

Special thanks to Dr. Edo Kegel

**Plato**

# ***Plato***<sup>®</sup> ***technology***

**A thermal modification process**

**presentation by Prof. George Mantanis**

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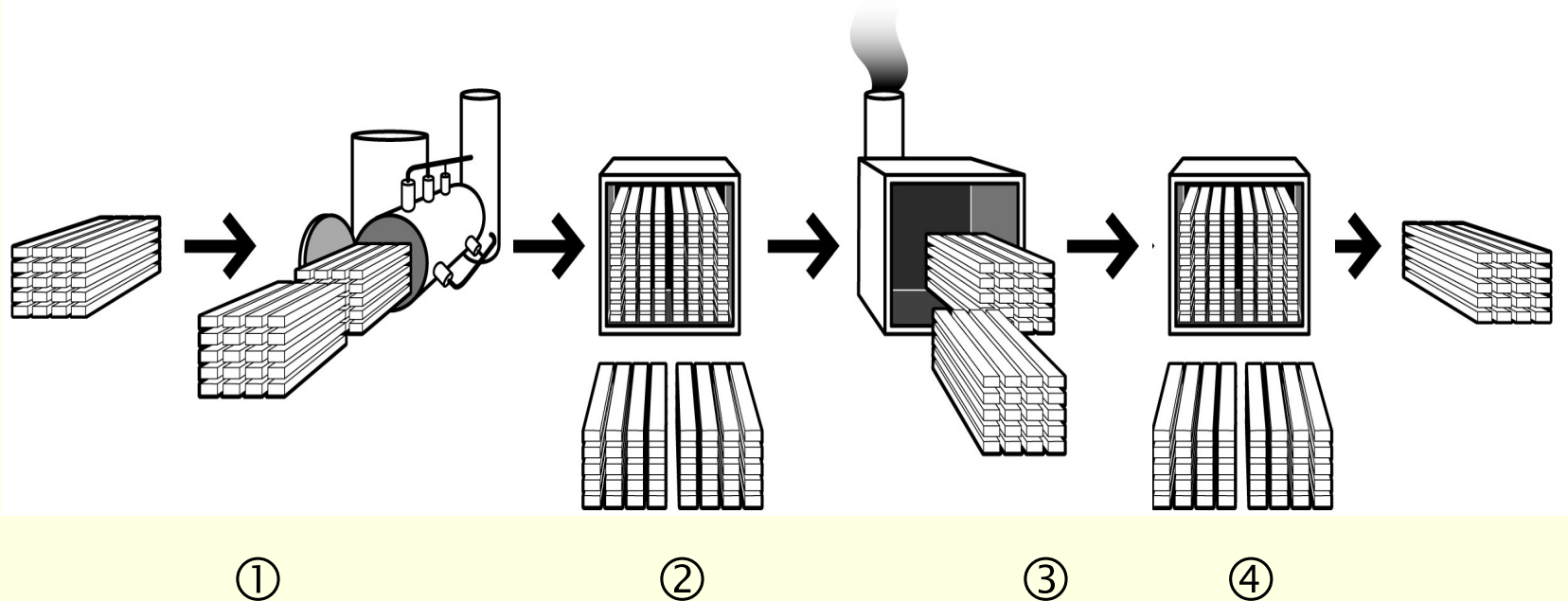
## ***Modified Wood***

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- **Native wood: wood species, wood structure as it is**
- **Preservative treated wood: native wood + additive**
- **Chemically modified wood: native wood with a changed wood structure by additives**
- **Thermo modified wood: native wood with a changed wood structure by temperature**

# The Plato<sup>®</sup> process

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1. Hydrothermolysis (*cooking*)
2. Drying
3. Curing (*baking*)
4. Conditioning

## Phase 1: *Hydrothermolysis*



- Wood is heated to ca. 165°C in aqueous environment at superatmospheric pressure.
- Converting of hemi-celluloses and lignin into reactive intermediates (e.g. *aldehydes*)
- Cellulose remains intact (crucial for mechanical properties).

## Phase 2: *Drying*



- Kiln drying to ca. 8% moisture content.
- Necessary to avoid internal cracks in third stage.

