Accoya Solid Wood and Tricoya Wood Elements Technologies

Hans Pauli – Chief Operating Officer

Presentation aim

• Overview: Accsys & acetylation
• Describe the Accsys business in numbers
• Summarise Accoya & Tricoya performance
• Outline Accsys commercial activity
  – Core business
  – Emerging opportunities
• Focus on Potential in New Zealand & Australia
Overview

- Accsys develop, prove & license commercial wood acetylation technology
  - License agreements in place in Europe & South America
- Accoya is high performance acetylated solid
  - Produced at the Accsys factory in the Netherlands
- Tricoya is high performance acetylated MDF
  - Produced at Medite, Ireland from wood acetylated by Accsys

Overview

- Regarding NZ & Aus
  - Accsys are a large radiata pine lumber buyer
  - Strong sales underway in both NZ & Aus.
    - We’re working hard with our distributors to increase these further
  - Potential for Tricoya sales in collaboration with domestic manufacturers
  - Accoya licensed production at ‘lumber source’ presents advantages
Wood naturally contains ~2% (pine) to ~5% (oak) acetyl molecules.

Acetylation causes the acetyl % to increase through a reaction with acetic anhydride (vinegar minus H₂O).

Nothing else is added.

It is 100% non-toxic.

Acetylation process – not Accoya specific

Acetylation development

- Acetylation patents date back to 1928
  - Most large wood research organisations have run acetylation programs

- The technology is a gold standard

- Unfortunately, commercial success since 1928 is limited
  - Failed attempts: US ‘60s & Japan ‘80s
  - Substantial investment & innovation breakthroughs were barriers
Acetylation development

- A slightly disappointing story since 1928, but...
  - The resultant work provides a rich source of real life performance testing.
  - This is essential credibility for a new product with claims of such high performance

**LEFT – Tricoya,**
14 year ground contact & no degrade

**RIGHT – Accoya,** 16 years in water & cut open to show no degrade

---

**Accoya process - Accoya specific**

- Accoya increases acetyl level of the entire cross section by a factor of ~10x the original level
  - This enables class 1 durability through the entire cross section
  - (Pine ~2% acetyl and oak ~5% acetyl)

- Accoya is dried in the single stage process to remove residual ‘vinegar’ and emerges ready for use
**Accsys**

- **History**
  - 2003-06: Product & process development investment
  - 2006: Accoya plant build
  - 2007: Accoya production underway
  - 2011 /12 Accoya sales = 12,000m³
  - 2012: Tricoya production underway (Medite JDA)

- **100 employees**
  - 80 Netherlands, 15 UK & 5 USA

- **Today:**
  - Accoya plant operating as an economically feasible, stand alone unit
  - Licensing agreements in place to extend production base of Accoya and Tricoya

**Accsys**

- **Financials**
  - More than EUR 150 million invested in technology
  - 2011 /12 revenues EUR 15 million (+ 10%)
  - YTD 2012 /13 revenues up ~ 40% up on YTD 2011 /12
  - Cash position EUR 24 million (March 31, 2012)
  - Cash flow 2011 / 12 negative EUR 3 million
**Accsys**

- **Licensing**
  - **Solvay Rhodia**
    - Production and distribution of Accoya in Europe (excl. Benelux, UK & Ireland)
    - 1st license for 63,000 m³
    - Operational in 2014
  - **Medite**
    - Joint development for Tricoya (sustainable & dimensional stable MDF)
    - Currently seed marketing
    - Expected to be operational 2014
  - **ineos**
    - Joint venture for out-licensing Tricoya technology
    - Effective October 2012
    - Ineos obtained 5.4% equity in Accsys Technologies
Accoya & Tricoya performance:
- Durability

SCI ON 7 year durability test: Accoya outperforms CCA & teak

SP, Sweden: 14 years ground contact with no degradation

![Graph showing decay rates of stakes](image)

Accoya & Tricoya performance:
- Stability

TRADA: Dimensional stability. L to R: Siberian larch, thermally modified, Accoya, western red cedar

Medite: Distortion assessment. Tricoya, marine ply & birch ply

![Images of wood samples](image)
Accoya & Tricoya performance:
- Coatings

SHR: Coating durability test. 10 year test period & no maintenance required - Unlike Nordic pine

Akzo Nobel: 2 year coating trial on panels with raw edges (no coating)

Accoya & Tricoya performance:
- Termites

JIS 1571: Termite testing. Accoya in perfect condition. Control wood largely destroyed

AFRC: Northern Territory termite testing. Weight loss:
Tricoya = 1%, radiata = 82% & western red cedar = 29%
Window energy ratings are becoming increasingly important in Europe and elsewhere.

