1 On-line heating temperatures of green-wood prior to peeling.

Anna DUPLEIX

PhD student – First year

Professor Rémy MARCHAL[1]

Professor Mark HUGHES[2]

Joint supervisors: Dr Louis-Etienne DENAUD[1]
Dr Fréderic Rossi[1]

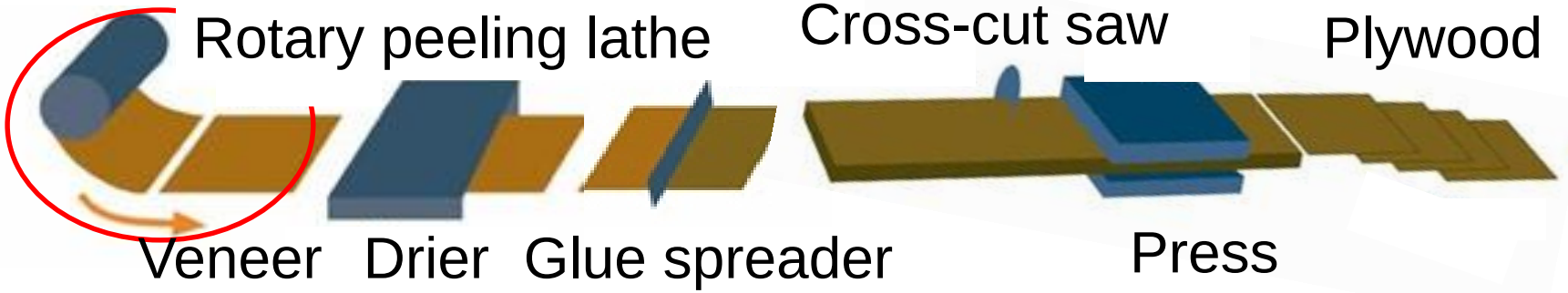
[1]Arts et Métiers ParisTech Cluny, France

[2]Aalto University, Helsinki, Finland.

2 What is the assumed role of wood heating prior to peeling?

Heating green-wood

Peeling process



to increase wood deformability

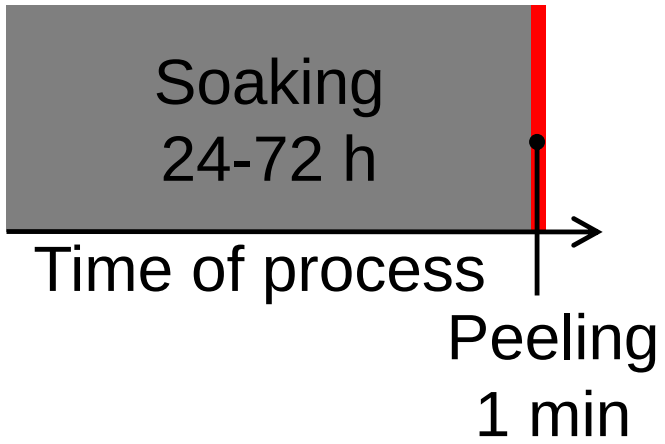
- to improve veneer surface quality
- to lower cutting efforts
- to soften knots

Thickness 3 mm

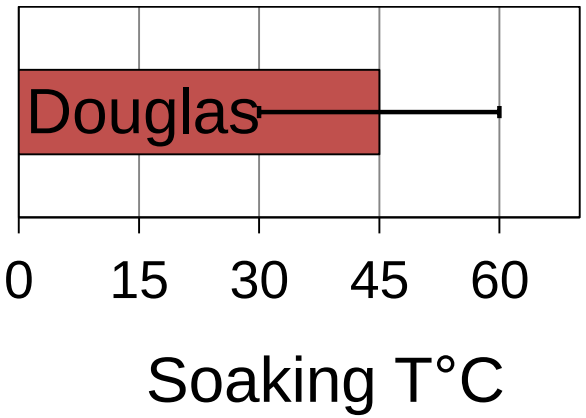
Traditionnally made by soaking.

Soaking wood is :

Time-consuming



Empirical



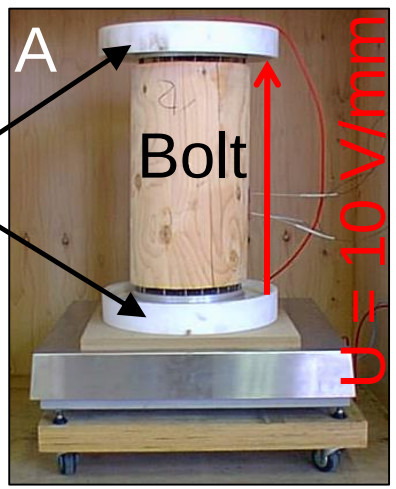
Imperfect

Cost	Yield	Veneer quality
▪ Energy efficiency	▪ Stock downtimes	▪ Coloration
▪ Water pollution	▪ Wood cohesion	▪ Durability
▪ Facilities requirements	▪ Handling	▪ Wooly surface

Previous trials on alternative methods to soaking.

