# Global challenges

## for forest products industries

## Threats or opportunities for The tropical timber sector??

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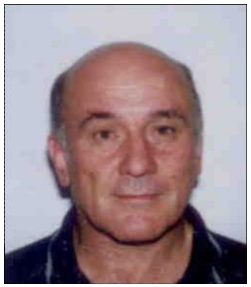

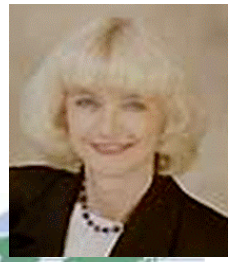

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# The squeeze on Tropical Timbers

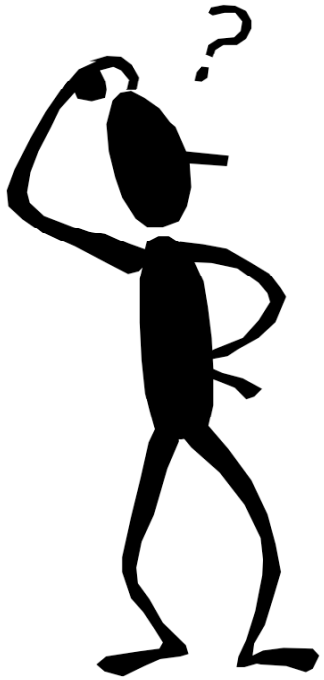
- Threatened by innovative products, both wood and non-wood
- Declining prices and falling quality
- Declining availability and increasing costs
- Environmental certification
- Carbon and energy auditing

- ITTO 2010 Review of World Timber

# The competition -How can we use them to our advantage”

- The challenge – How can we move into higher-value products with a resource declining in availability and quality
- We need to learn from others and become smarter (ITTO has a vital role)
  - Intelligence gathering
  - Research and development
  - Investment
  - **TRAINING**

# Challenges
# Where can we improve?



- Resources
  - Regional –better use of plantations to supplement tropical timbers
- Products
  - Appearance products
    - Veneer
    - Sawn
  - Use of residues
    - Composites
    - Energy products – charcoal and fuel pellets
    - We need to reduce waste and match the aggregation of residues with the product input requirement

# The resource

- Unlike temperate regions, there is a diverse range of species (even on one hectare)
- Delicate ecological systems
- Challenge - managing the ecological system while providing a sustainable flow of wood products
- Supplementary resources

Picture courtesy of ITTO

# There is no known hidden resource (such as Siberian softwoods) to make up the hardwood shortage

**Supplementary resources**

- Rubberwood – shortage of natural rubber can reduced availability
- Plantation teak – veneer product - increased interest, prices through the roof
- *Acacia mangium* – greater potential for solid wood than intended pulp resource
- Coconut and palm oil wood – Extreme variation in quality, low product recovery
- Other resource – African mahogany, other pioneering species
- Temperate climate resources
  - Increased dependence on intensively managed native forests and plantations
  - Increasing wood availability, mainly young and low-quality

# What are the technical challenges?

- Improved and consistent wood quality for a wide range of solid and fibre products
  - Tree breeding and vegetative propagation
  - Potential of hybrids
  - Intensive silviculture
- Processing smaller and unpruned logs:
  - Drying and performance of younger wood
  - Value-adding wood with character (eg knots):
    - Structural composites (veneer products, stranded lumber)
    - Appearance use components (eg furniture and parquet)

# Is it possible to apply developments with rubberwood to other resources?

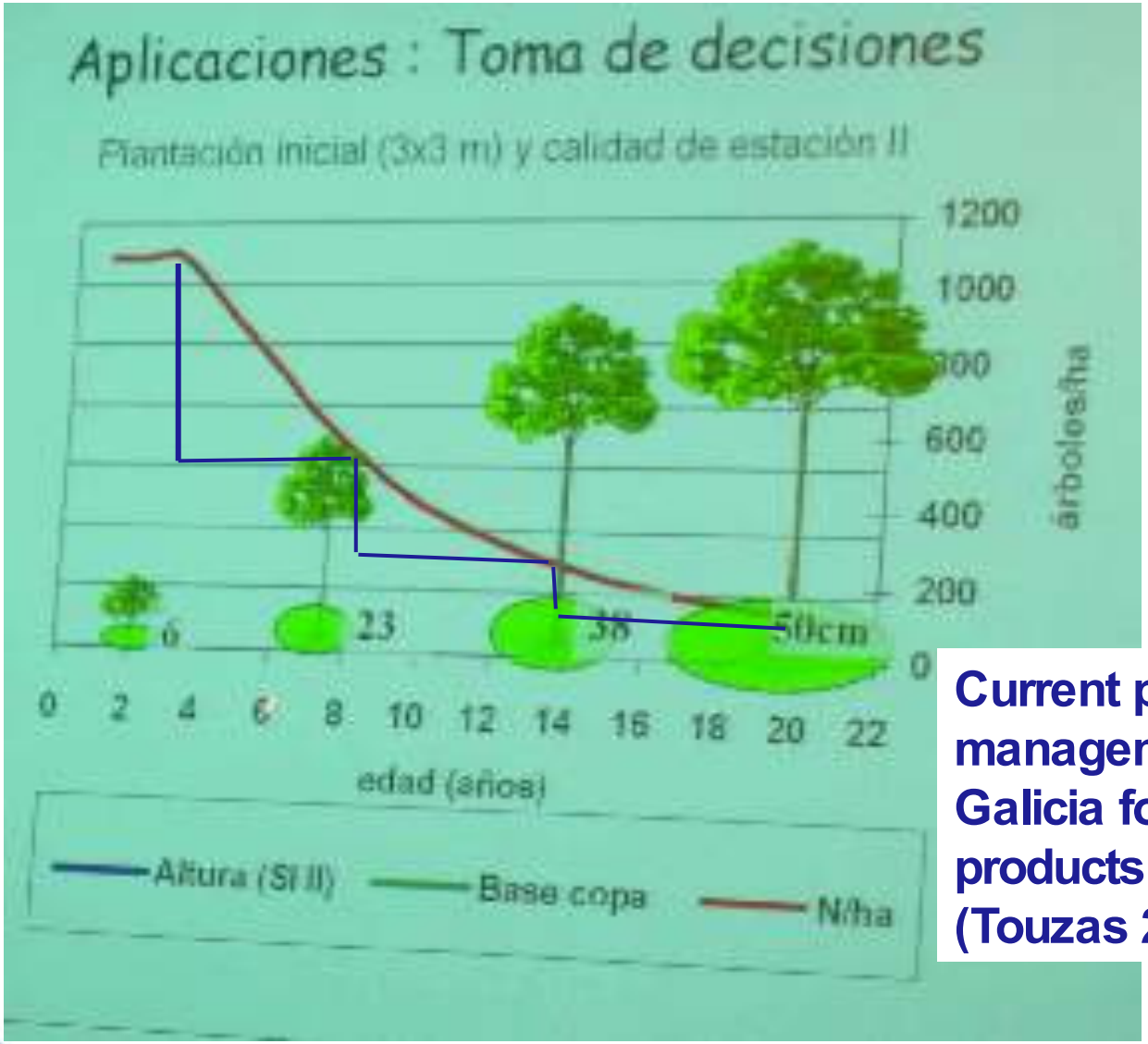

## *Acacia mangium*

- Over 1.5 million ha in Asia
- Fast-growing pioneering species
- Marketable wood characteristics at young age, but carries many defects which limit availability of larger dimension products
- Compared to many tropical species, a challenge to dry