## Phase 3: *Curing*



- Wood is heated at 180°C under dry conditions.
- Reactive *intermediates* are jointed again (**crosslinking**).
- The result of this step is to obtain durability and dimensional stability.

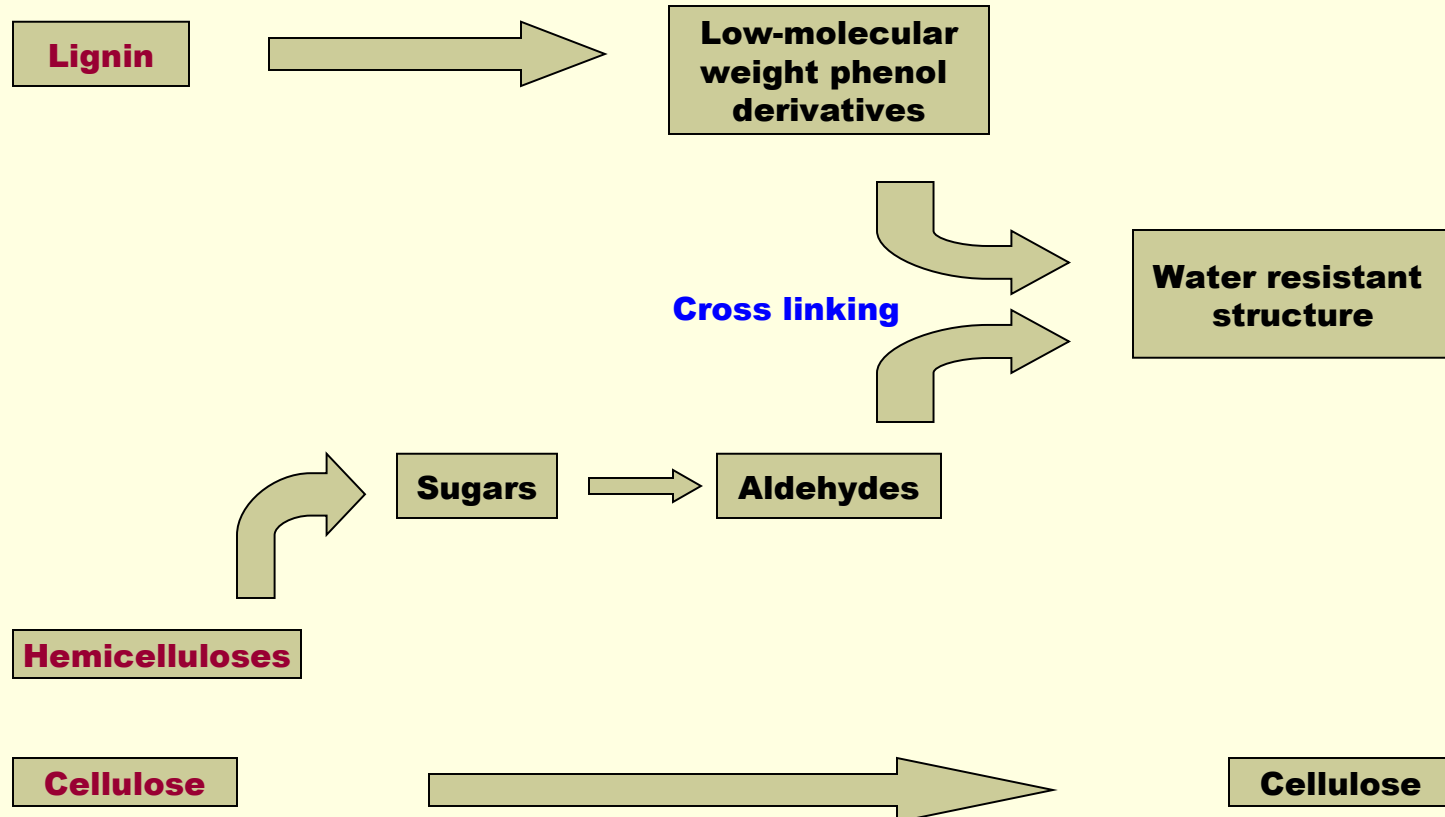
## Phase 4: *Conditioning*



Restore the moisture content from 1% (after curing) into the more suitable 6-8% MC (necessary for manufacturing)