Volume heating

- Electric ohmic heating



Electrodes insulated with Teflon®

- Microwave heating (MW)

MW heater

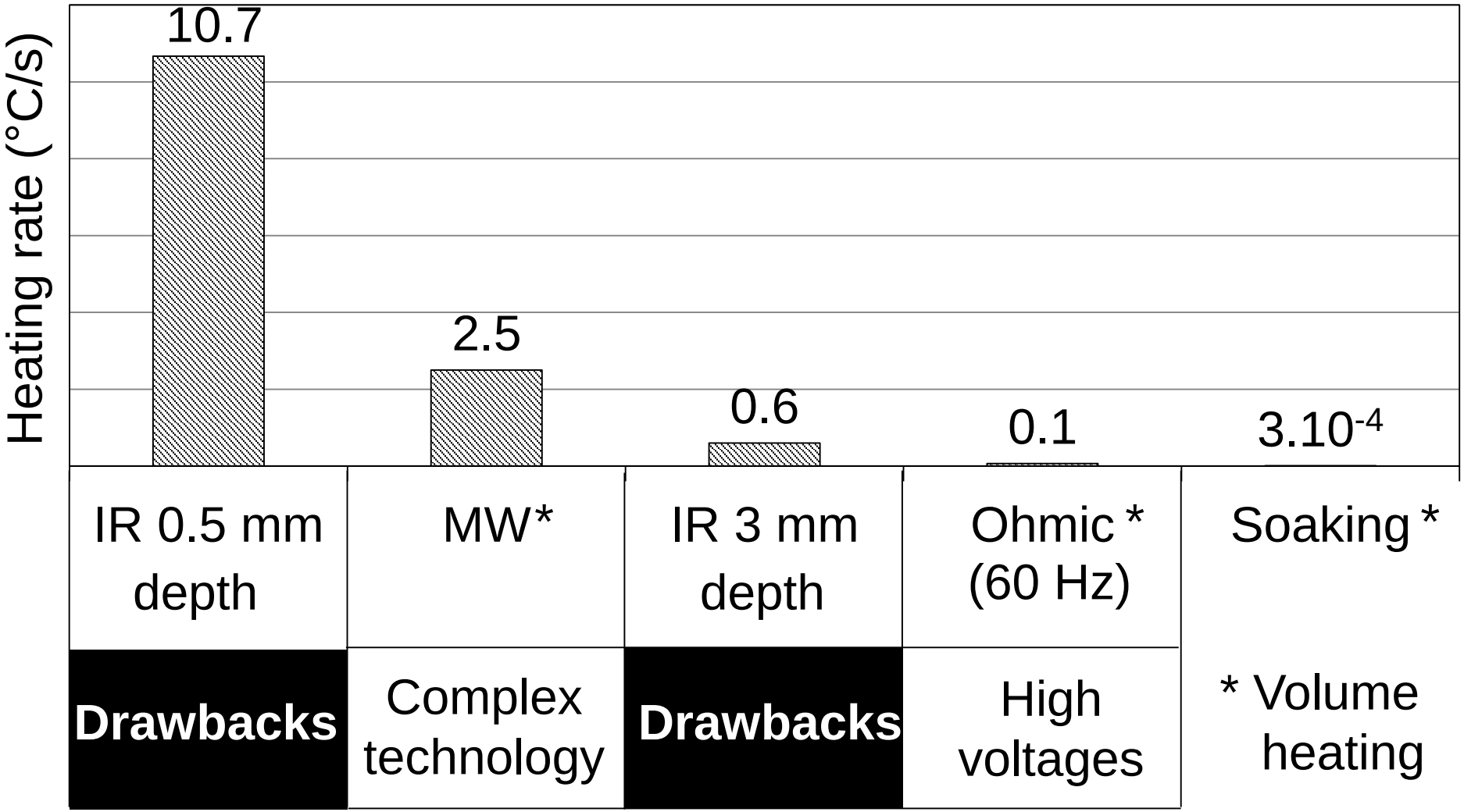
Surface heating

- Infrared heating (IR)

IR heater

A Arts et Métiers ParisTech, Cluny, France
B University of Melbourne, Australia

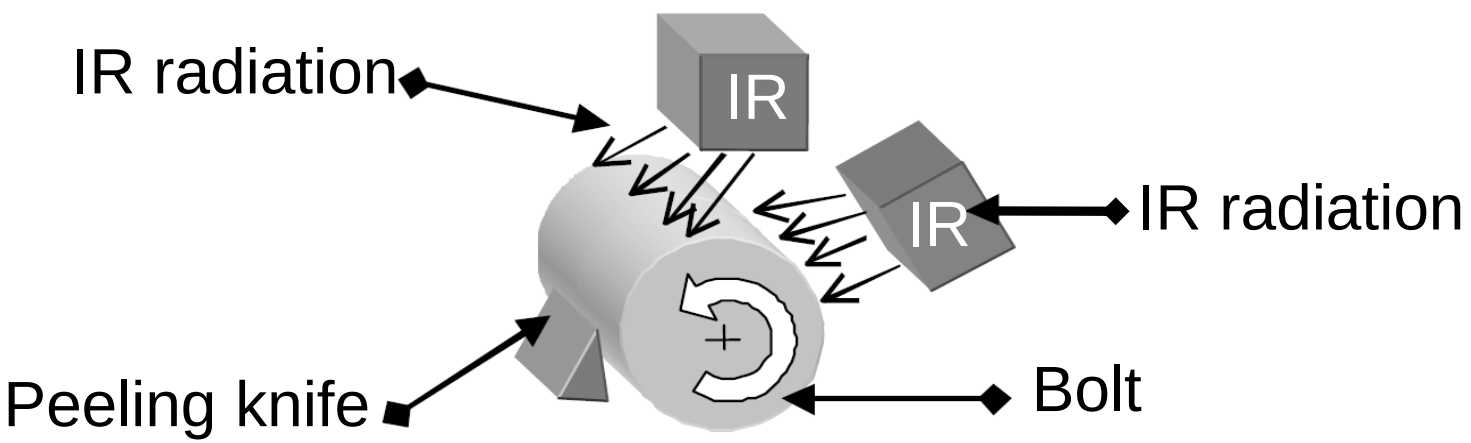
On-line feasibility of alternative heating systems.