# Even at young age, pioneering hardwood species have a high potential for solid wood products

- They can be used for a wide range of products and at a very young age
- They can achieve a very fast growth rate and have the potential to be grown even faster
- They have a proven adaptability to an extreme range of environmental conditions in may countries

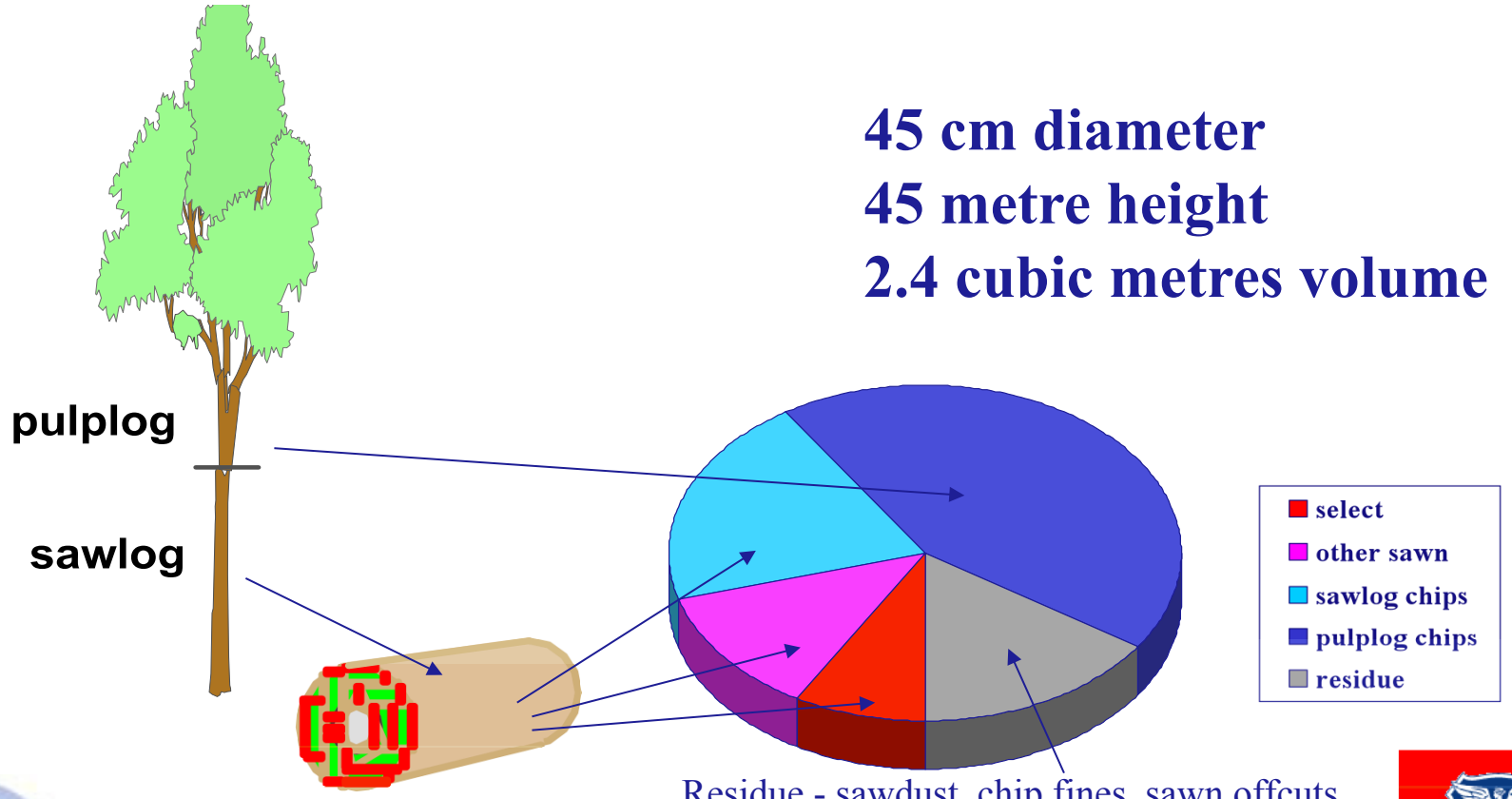
**Table and chairs from 10-year-old *Eucalyptus camaldulensis* - Thailand**




**Current plantation management strategy in Galicia for solid wood products (Touzas 2006)**

# Products

# Wood flow from plantation-grown 18-year-old *E. grandis*



# Products from 12 year old 'clearwood'

## *E. globulus*

Small low-quality sawlogs, veneer billets, pulpwood.

Furniture components, LVL structural veneer, engineered composites

Pruned height 6 metre.
Stem diameter >40 cm

High-quality sawlogs, veneer billets

Long-length strip flooring, furniture timbers and appearance or face grade veneers

