



Acetylated Wood

Durable, Stable, Sustainable Wood for
Windows, Doors & Siding



the world's leading high technology wood

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Learning Objectives

- Define term "Acetylated Wood"
- Explain basic history of wood acetylation
- Describe acetylation process
- Understand benefits of acetylated wood
- Provide applications in which acetylated wood can be used



What is Acetylated Wood?

- Sustainably grown Radiata Pine from New Zealand and Chile which has been modified in by a process called acetylation
- Acetylation increases the amount of naturally occurring acetyl molecules and reduces the amount of hydroxyls
- Acetylation improves the timber's durability, stability, and service life
- Ideal for exterior applications such as windows, doors, siding, decking and outdoor furniture.

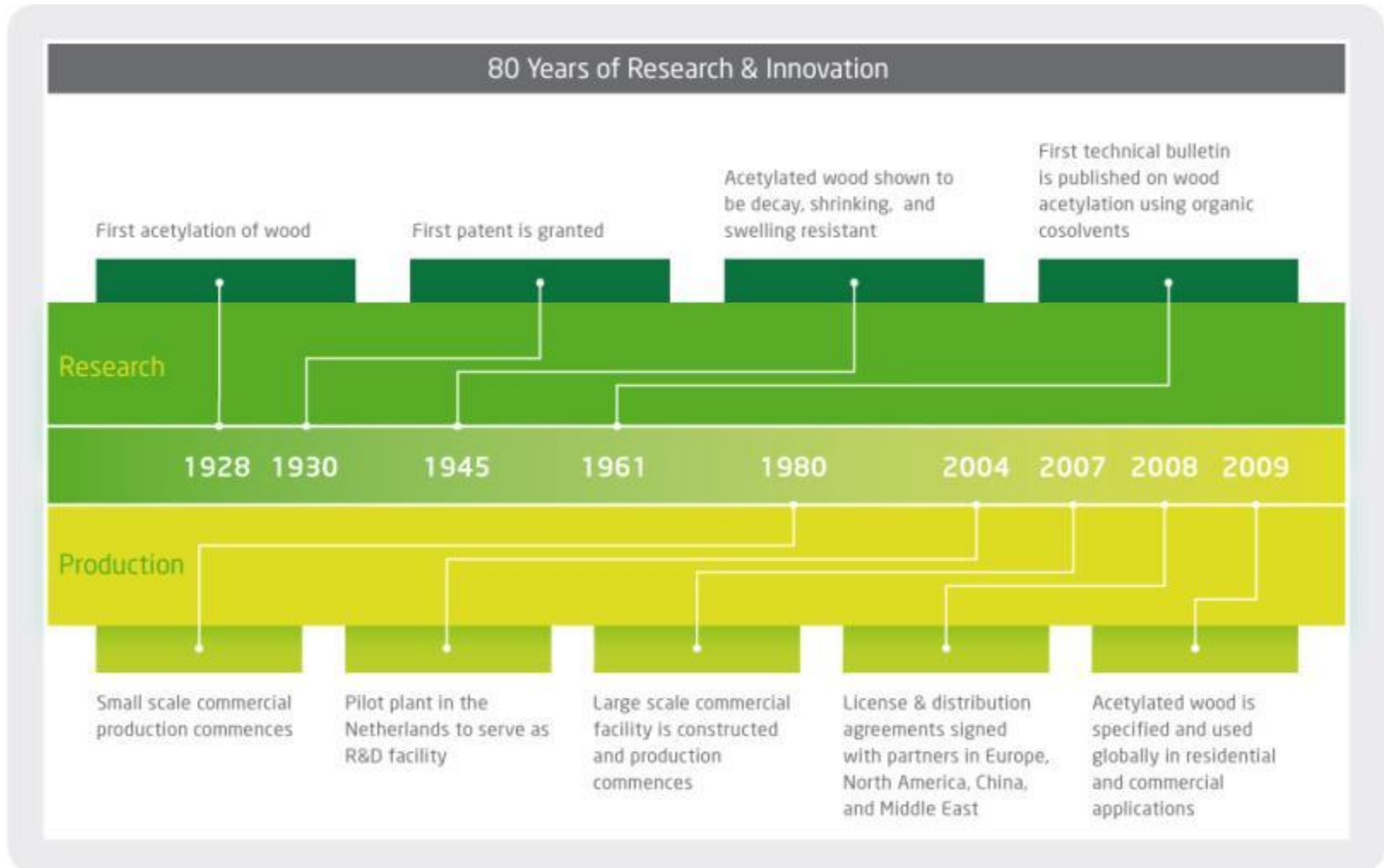


History of Acetylated Wood

- Has been studied by scientists around the world for more than 80 years
- First commercial attempt occurred in 1980
- Until recently, commercialization failed due to:
 - High cost of the “acetyl cycle”
 - Acetylation process design challenges
 - Abundant supply of quality tropical timbers
 - Unregulated chemical treatments
 - Lack of focus on sustainable forest management practices