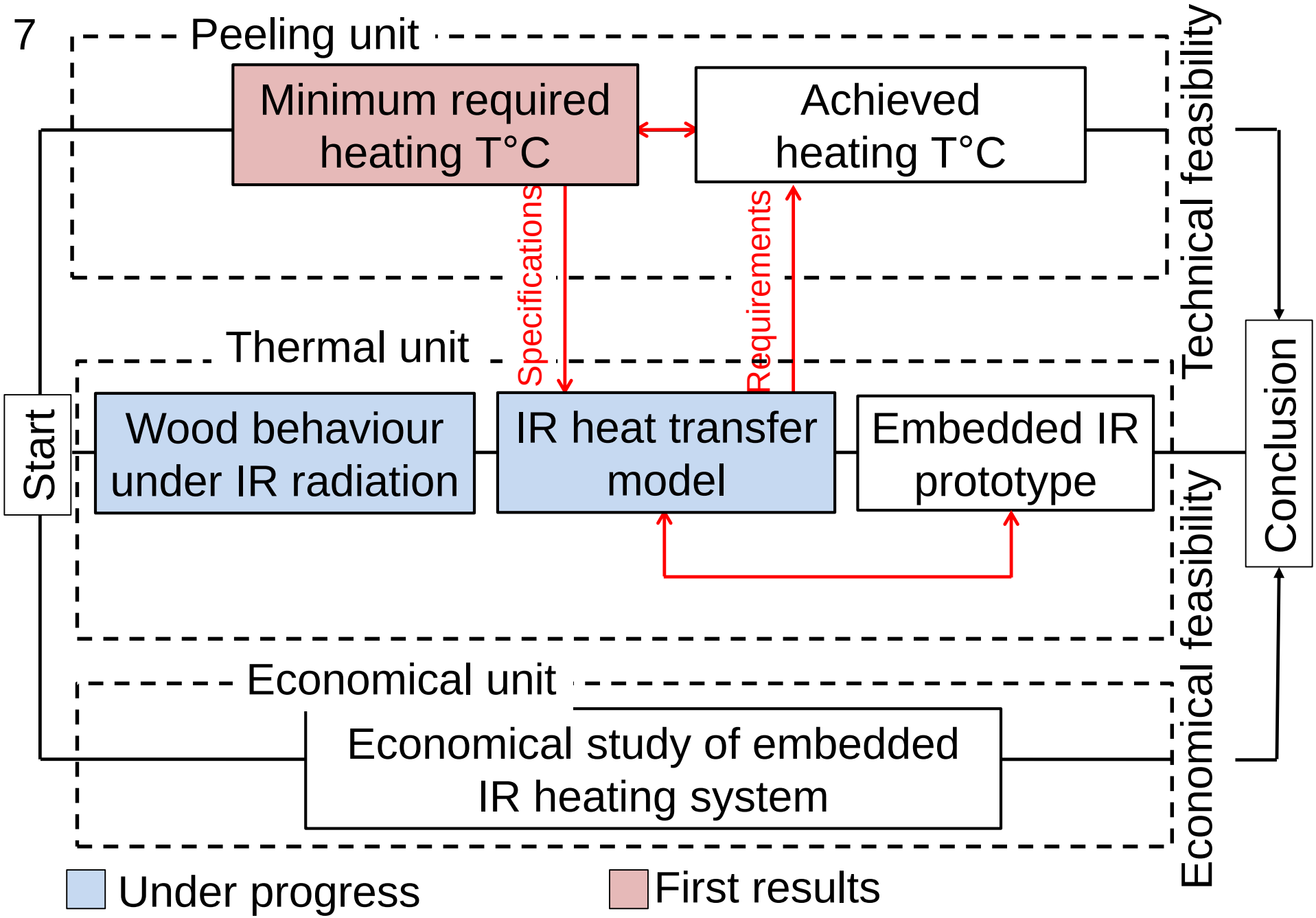


IR radiation penetrating into wood features the best suitability.

Development of on-line embedded IR heating system.

- **directly embedded** on the peeling lathe
- to heat **wood surface while peeling**
- activated when peeling comes to **heartwood**



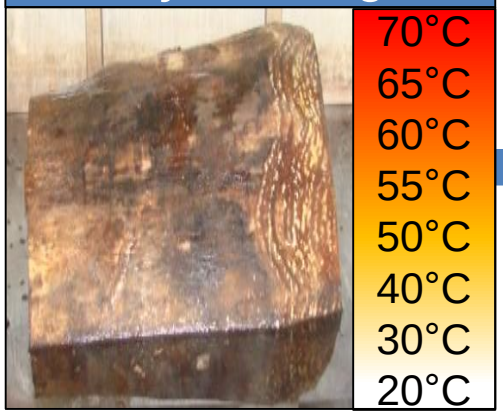

Peeling unit
Minimum required heating T°C
Achieved heating T°C
Specifications
Requirements
Thermal unit
Start
Wood behaviour under IR radiation
IR heat transfer model
Embedded IR prototype
Technical feasibility
Conclusion
Economical feasibility
Economical unit
Economical study of embedded IR heating system
Under progress
First results