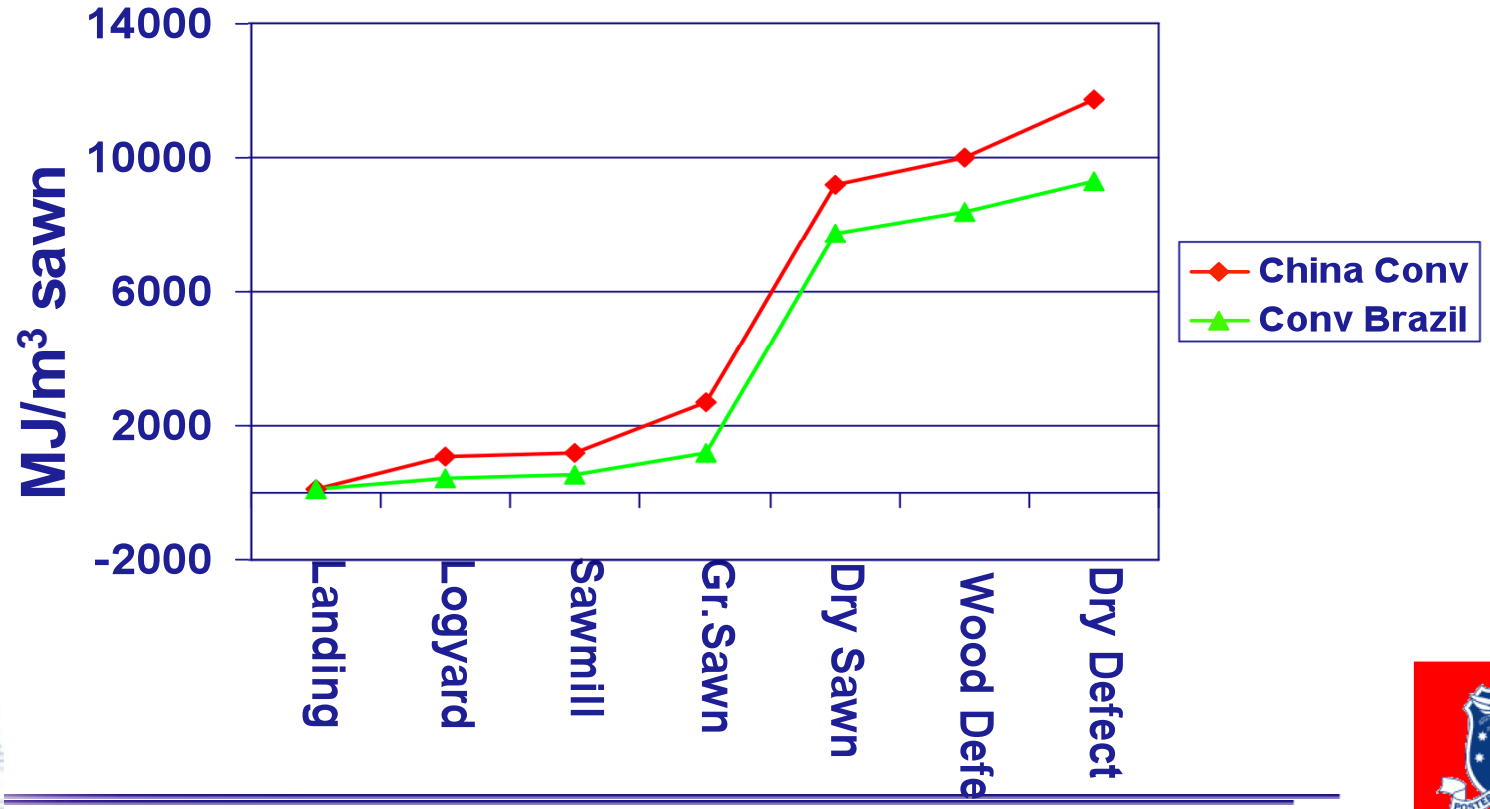
# Primary wood processing

Carried out closer to the resource

- Legislative requirement
- Reduced energy use
- Equipment and training - investment
- Quality control
- Certification – chain of custody
- Efficient use of residues

# ENERGY AUDIT

## Advantage of primary processing close to resource



# Sawn products

- Need to aim for higher-value products
- Improved sawing and in particular drying practices are essential
- Grade sawing (manual intensive) practices needed for high value appearance products.
- More uniform plantation resources better suited for more automated systems for commodity products

# Sawing rain forest species

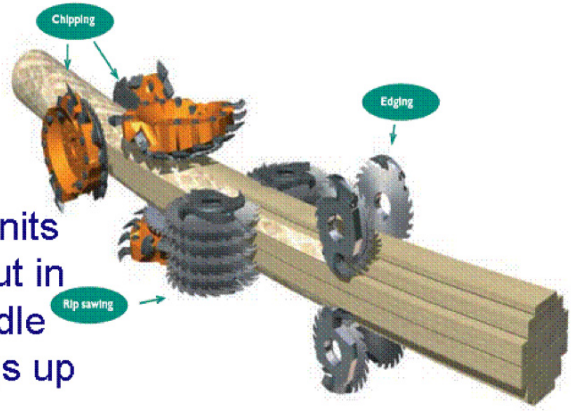
- More valuable species need specialised grade-sawing for high-value products
- Operator training in sawing strategies and grading is essential
- Downstream grading and sorting
- Horizontal integration with decorative veneer manufacture

# Sawing plantation species

- More mechanised systems need uniform resource and greater volume throughput
- Downstream grading and sorting essential
- Higher concentration of residues. Asset or problem?

Hewsaw R200

Profiles log and multiple saws in one plane. Best suited for logs 150 to 250 mm diameter

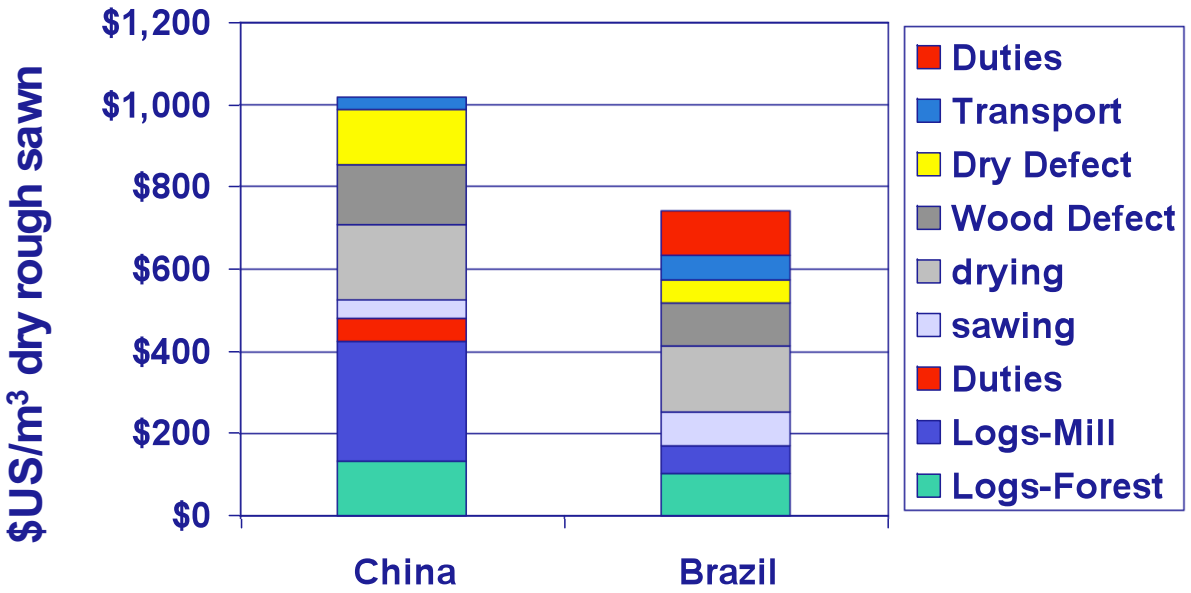



Other multi-station units such as R250 duo cut in two planes, can handle sweep in logs for logs up to 350 mm diameter

# DRY SAWN COST COMPARISON

## (desk-top study)

- Brazil plantation *Eucalyptus grandis*
- Two processing options, in Brazil or China
- Cost $US/m$^3$ delivered to China further processor



# Need to rethink sawing systems

- Sawing units are oftenmore suited for processing small low-density logs eg Sugi
- Small kerf and pitch result in ‘wood flour’ rather than sawdust, packing saw cut, causing overheating of saw and loss of tension
  - Poor sawing accuracy
  - Frequent saw changes
- Poor occupational health and safety
- Occupational training??

