
- The focus was specifically on mental workload and factors that might affect the performance of operators.
- Mental workload was measured using:
  - NASA task load index (TLX), a commonly used subjective rating scale
  - Measurement of secondary task performance – spare mental capacity
  - Primary task measures – production rate, operating environment, etc

Objective: Improved performance – productivity, consistency, value recovery

1st Such Study of its kind to be Undertaken!

Opening Face Scanner Development

Objective: Scan opening face for intrinsic wood quality: compression wood, resin, knots, etc

Potential Application:
- better sawing decision making: right log for the right products
- log quality monitoring
- check on performance of headrig scanning, positioning system
- other……

Prototype Scanner being installed/tested now
**Improved Exterior Products - Reduced Resin Bleeding**

- Resin bleed through in high value exterior products is unacceptable. For example, painted, LOSP treated fascia and weatherboards.
- Research programme has two aims:
  - Better performing products
  - Higher yields through ability to utilise resinous material
- Testing wide range of products (existing and new):
  - Treatments, Primers, Topcoats
- SWI Exposure trial results have already made a difference to companies
  - Simple method to improve product performance
  - "Pointers" for future high performance products
  - Identified a new issue with painted exterior wood products – R&D underway to resolve problem

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**Understanding Surface Checking**

Aim – understand the variability of surface checking during drying

Experimental work in conjunction with Lulea University, Sweden: Use of X-rays to examine moisture gradients during drying:

X-Rays show quite significant moisture differences across the cross-section while the wood is drying, and significant differences between pieces – Impact on checking, stress, distortion?
Lumber Quality from CDK drying

Comparing the effect of CDK schedules on the drying quality of both structural and appearance grade timber

- With-in and between-board MC uniformity
- Distortion
- Residual transverse stress
- Residual longitudinal stress

Technology identified offshore that potentially could be used by SWI shareholders. Trials were organised and conducted promptly.

Recovery of Condensate from Kilns for Reuse

Aim - Develop an affordable, robust and effective kiln condensate treatment package suitable for current and future kiln technology, with opportunity to reuse condensate

- Kiln discharges are rarely collected
- Up to 50% of the wet timber is recoverable liquid
- Water shortages at some sites, disposal issues at others
- Cannot easily use untreated liquid discharge for other applications due to odour, pH and other problems.

Progress so Far:
- Desk-top study on condensate characteristics
- Initial lab trials to determine appropriate methodology
- 1st Generation Pilot Plant tested
- 2nd generation pilot plant – just commissioned
Objective: Package current information and best practices in one easy to access form that can be used day to day by companies


3. Priming and Painting – Final Draft completed

4. Planing and Moulding – Draft complete, out for industry review

5. Sawdoctoring – Draft being prepared

The need for these Guides was identified early on by SWI shareholders, and they have provided immediate value to day to day operations

Key areas of focus now includes:

- Green lumber segregation for structural and appearance
- Cant assessment technology for improved structural lumber recovery
- Open face scanning systems for higher grade recovery in appearance sawing
- Energy options decision support
- Improved performance of exterior wood products
- Improved grading systems/reliability for structural lumber (Australian focus)
Opportunities for new Investors

• Projects underway are of direct relevance
• Considerable scope for SWI investments to be influenced and tackle problems of direct applicability to your company
• Some scope to offset shareholding costs through research services provided to SWI
• SWI would in all likelihood be able to leverage new shareholding (but not a major driver)
• SWI will operate in close co-operation with WPA and PMA in securing further Government support for solid wood processing R&D.
• For seamless information transfer residual companies need to become shareholders and pay their way.

\textbf{SWI is not driven by $s. It's all about delivering for the Wood Processing Sector – Inclusivity is important.}