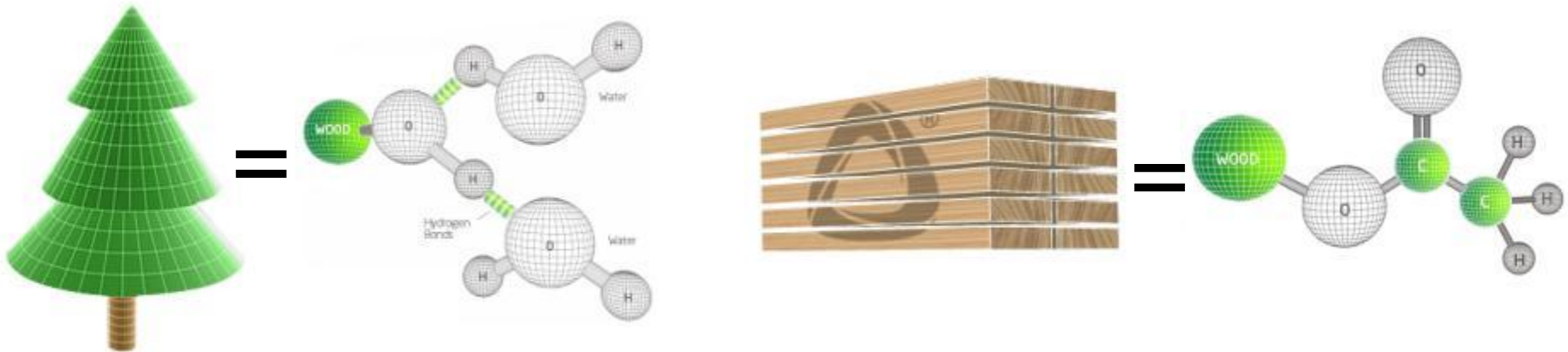


Wood Acetylation Time Line



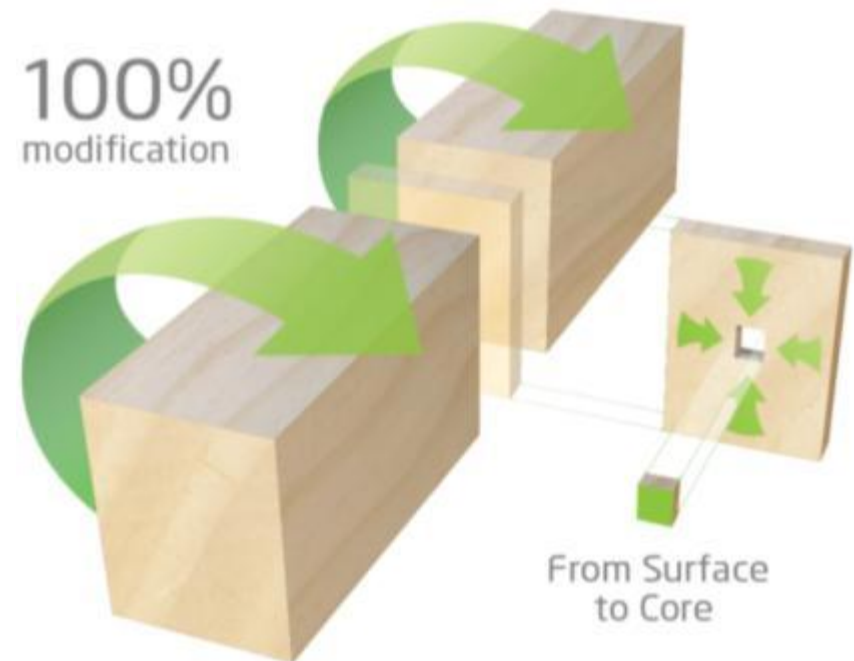
The Acetylation Process

- Acetylation changes the balance of naturally occurring chemicals in wood
- An abundance of chemical groups in wood called “free hydroxyls” absorb and release water, causing unacetylated wood to shrink and swell
- Acetylation transforms hydroxyl groups to acetyl groups:
 - Greatly reducing water absorption
 - Making the wood extremely durable
 - Dimensionally stable
 - A barrier to insect decay



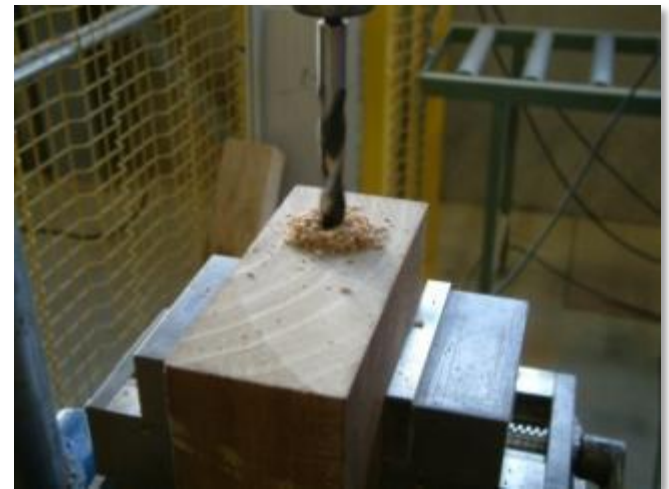
Impact on Molecular Structure

- Only naturally occurring wood compounds are added to the wood
 - Result is a non-toxic, fully recyclable wood
- Acetylation changes wood at the molecular level:
 - 100% of the wood is modified, it is not a surface treatment
 - Can be cut or profiled without exposing unprotected surfaces
- Permanent improvement in performance
- The acetylation process is irreversible