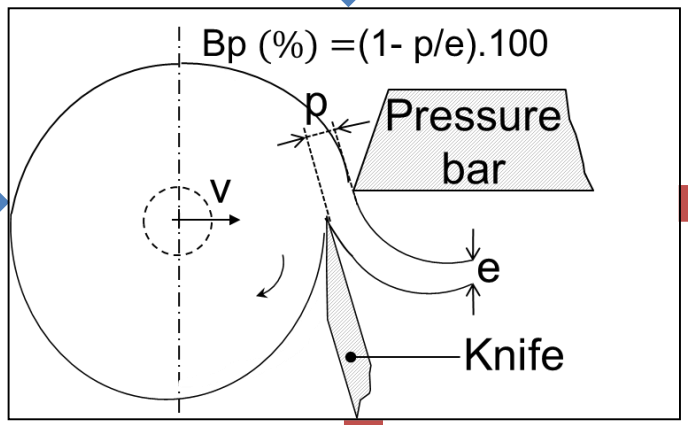
Specie
Douglas-fir

Process parameters

V = 1 m/s
Bp = 5%
e = 3 mm

Heating bolts by soaking

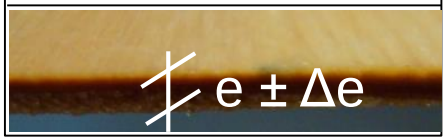




Veneer quality

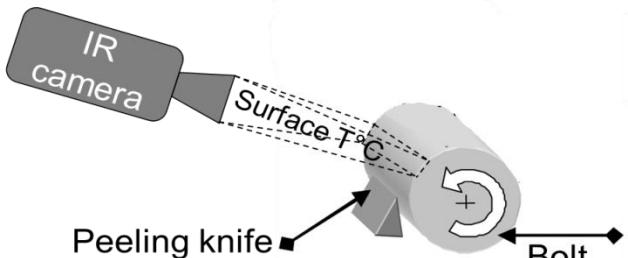
Lathe checking (fuitometer)

Veneer thickness

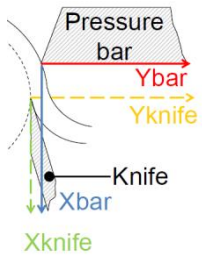


Process assessment

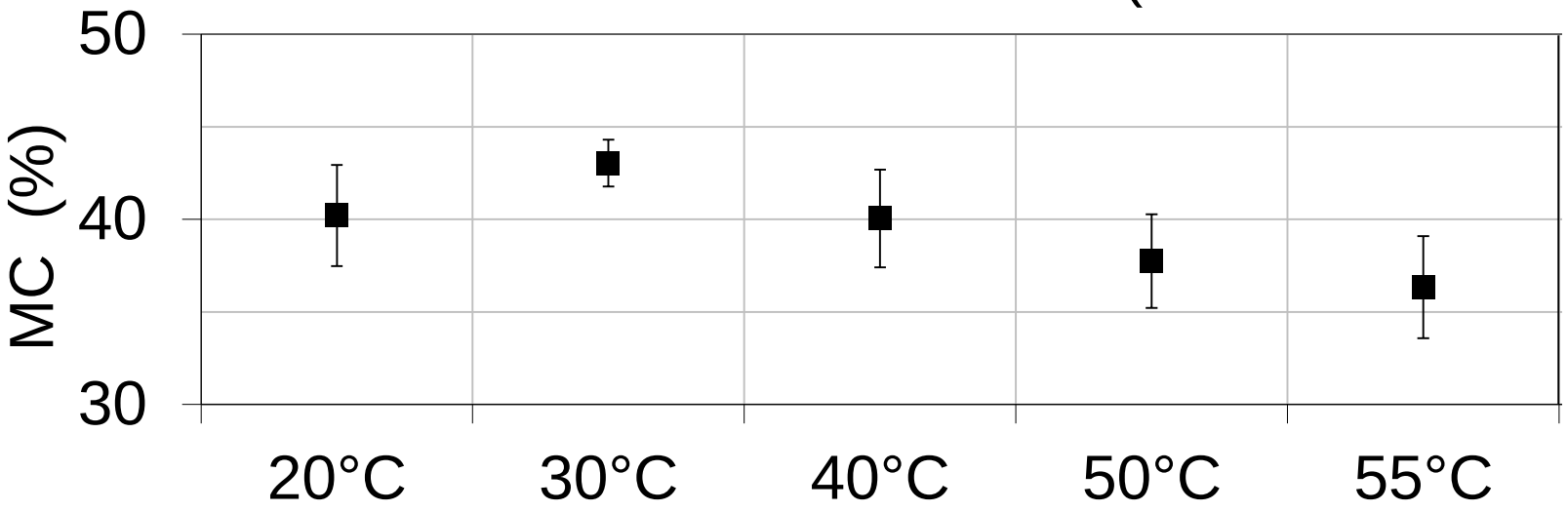
On-line surface temperatures (IR camera)