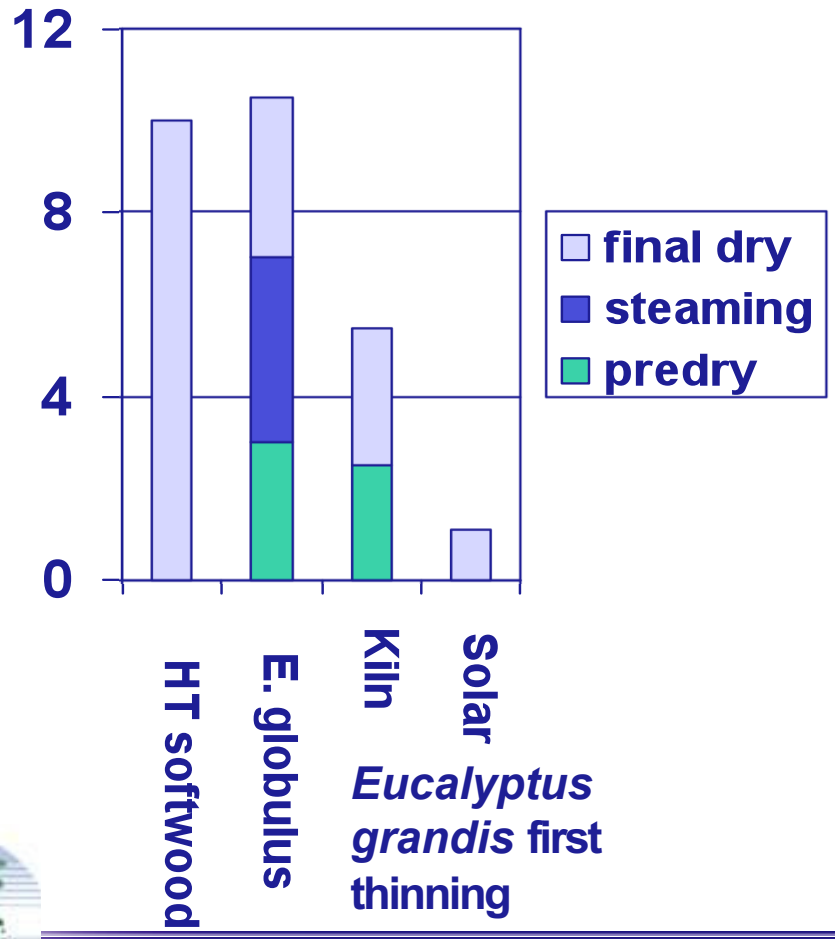
# Wood drying

- Quality drying is perhaps the most critical factor in moving to higher value products
- In most tropical countries there needs to be a complete reappraisal of drying practices
- Reinvestment on drying and improved control systems and more essentially in training are the key to success
- Training and improved operational procedures are essential in all stages of wood drying

# New generation solar drying

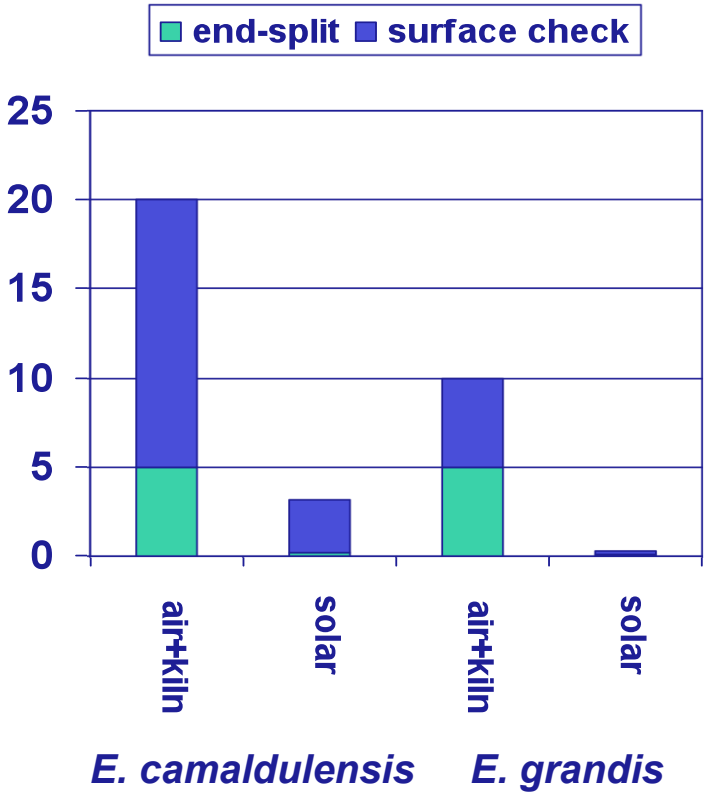
- Increased solar collector area-capacity ratio and improved insulation maximise energy efficiency
- Conventional ‘cross-flow’ air path in dryer with reversing fans
- Full weather station & highly intelligent automated controller with intelligent venting
- Cyclic drying strategy – optimizes solar efficiency and improves drying quality
- Built-in air-flow baffles
- Kiln moves between wood stacks for rapid turn-around and easy access

# Energy savings are enormous
## (heat plant requirement GJ/m$^3$)




- Solar energy use based on average energy use for southern Australia, including winter supplementary heating.
- Expect considerable energy requirement reduction at latitudes closer to tropics
- 80% Savings recorded over 1 year operation in Melbourne while drying in same time as conventional dryers