 - No risk of leaching/loss



Quality control

- Every production batch is tested to determine decay resistance and dimensional stability
- Only product that passes the strict tests is released for sale
- Result is wood that not only performs to a higher level but is also less variable than unmodified wood
- Quality control allows guarantees to be given



Performance of Acetylated Wood



Durability: lasting at least 50 years above ground and 25 years in-ground or fresh water



Outstanding dimensional stability & improved hardness



Improved insect barrier



Consistent supply from sustainably managed certified sources



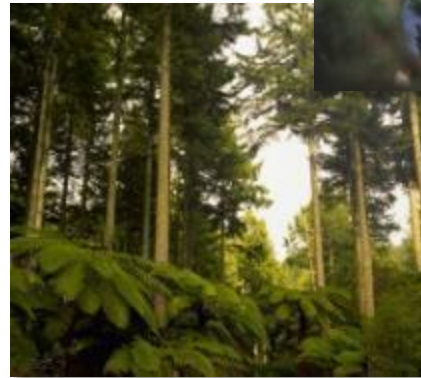
Consistent measurable quality from surface to core



Retained natural strength and hardness

Sources of Acetylated Wood

- Sourced from responsibly managed plantation forests
- Average rotation from sapling to sawmill 28 years
- Acetylated lumber is available in FSC Mixed Source