- Accoya is 17% more thermally efficient than typical softwoods.
- Accoya is 40% more thermally efficient than typical hardwoods.
- Accoya windows have achieved A rated status under the BFRC energy rating system.

Accoya performance:
- Thermal conductivity

<table>
<thead>
<tr>
<th>Material</th>
<th>Dimensional stability</th>
<th>Thickness swelling 72hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accoya®</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Softwood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardwood</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tricoya Performance:
- Stability matches non wood panels

<table>
<thead>
<tr>
<th>Material</th>
<th>Dimensional stability</th>
<th>Thickness swelling 72hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricoya - NDF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPL - Compact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stone-fibre panel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibre-Cement LD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocume Plywr. Guar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finn. Birch Plywood</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tricoya MDF with pMDI
Accoya & Tricoya performance:
- QC of every batch

Samples are cut from multiple pieces of every Accoya batch. All pieces must achieve the durability class 1 level in the core. KOMO certified.

Accoya & Tricoya performance:
- Guarantees & Approvals

Accoya & Tricoya are Guaranteed:
- Durability class 1
- 50 year above ground service life
- 25 year in ground service life
- Stability: Will swell no more than 2.5% from Oven dry to water soaked

Worldwide accreditations including:
- UK: BBA
- NL: KOMO
- DE: RAL
- USA: WDMA Hallmark & AWPA
- Japan: JWPA / JIS
- NZ: Codemark (Timspec)
A Green Building Material

- Accoya is pure wood technology
  - Wood naturally contains acetyl molecules. The Accoya process increases this number of Acetyl molecules
  - There are no other chemical additions
- Wood for Accoya production is from short rotation FSC timber plantations

.....fuller performance summary at

accoya.com/downloads  medite-europe.com
Presentation aim - recap

- Overview: Accsys & acetylation
- Describe the Accsys business in numbers
- Summarise Accoya & Tricoya performance
- Outline Accsys commercial activity
  - Current
  - Target
  - Future growth
- Focus on potential to Australia & New Zealand

Accsys - Current

- Accoya sales
  - 35 WW distributors
  - Growth in a difficult climate:
    - >50,000m³ since summer ’07 start up
    - 2012/13 up 40% YTD
  - Production plant now achieving a break even position, and set to turn cash generative
Accsys - Current

• Tricoya sales
  - Initiated early 2012 with Medite
  - Distribution established in UK, NL, DE, BE, IE & JP with leading timber & panel companies
  - Regular use developing in joinery, low level facades & ‘frontages’
  - Work underway on a ‘Design Guide for High Performance Facades’

6mm Tricoya used on doorblanks which are CNC’d prior to finishing

Accsys - Current

• Process and technology development
  - Patent development
  - Production efficiency improvement
    • (~100% since 2007)
  - Product development
    • Accoya structural
    • Accoya Alder
    • System partner development
    • Testing & cert

Accoya Structural Design Guide to Eurocode 5
Accsys - Targets

• Accoya sales
  - Increase individual emerging market sales to the level of a current core EU country market
  - Accoya production plant achieving a cash positive position
  - Increase use in large infrastructure projects

Accsys - Targets

• Tricoya sales
  - Adopted by large OEM and component manufacturers
  - Entry into the high value non wood panel facade market
  - Sales expansion to new geographies in collaboration with MDF companies
    • Either Tricoya elements offtake or Tricoya panels offtake
Accsys - Targets

• Licensing
  - Accoya, Solvay-Rhodia
    • A €10billion European business with a large related business in wood pulp acetylation - cigarette filters
  - Tricoya, Medite
    • Medite build of on site acetylation capacity
  - Tricoya, South America
    • Un-named, large Sth. American panel producer. Option agreement signed
  - New agreements
    • Both Accoya & Tricoya

Accsys - Targets

• Product development
  - Commercialise two European wood species for Accoya production
  - Position Tricoya as an ‘off the shelf’ high performance building facade option
    • Facade design guide in conjunction with ARUP
    • Multiple collaborations with system partners
Relating this to NZ & Australia

• Current business
  - >50,000m³ high value radiata purchased & rate set to increase
  - Accoya outperforms naturally durable & treated timber in local termite & durability tests
  - Sales & domestic stocks established in early 2011 & growing

Relating this to NZ & Australia

• Target business
  - Sales
    • Increasing Accoya sales support to regional distributors to bring sales to level of a current core Euro country
  - Wood buying
    • The combined Accsys increased sales and the new Solvay Rhodia plant will require increasing levels of high grade radiata for Accoya
  - Tricoya off-take
    • Potential for partnership with a domestic panel producer to offtake Tricoya panels or wood elements as a step towards full market development
Relating the potential to Aus & NZ