## The chemistry



## *Advantages of Plato process*



- **Low energy consumption**
- **No addition of chemicals or toxic additives**
- **Environmentally friendly & favourable LCA**
- **Upgrading of underestimated wood species which are largely available (poplar, fir, etc)**

# Advantages of Plato<sup>®</sup>Wood



- **Dimensionally stable**
- **Durable and service-life**
- **Preserving most of the mechanical properties**
- **Durability at a high level**
- **Low maintenance**
- **Good manufacturing and easy to handle**

**Winchester United Kingdom Restaurant**  
**2008 140 m3 Plato® Wood FSC Spruce cladding**  
**Principal: Marwell Zoo**

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**Why:**

- **Size and length variation**
- **Low maintenance**
- **Dimensional stability**

Slochteren The Netherlands **Townhall**  
2005 60 m3 rough Plato®Wood Spruce Open-cladding  
Principal: City Council

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**Why:**

- **Low maintenance**
- **Dimensional stability**

Oldenzaal The Netherlands **Municipal works**  
2005 90 m3 rough Plato®Wood Spruce Open-cladding  
Principal: City Council

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**Why:**

- **Dutch product**
- **Low maintenance**
- **Dimensional stability**

## Ronse Belgium **Passive House**

2007 60 m<sup>3</sup> rough Plato® Wood FSC Spruce Open-cladding

Principal: private

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### Why:

- **Low maintenance**
- **Dimensional stability**
- **Also fingerjoint / laminated beams**

**Zeist The Netherlands Head-office Triodos Bank**  
**2006 80 m<sup>3</sup> rough Plato® Wood FSC Spruce cladding**  
**Principal: Triodos Bank**

**Plato**



**Why:**

- **Dimensional stability**
- **Durability**
- **Triodos Bank recently chosen as most sustainable bank of the world**



Aalsmeer The Netherlands **House-boat**  
2007 20 m<sup>3</sup> Plato® Wood Poplar vertical-cladding  
Principal: private

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**Why:**

- **Wood species Poplar**
- **Low maintenance**
- **Dimensional stability**

Tervuren Belgium **Lake Royal Park**  
2004 800 m3 Plato® Wood Spruce Sheet-piling  
Principal: Region Flanders

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**Why:**

- **Environmentally friendly**
- **Alternative tropical hardwood (wood for 98% under the water)**
- **Socially responsible: public place**

Otterloo The Netherlands **Wildlife observation post**  
2003 80 m3 Plato®Wood FSC Douglas-Fir  
Principal: National Park Hoge Veluwe

**Plato**



**Why:**

- **Environmentally friendly**
- **Use of local wood species (Douglas fir growing in the park)**
- **Socially responsible: public place**

A35 Highway near Almelo **The Netherlands Soundbarrier**  
2006 600 m<sup>3</sup> Plato® Wood Spruce  
Principal: Rijkswaterstaat

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**Why:**

- **Dimensional stability**
- **Availability one dimension one length**
- **Mechanical properties extremely tested**

Duiven The Netherlands **Apartment block**  
2009 80 m3 Plato®Wood FSC Frake  
Principal: Municipal Duiven

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### Why:

- Dimensional stability
- Upgraded tropical softwood as an alternative on *Western Red Cedar* and *Louro*
- Fire safety regulation: **Frake with fire retardancy** is approved Euroclass B-S1

Berlin Germany **Haus der Begegnung**  
2004 70 m<sup>3</sup> Plato® Wood Spruce open-cladding  
Principal: Ideal lebensversicherung

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**Why:**

- **Dimensional stability**
- **Availability one dimension one length**
- **Low maintenance**

Breda The Netherlands **Summerhouse / Studio**  
2009 20 m<sup>3</sup> Plato®Wood Spruce open-cladding  
Principal: Private Architect

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**Why:**

- **Dimensional stability**
- **Low maintenance**

# Sustainable Inspiration

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***Thank you for your attention***