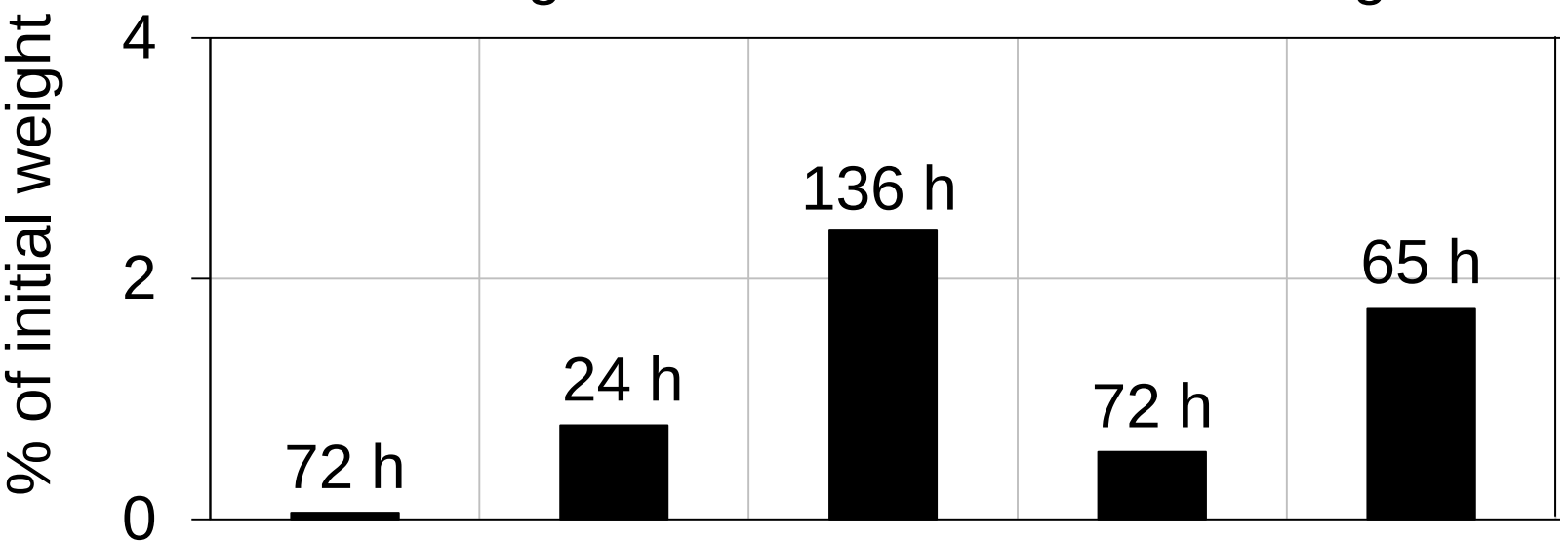
Cutting efforts



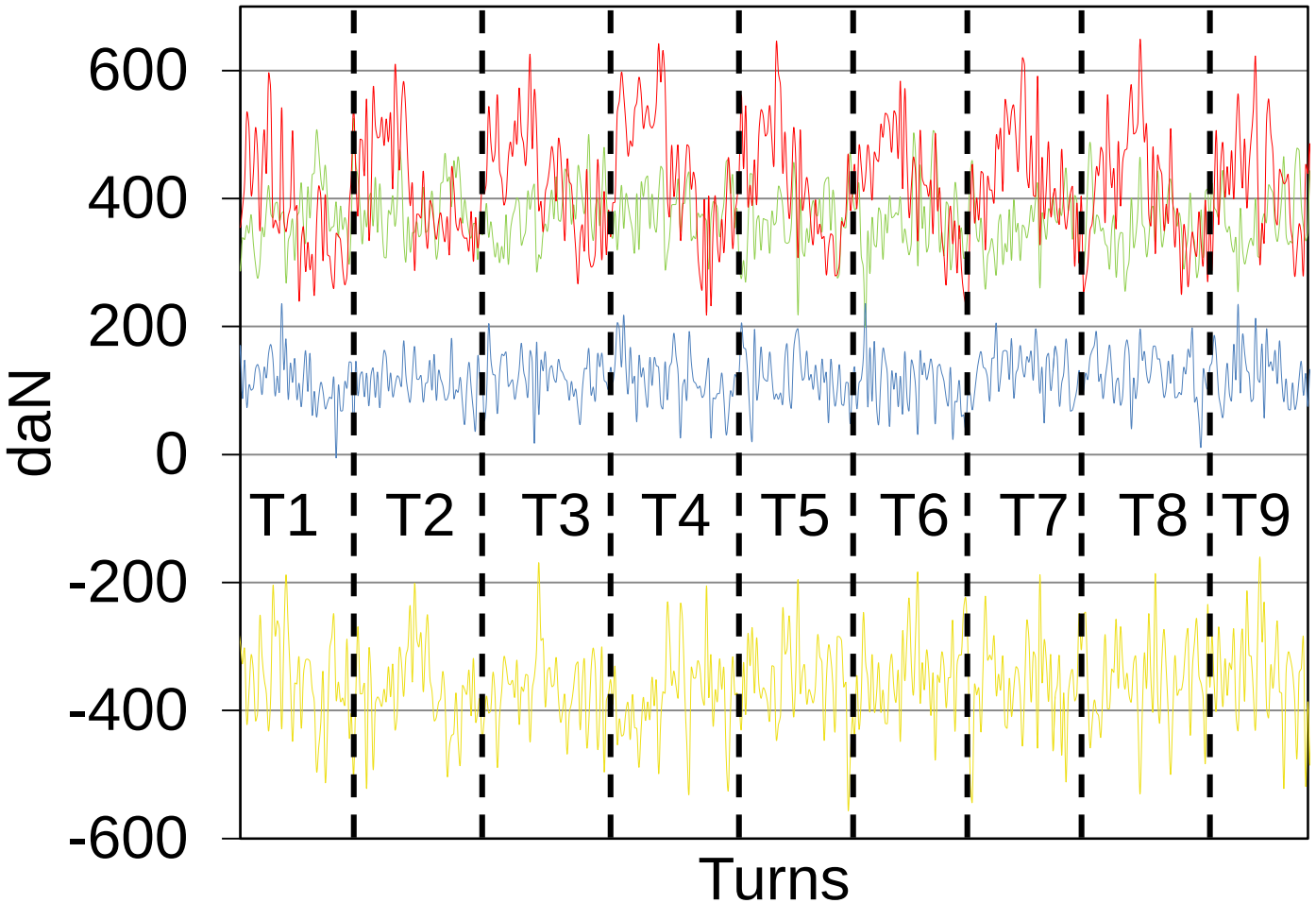
Moisture content of heartwood (mean on 9 turns).

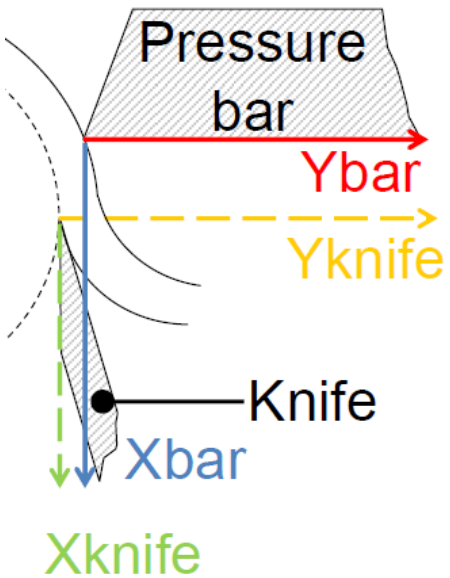


Water gain of whole bolt after soaking hours.