• Future growth
  - Regional production of both Accoya and Tricoya

Production at source carries significant advantages

Reference project examples follow – many more at: www.accoya.com/projects
Urban & Infrastructure Uses

**Canal lining:** >25 year life, sizeable maintenance savings

Engineer: Reef Hout BV; Client: Waterschap Vlaai en Eem; Country: the Netherlands; Date: 2007

---

Urban & Infrastructure Uses

**Heavy load (65mt) motorway bridge:** 80 yr.+ life, aesthetics

Architects: Achterbosch Architectuur, Onix; Engineer: H.E. Lüning, Granjewoud, GLC; Contractor: Schaffitzel; Client: Province of Friesland; Country: the Netherlands; Dates: 2008 & 2010
Urban & Infrastructure Uses

Street lighting / lampposts - regeneration/aesthetics

Architect: Rakesh Patel, Hillstone Restaurant Group, Manufacturer: Structura; Client: Hillstone Restaurant; Country: USA; Date: 2010

Urban & Infrastructure Uses

40km Council fencing: whole life cost, aesthetics

Manufacturer: Haverslag; Client: Sustainable Wildlife Systems; Country: Netherlands; Date: 2012
Urban & Infrastructure Uses

Bus shelters: aesthetics/regeneration

Architect: Cecilia Man, Opus Architecture; Client: Auckland City Council; Country: New Zealand; Date: 2011

Landscaping Uses

Decking: performance / durability / aesthetics

Client: Shanghai World Expo; Country: China; Date: 2010
Landscaping Uses

“Moses Bridge”: durability (in ground & water), aesthetics

Architect: RO&AD; Client: Municipality of Bergen op Zoom; Country: the Netherlands; 2011

Landscaping Uses

Park benches: durability, ecology, whole life cost

Client: GRÜN BERLIN; Design: Atelier Loidl Landschaftsarchitekten; Glulam manufacturer: Schaffitzel Holzindustrie; Country: Germany; Date: 2011
Landscaping Uses

Urban art/regeneration: aesthetics, durability

Architect: Ruurd Hollema; Client: City of Rijssen; Country: Netherlands; Date: 2012

Infrastructure Uses

Bridge rails: aesthetics, durability

Architect: De Zwarte Hond; Structural Engineers: Schaffitzel-Meibach/TiComTec; Client: Province of Groningen; Country: Netherlands; Date: 2012
Cladding / facade Uses

Pre-school: coatings performance, longevity

Architect: RO&AD; Client: Heathfield Junior School; Country: United Kingdom; Date: 2011

Building Facade Uses

Front wall/interior structure, swimming pool: aesthetics, durability

Architect: Architectenwerkgroep; Client: City of Tilburg; Country: Netherlands; Date: 2009
Balcony Uses

Balconies for 240 homes: BRE 60 yr accreditation enabled property insurance

Architect/Client: Berkeley Homes; Country: United Kingdom; Date: 2008

Window Uses

200 wood & PVC hospital windows replaced: whole life cost

Manufacturer: Dempsey Dyer; Client: Victoria Hospital NHS; Country: UK; Date: 2008, 2011
Inset: Carradale House, Bethnal Green, London – complete window replacement underway 2012
Residential Uses
Refurbishment: Auckland’s ‘oldest house’

Resorts & Restaurants Uses
Louvres and furniture: aesthetics & whole life cost
Accoya & Tricoya
Bus stops: Accoya frame & Tricoya roof panels

Client: A local Cornish Council Country: England; Date: 2012

Tricoya
Climbing wall panels & facade

Client: tbc Country: The Netherlands; Date: 2012
Tricoya

ATM / Cash point surrounds

Client: RaboBank. Country: The Netherlands; Date: 2012

Tricoya

Roofline replacement: Barge boards & soffits (entire estate)

Client: Bennekom Housing Association. Country: The Netherlands; Date: 2012
Tricoya

Insulated panels for window infil (Tricoya-PU foam-Tricoya)

Client: Thomas Joinery. Country: Wales; Date: 2012

Tricoya

Outdoor, multi or extended use exhibition stands

Client: Land Rover. Country: England; Date: 2012
Tricoya

Shopfronts

Client: Kells Joinery. Country: Ireland; Date: 2012

Tricoya

Gates

Client: Jongeneel. Country: The Netherlands; Date: 2012
Tricoya

Promenade benches (replacement of failed marine plywood)


---

Tricoya

Curved Joinery Elements

Exterior decoration, screening & cladding, Shanghai, China

Tricoya
Door panels