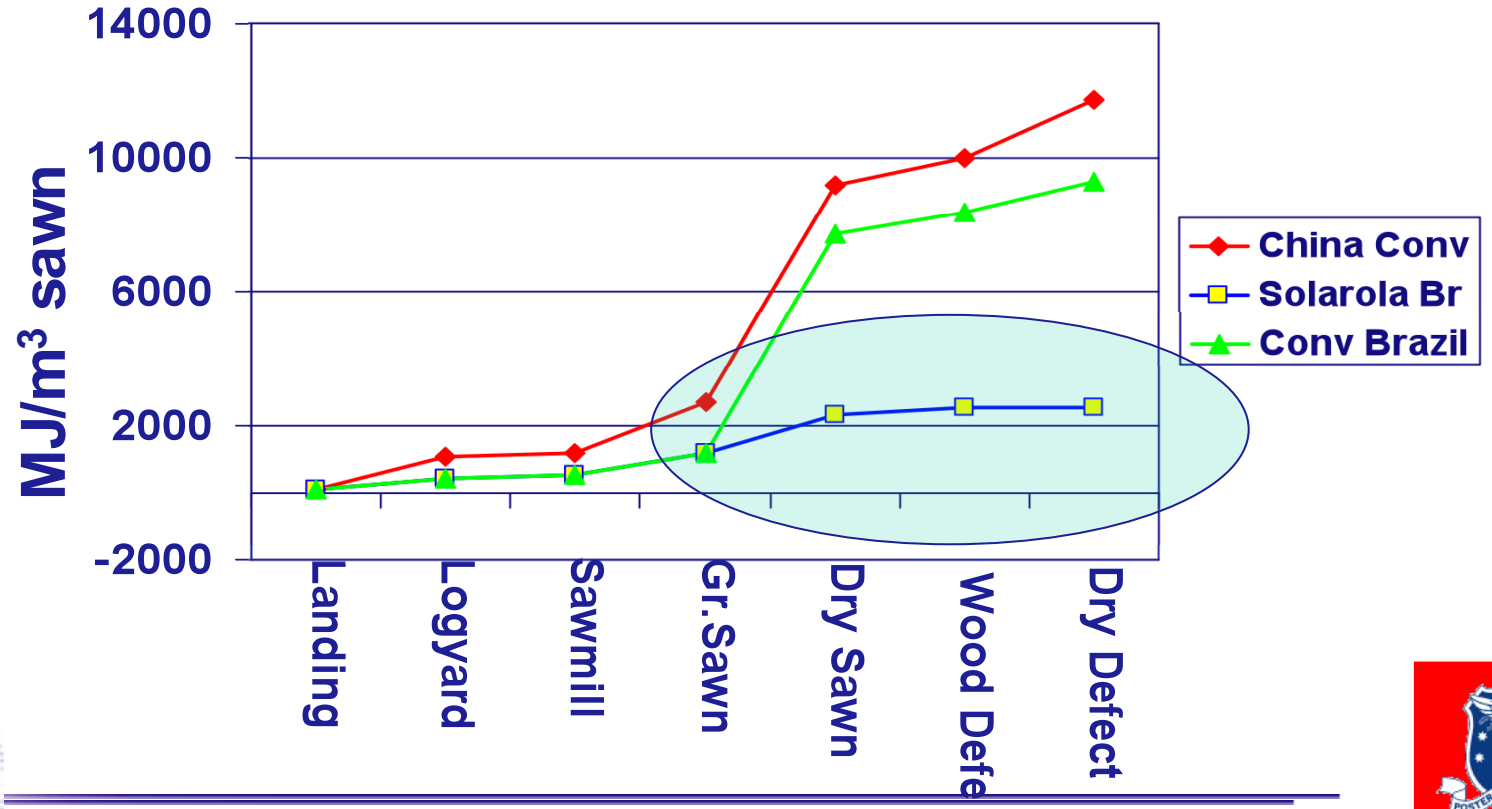
# Reduced degrade using new generation cyclic solar drying




- Improved product volume recovery through reduced end-splits (graph)
- Improved product value through reduced surface checks
- Confirmed Melbourne Performance