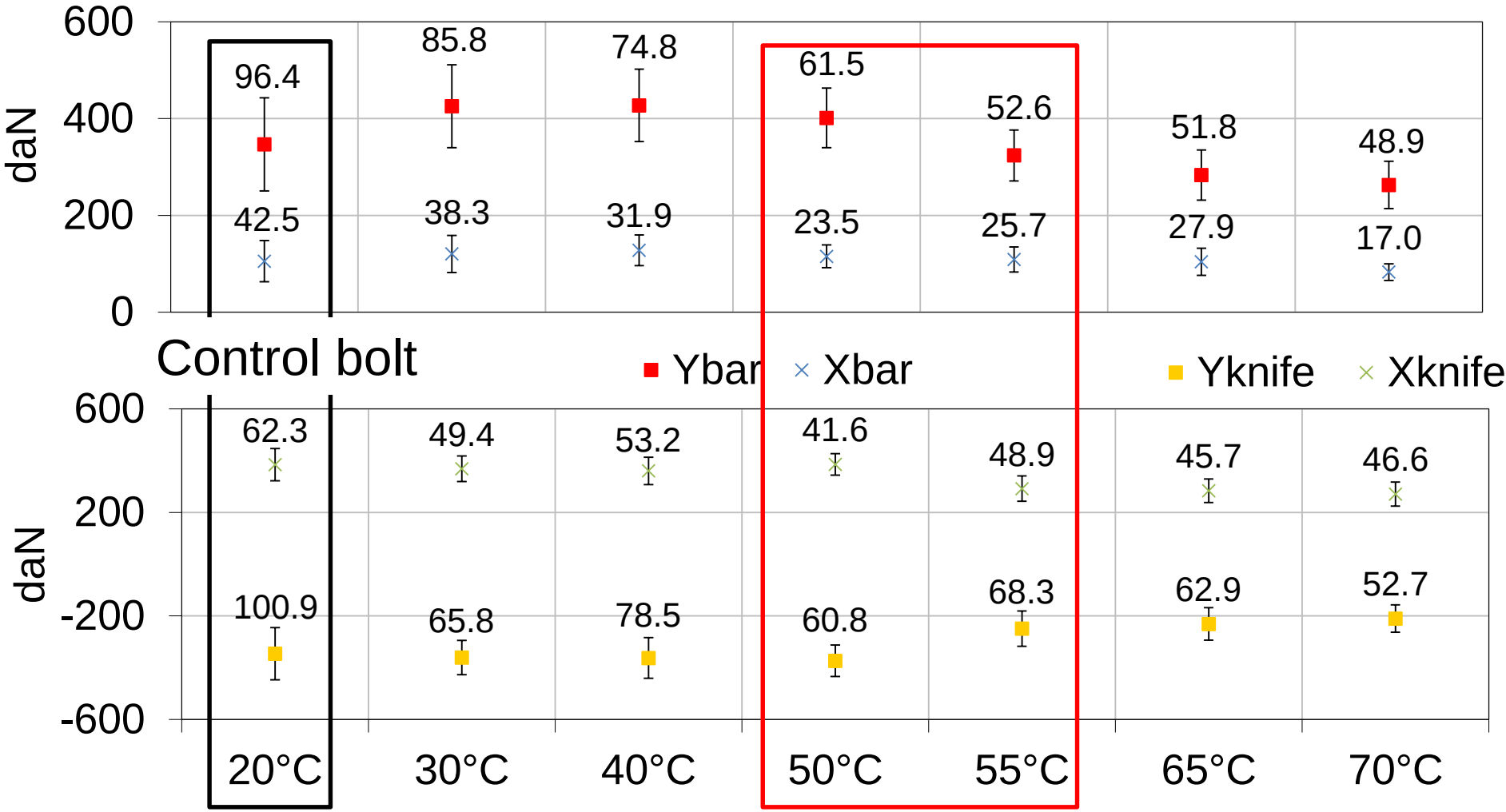
Cutting efforts in heartwood.





Cyclic behaviour of cutting efforts characteristic of heterogeneous structure of Douglas-fir

