Study of the stress-grading of poplar for a structural use

IPC Working Party on Harvesting and Utilization of Poplar and Willow Wood

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Regional context

- Small sawmills (less than 2500 m3/year)
- Mostly palette production
- Difficult to know exactly the clone
- Important mechanical differences between clones
Grading

- The previous structures build and tested oblige us to grade every pieces of poplar used in the structure
Method evolution

- Loaded by hands with sandbags
- Pneumatic bending (only thin pieces)
- Hydraulic bending computer controlled
- Modulo automatic machine 4 pieces/min
Object of this study

• Relation between high speed test, wet and dry, and EN408.
• Grade poplar wood only with MOE
• Validate a simple low cost method
• The clone is unknown
Clones tested

- Robusta
- Trichobel
- Flevo
- Koster
- Ghoy
- Dorskamp
Test procedure

• Each trunk was cut in 2,5m logs. The sawn timbers, before drying, were 72 mm x72 mm
• 1483 samples
• High speed E wet
• Timbers were kiln-dried 15 to 18% and planed at 60x60 mm
• High speed E dry
• MOE and MOR according to EN 408
• The wood density, the knot distribution, and the growth rings dimensions were registered.
High speed 3 points bending machine
Ultrasound speed

• To complete the investigation the ultrasound speed was tested by a portable Sylvatest
• No correlation between ultrasound Speed and MOE was found.
Results

• Density and knots are not relevant
• The MOE is relevant for grading poplar. As soon as MOE fits to EN 384 specifications, MOR is higher than request
The coefficient of determination is, in the case of non-dried wood, 0.786.
The coefficient of determination is, in the case of dried wood, 0.890.
MOE distribution for each clone

Lois normales idéalisées des lots

- lot complet
- Trichobel
- Robusta
- Flévo
- Koster
- Dorskamp
- Ghoy

Module E2 [MPa] vs. Fréquence
conclusions

• The high speed 3 points bending test gives very reliable results and is not dependent of the clone

• This method is cheap and easily mountable in the local sawmills and it will not be an obstacle to the production output.

Thank you for your attention.