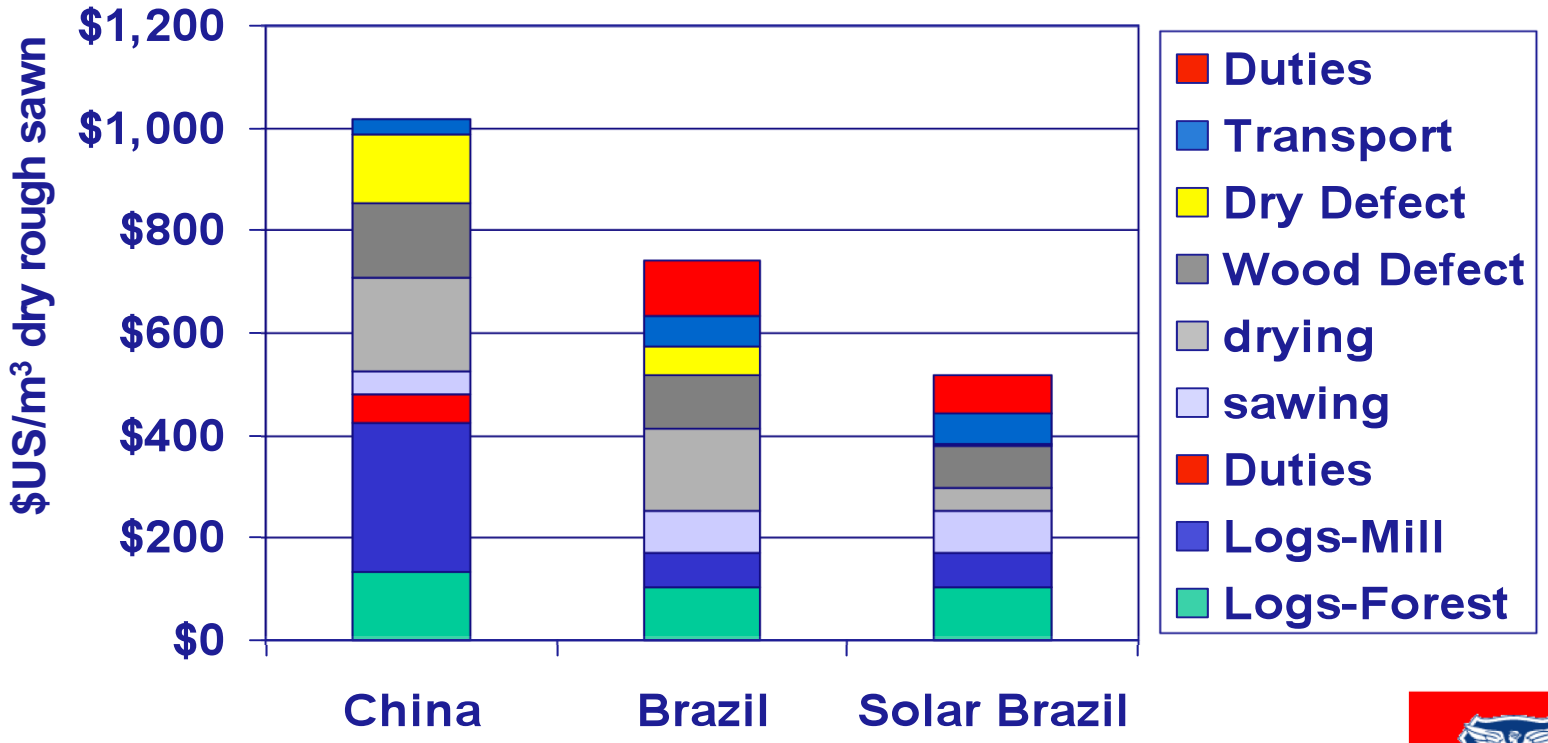
# ENERGY AUDIT

## Large saving using solar drying



# DRY SAWN COST COMPARISON

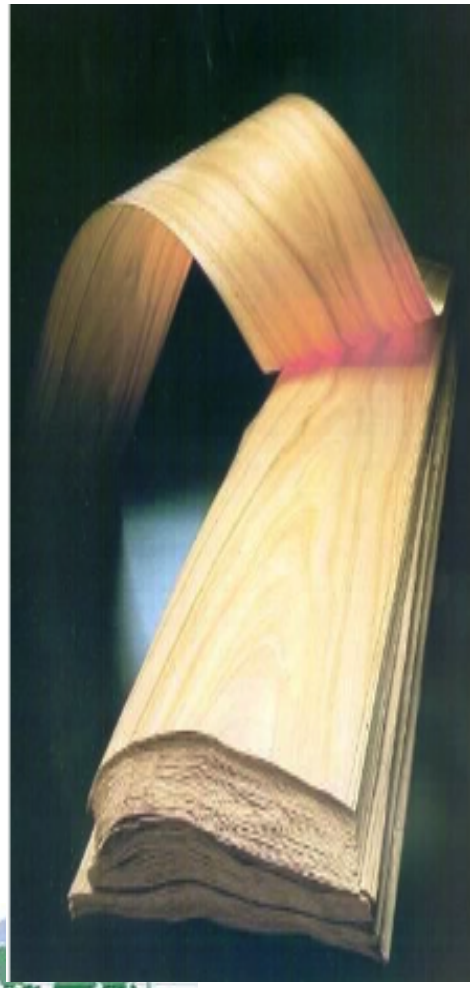
## Cyclic Drying Technology (*E. grandis*)



# Value-added applications

- Decorative veneer
- Flooring
  - Solid
    - Single strip
    - Parquet
    - Multi-strip
  - Engineered
- Furniture and furnishings

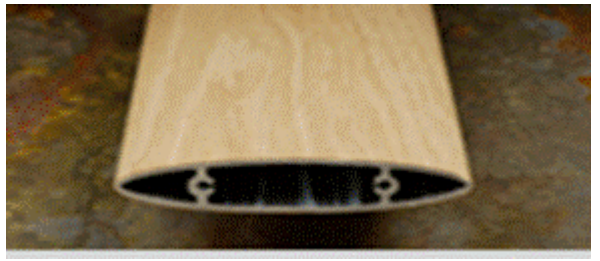
# Decorative veneers



- Generally need to be sliced to take advantage of appearance attributes
- If manufactured in association with sawmilling, enables billets to be selected
- Very thin veneer (0.1 - 0.25 mm) can be applied directly to shaped composites
- Thicker veneer (eg 0.4 to 1 mm) applied to flat surfaces

# Decorative veneer wrapped products

- Very thin (0.1-0.25 mm)
- Can be wrapped and fastened by adhesive (eg isocyanate) to almost any substrate
- Can be applied green to many substrates (veneer less fragile)
- Very high value-adding from selected billets



Metal window louvre blind

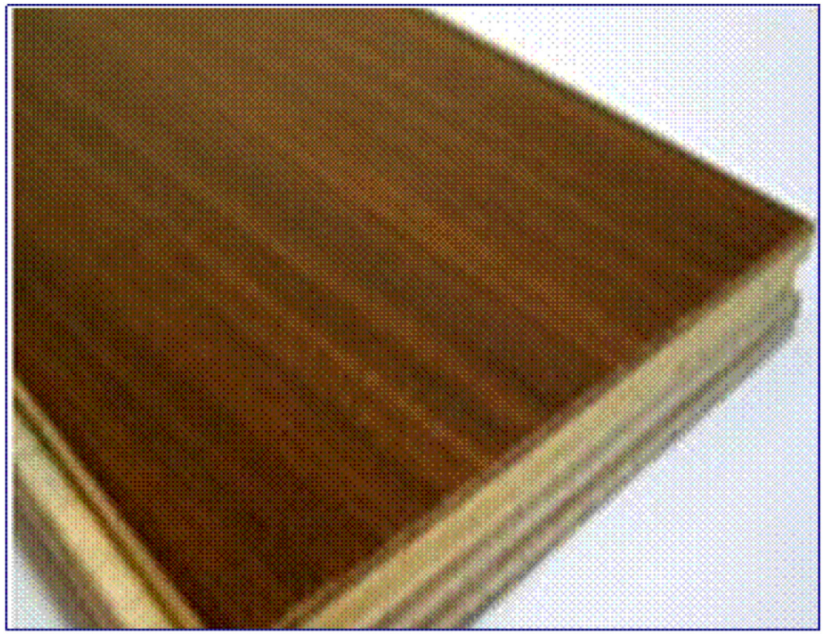
MDF mouldings

# Multi-strip flooring

- Assembled from short-length, narrow pieces from low-quality boards
- Finger-jointed and edge-glued
- Colour matching required for higher priced markets
- Labour-intensive at every stage of manufacture

# Engineered flooring

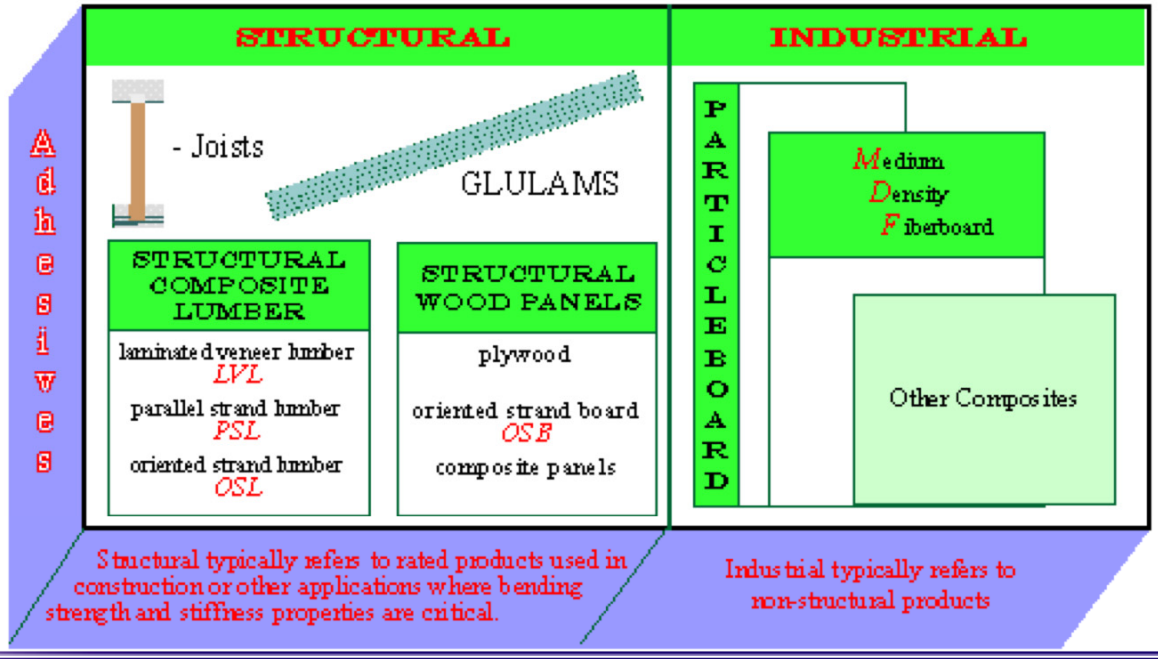
- Top lamel (2 to 4 mm) sawn from selected boards
- Specialised primary drying required to ensure uniform moisture content and free of drying stresses
- If base product is from certified resource then final product should meet certification specifications
- In-use stability much better than solid product