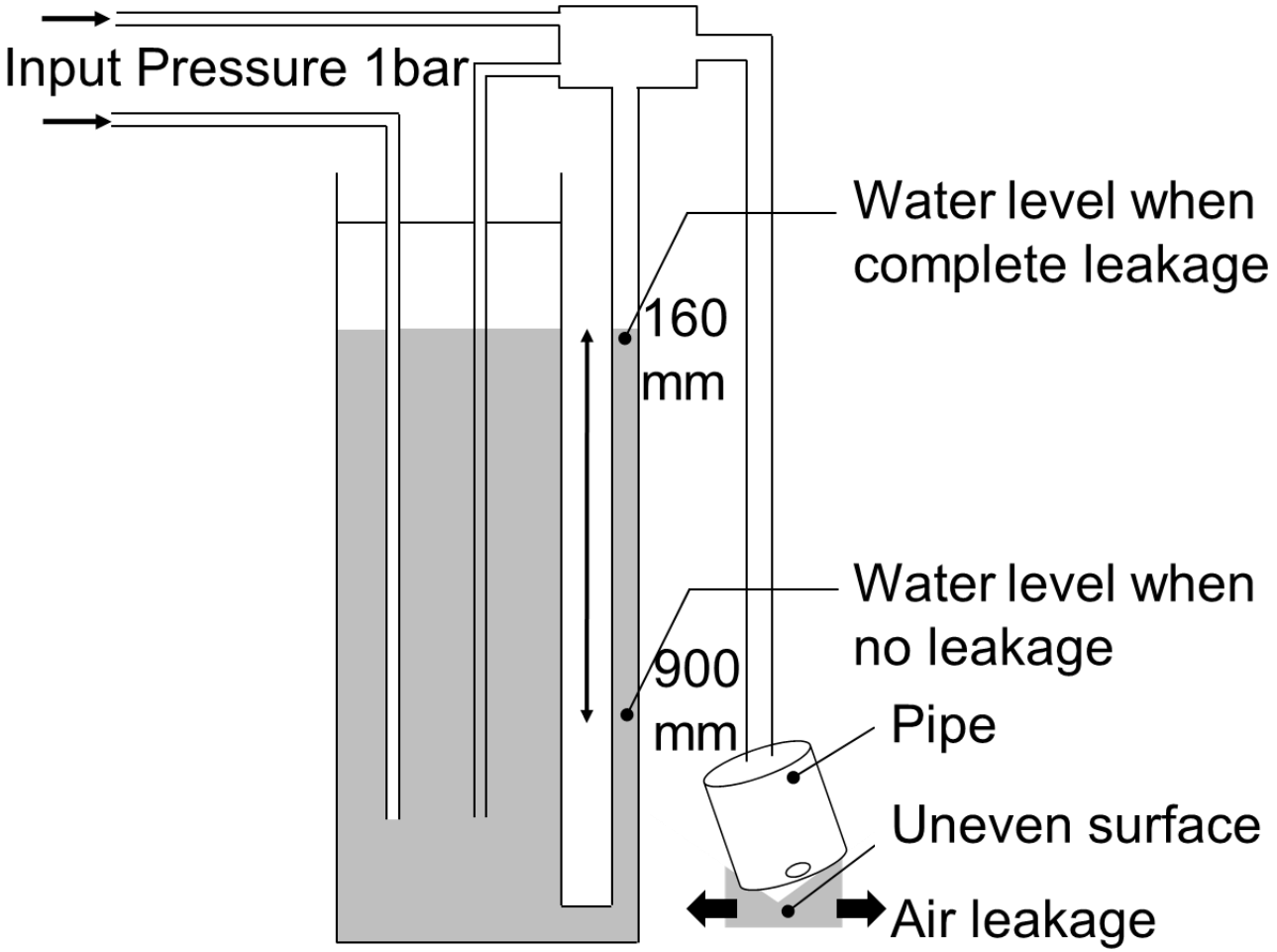
Influence of heating temperatures on cutting efforts.

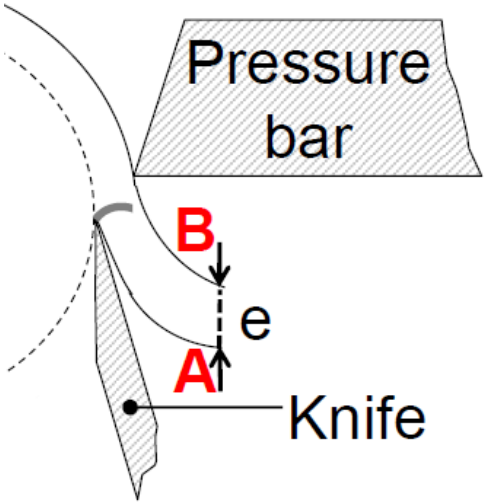


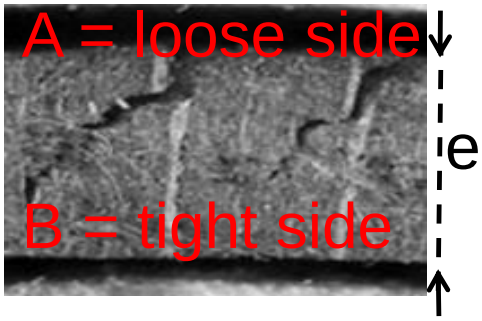
Transition at 50-55°C when cutting efforts start to decrease.

Effects of knots: decrease of standard deviations with temperatures.

Principles of fuitometer.