Durability Class 1



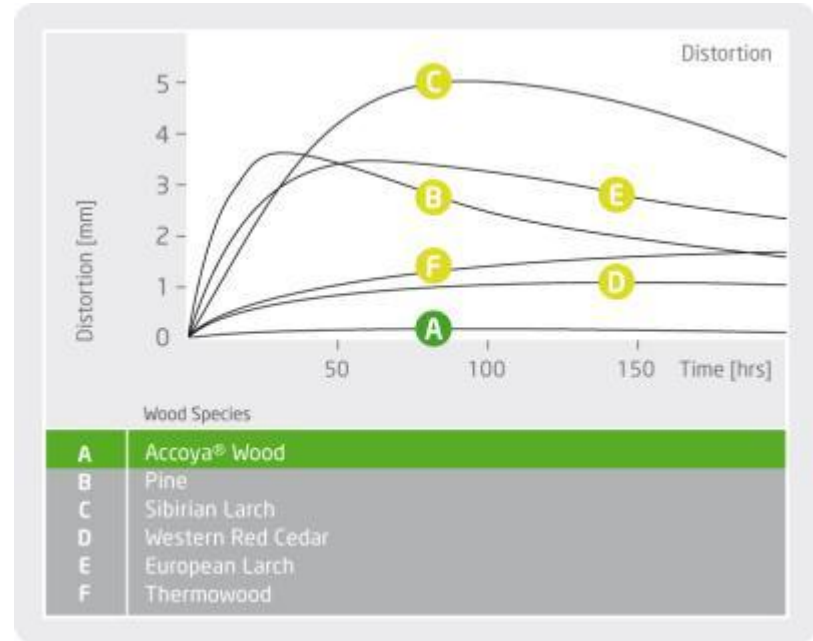
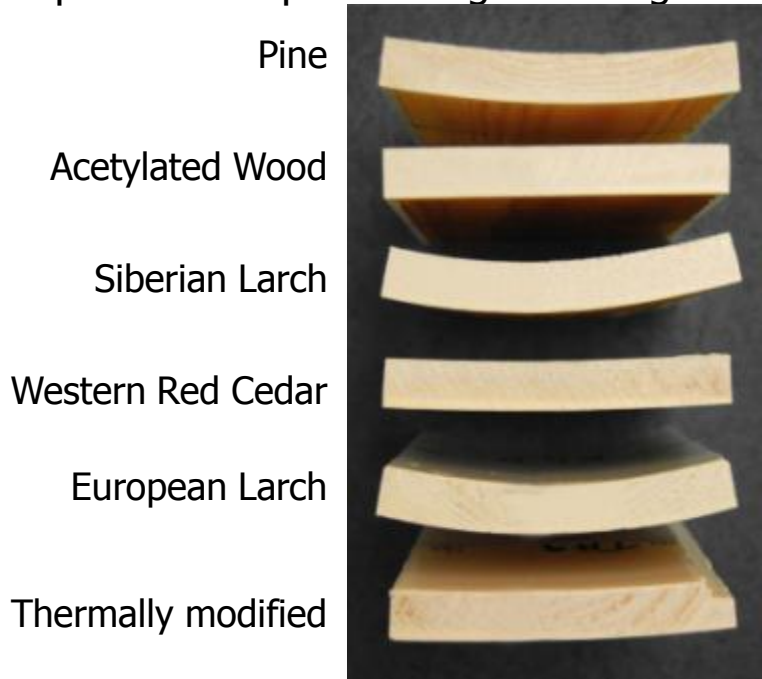
Durability Class 1

- For testing purposes acetylated wood was placed in the walls of several canals in the Netherlands
- After 13 years it was removed and determined to have minimal damage due to UV and biological degradation



Dimensional Stability

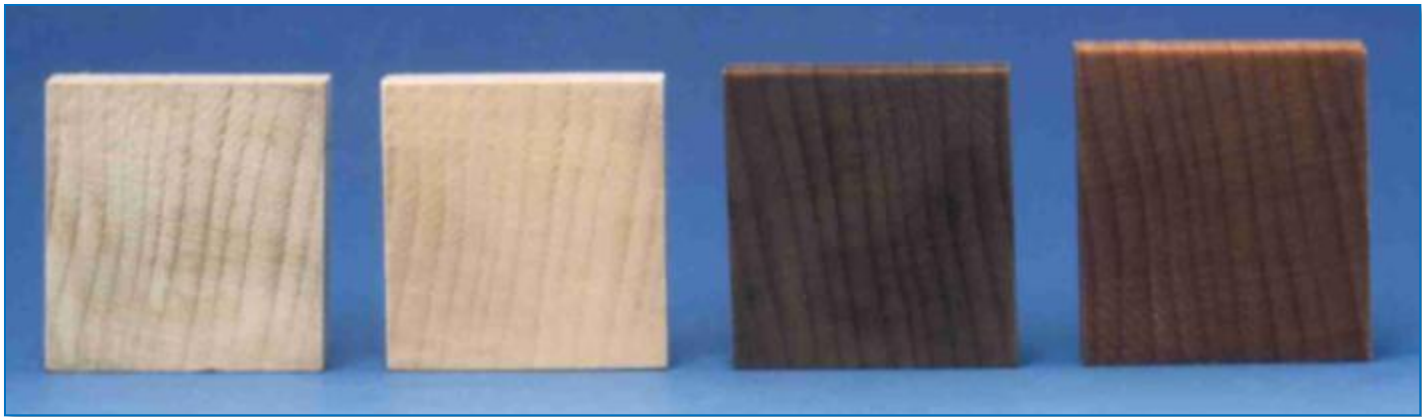
- Outdoor exposure siding trial
- Acetylated wood showed minimal cupping
 - Dimensional Stability – 97.7%
- Allows use of wider siding boards
- Improves coating life
 - Expected life span of single coating 3-5 years