# Composites

## Threat or opportunity?

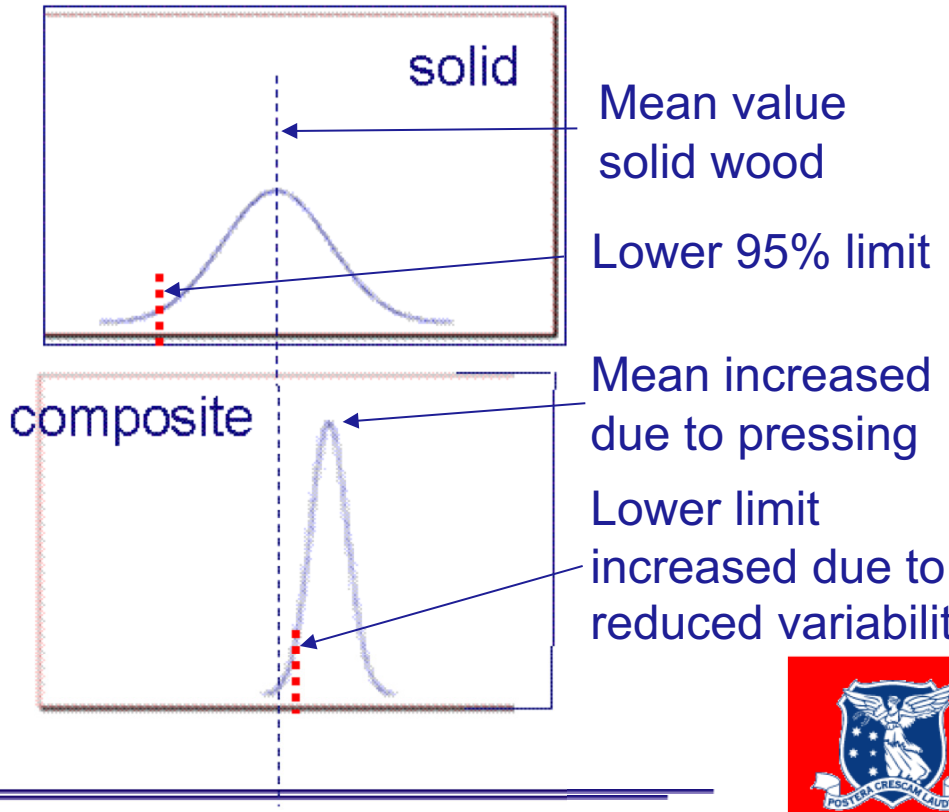
- Composites, mainly from temperate resources are the big threat to structural products from tropical hardwoods.
- A wide range of composite with markedly different resource and manufacturing requirements and product performance



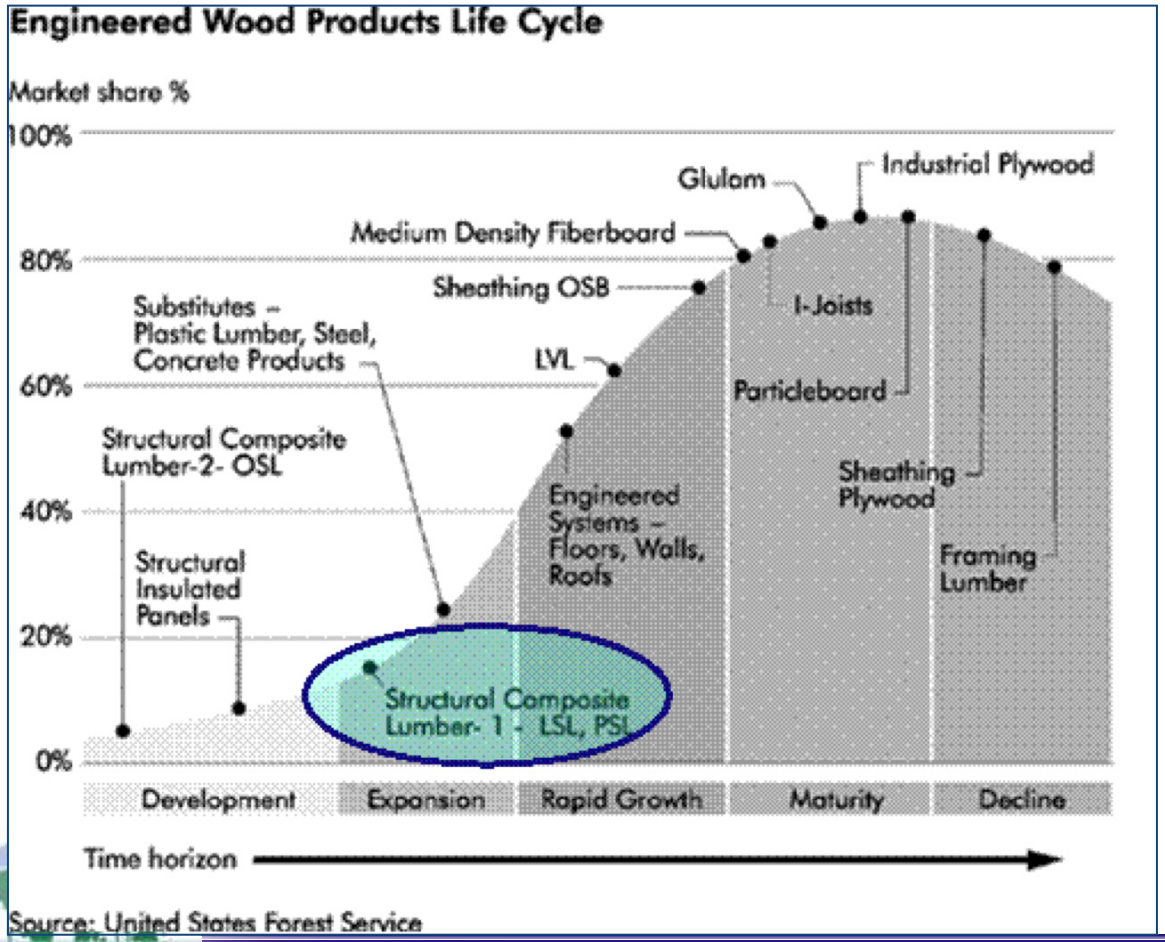
# Why composites are the big threat

- Engineered to meet specific market requirements
- Possible to get improved performance from young wood
- Price
- Environmental certification