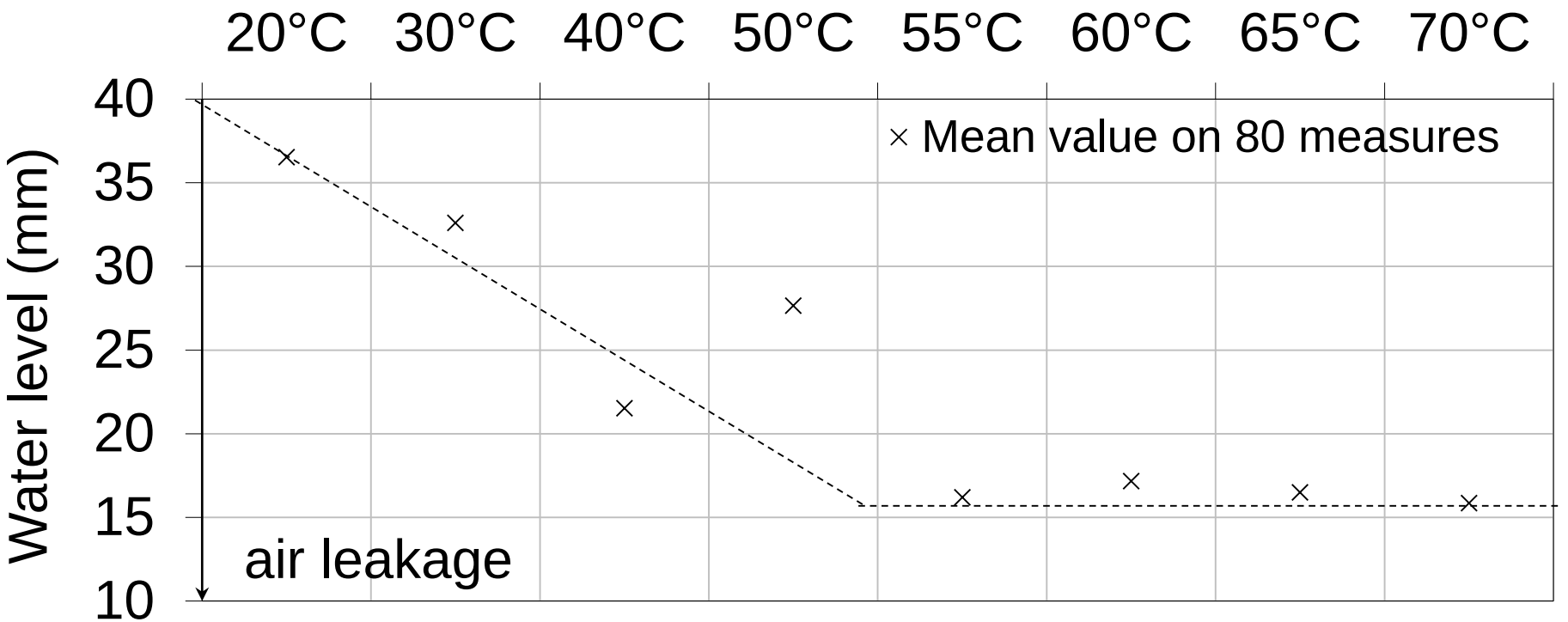






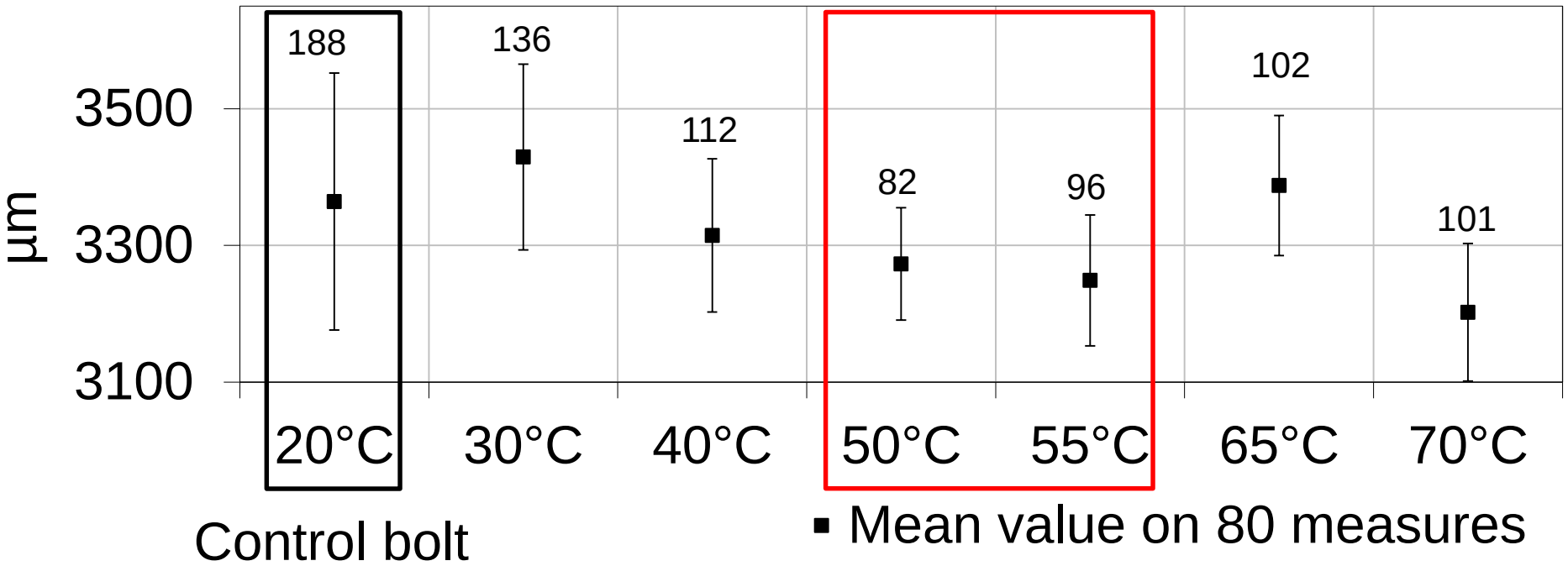
Measure of veneer air permeability is correlated to lathe checks.

Influence of heating temperatures on checking index = permeability of tight side – permeability of loose side.



Measured air leakage is higher on loose side than on tight side. Above 50°C, heating temperatures have positive influence on lathe checking.

Influence of heating temperatures on thickness variation.



Decrease of standard deviation with heating temperatures

Not necessary to heat up to 70°C to produce veneers with minor thickness variation.

Conclusions

- No interest in heating Douglas-fir heartwood up to 70°C

- 50-55°C = target temperatures at which:
- Cutting efforts start to decrease
- Lathe checkings are reduced
- Minor thickness variation
- Effects of knots (standard deviation of cutting efforts) are weaker

- Development of an alternative heating system which would heat bolt surface at 50-55°C.

 On-line heating temperatures of green-wood prior to peeling.

Anna DUPLEIX

PhD student – First year

ARTS ET MÉTIERS ParisTech
Cluny
LaBoMaP
LABORATOIRE BOURGUIGNON DES MATÉRIAUX ET PROCÉDÉS

Professor Rémy MARCHAL

Aalto University

Professor Mark HUGHES

Thank you for your attention.