Dimensional Stability

Water Absorption of Acetylated Wood

All blocks were identical in size prior to soaking



Untreated
Beech

Acetylated
Beech

Acetylated Beech
After Soaking

Untreated Beech
After Soaking

Dimensional Stability

- Swelling and shrinkage reduced to 1.5% in either direction
- Joints do not open, tolerances remain tight and twist is reduced
- Less stress is exerted on coatings
- Coating life up to 3 times longer
- More flexible design made possible



Accelerated Weathering & Outdoor Exposure Testing



Resistance to UV Degradation

- Superior resistance to the effects of UV exposure
- The wood's natural appearance is retained for longer
- Translucent coatings can be used with acetylated wood
- Acetylated wood will eventually grey like most other woods



Acetylated wood decking after 1 year exposure
(Uncoated)

Improved insect barrier

- Acetylated wood is a proven barrier against insect damage
- Tests conducted by Mississippi State University and Louisiana State University
- “No-choice test” – 3-5 times better than untreated pine
- “Choice test” – 12-24 times better than alternative

Acetylated wood



Radiata pine



Improved Machinability

- Easier to machine than standard hardwoods
- Improved profile definition
- No special tools needed
- Improved tool life



Cost Effectiveness



Wood Species	Initial Cost per m ²	Replacement Frequency in years	Comparison Period in years	Building Area in m ²	Initial Cost per Building in 1,000 \$	Maintenance Frequency in years	Maintenance Cost per m ²	Life Maintenance Cost in 1,000 \$
A Accoya® Wood	731	60	60	24	17,6	10	12,2	19,0
B PVC	368	35	60	24	8,9	6	8,1	19,5
C Aluminium	465	35	60	24	11,1	6	7,3	23,9
D Pine	569	30	60	24	13,7	4	13,0	31,7
E Meranti	650	40	60	24	15,6	5	12,7	34,5

Uses of Acetylated Wood



- Many traditional applications
 - Decking
 - Siding
 - Windows
 - Exterior doors
 - Shutters
 - Shade screens
 - Marine decking
 - Outdoor furniture
 - Sound barriers
 - Fencing

Windows



Acetylated wood used to
manufacture windows

Park City, Utah



Windows



Finger-jointed acetylated wood used to manufacture windows

The Netherlands



Exterior Doors



Acetylated wood used to
manufacture doors & windows

Santa Margarita, California



Exterior Doors



The Netherlands

Finger-jointed acetylated wood used to manufacture exterior doors



United Kingdom

Outdoor Furniture

The Netherlands



China



Residential Decking



GOLD certified LEED® Home

Narragansett, Rhode Island



Marine Decking



The Netherlands

China



Residential Siding



United Kingdom



Norway



Commercial Siding



Dallas, Texas

The Netherlands



Shading



China

Gainesville, Florida



Traffic Bridge



Sneek, The Netherlands



Length: 105 feet
Height: 50 feet
Load class: 60 tons
Material: Solid
acetylated wood



Pedestrian Bridges



United Kingdom

The Netherlands



Restoration Projects

Ireland



United Kingdom



Non-Traditional Applications



Republic of Georgia

The Netherlands



Benefits Summary of Acetylated Wood

- Durable, dimensionally stable lumber
- Improved coatings performance
- Process that is environmentally-friendly and sustainably sourced
- Guaranteed for 50 years above ground and 25 years below ground
- More cost-effective for traditional wood applications
- 100% non-toxic

Questions?





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