Variability in strength of solid wood and composite from same young resource



# Composite wood products using hardwood resource



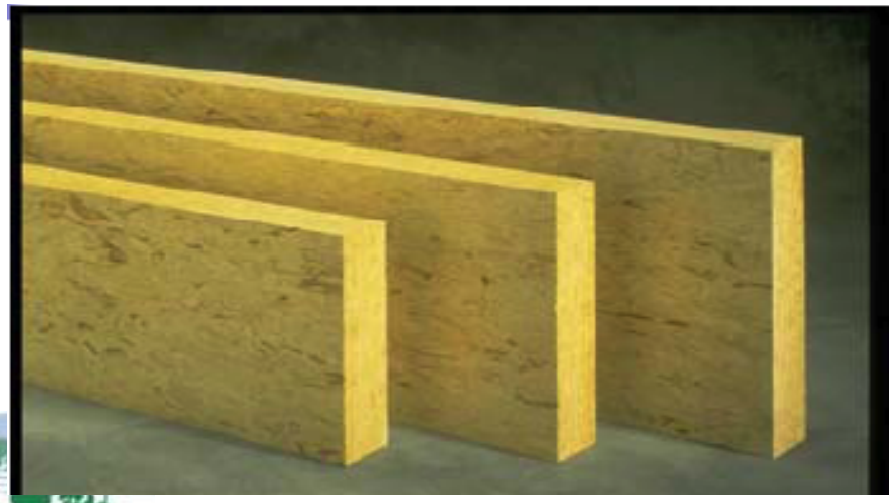

- Stranded lumber and board
- LVL replacement – cheaper, higher resource use and smaller wood
- Structural plywood substitute – Tropical timber threat

# Structural composite lumber and board

## New age wood composites

Manufactured from flakes 300-1200 mm length, 50-100 mm width, 0.7 mm thickness

- Product already manufactured using North American hardwood
- High recovery of large section product from small logs
- High-performance engineered product

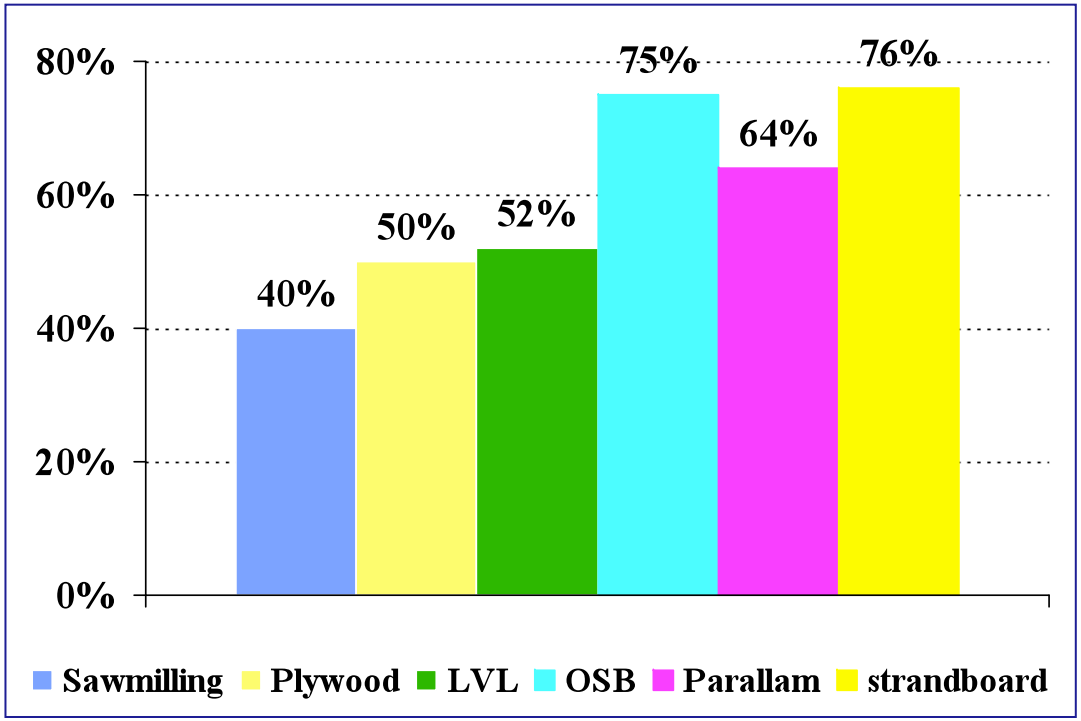


Considerable testing already have been carried out on several hardwood species

# Structural composite lumber and board

## New age wood composites

- High product recovery
- Will replace LVL and plywood for most applications
- High capital investment required, cost and throughput dictated by press type
- High throughput with consistent resource quality



# Cement/wood composite

- About 70% wood – sawdust, shavings or wood wool and fibre – ideal use of residues
- Can be manufactured with low volume throughput and low capital
- Can be sawn, nailed etc as wood, but fire, decay and vermin proof
- Heavy, low value, therefore needs to be manufactured close to market

**Small-scale wood-wool cement board plant in the Philippines showing the process of forming boards by hand**

Evans, P.D. 2002. Wood–Cement Composites in the Asia–Pacific Region.
Proceedings of a Workshop held in Canberra, Australia, 10 December 2000. ACIAR Proceedings No. 107, 165 pp

# Scrimber
# why some good ideas fail!

- Developed for young eucalypts:
  - High strength
  - Small random knots
  - Free-splitting
- Attempted commercialisation on young softwoods
  - Low strength
  - Whorls of large knots
  - Spiral grain
  - Not free splitting
- In a region where there were no eucalypts

# Minimum resource needed for different greenfield processing options

| Product | Volume requirement ($m^3$/year) | Plantation area (ha) (@ 25$m^3$/ha/year growth) |
|---|---|---|
| **Kraft paper** | **2 x $10^6$** | **80 000** |
| **Greenfield chip export** | **500 000** | **20 000** |
| **Stranded composites** | **500 000** | **20 000** |
| **Struct veneer products*** | **180 000 (750 000)** | **30 000** |
| **Small log sawmill**** | **150 000 (650,000)** | **27 000** |
| **High-quality integrated veneer and sawmill***** | **75 000 (750 000)** | **30 000** |

* Includes residue chip export
** Includes chip export (reduced to 15 000 ha otherwise)
*** Also includes appearance veneer manufacture, (requiring 40 000 $m^3$/year), small log sawmill and chip export

# Training
## Needs to be:

- Relevant to both employee's and employer's needs
  - Improved performance
  - Reward improved competency
  - Career path
- Structured and on-going
- Use both internal and external resources for training
- Have broad national and industry recognition

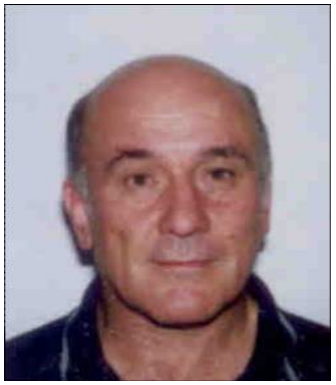
http://www.timbertrainingcreswick.com.au/

# Thank you

# 谢谢！

# Muito obrigado

Barbara Ozarska



Gary Waugh

# Muchas gracias

# Aguije

# Kiaora