Laboratory for Timber Constructions

Friction Welding of Wood

COST Action FP0904

Thermo-Hydro-Mechanical Wood Behaviour and Processing

Bernhard Stamm, dr ès sc. EPFL

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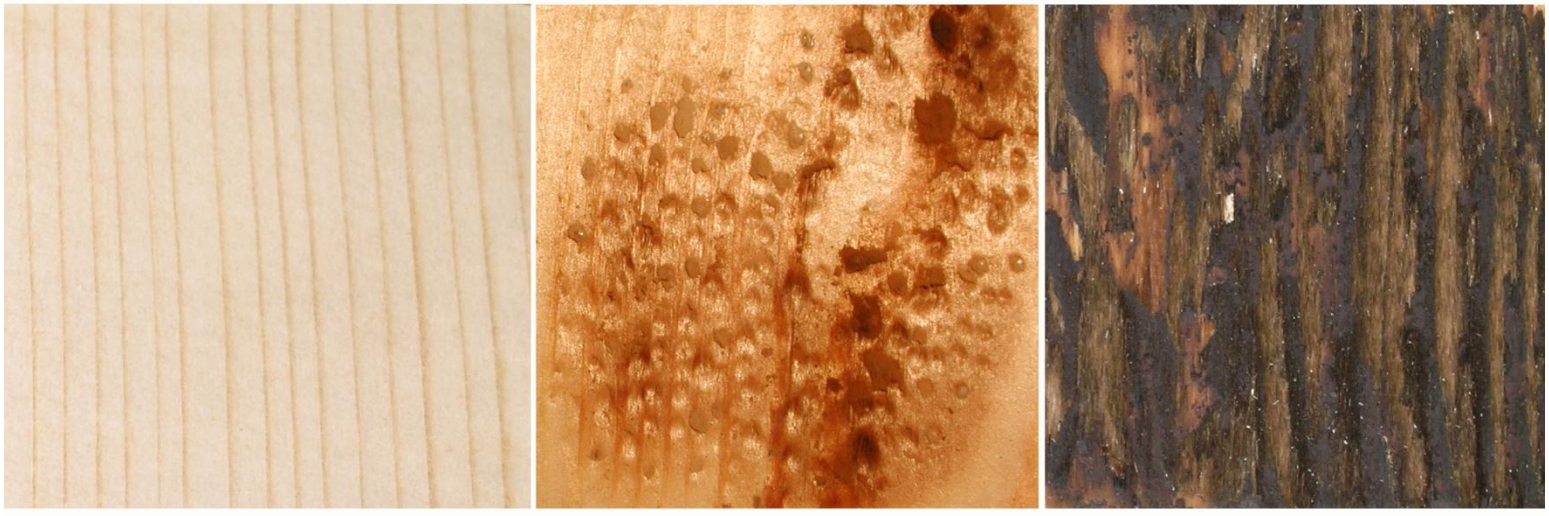
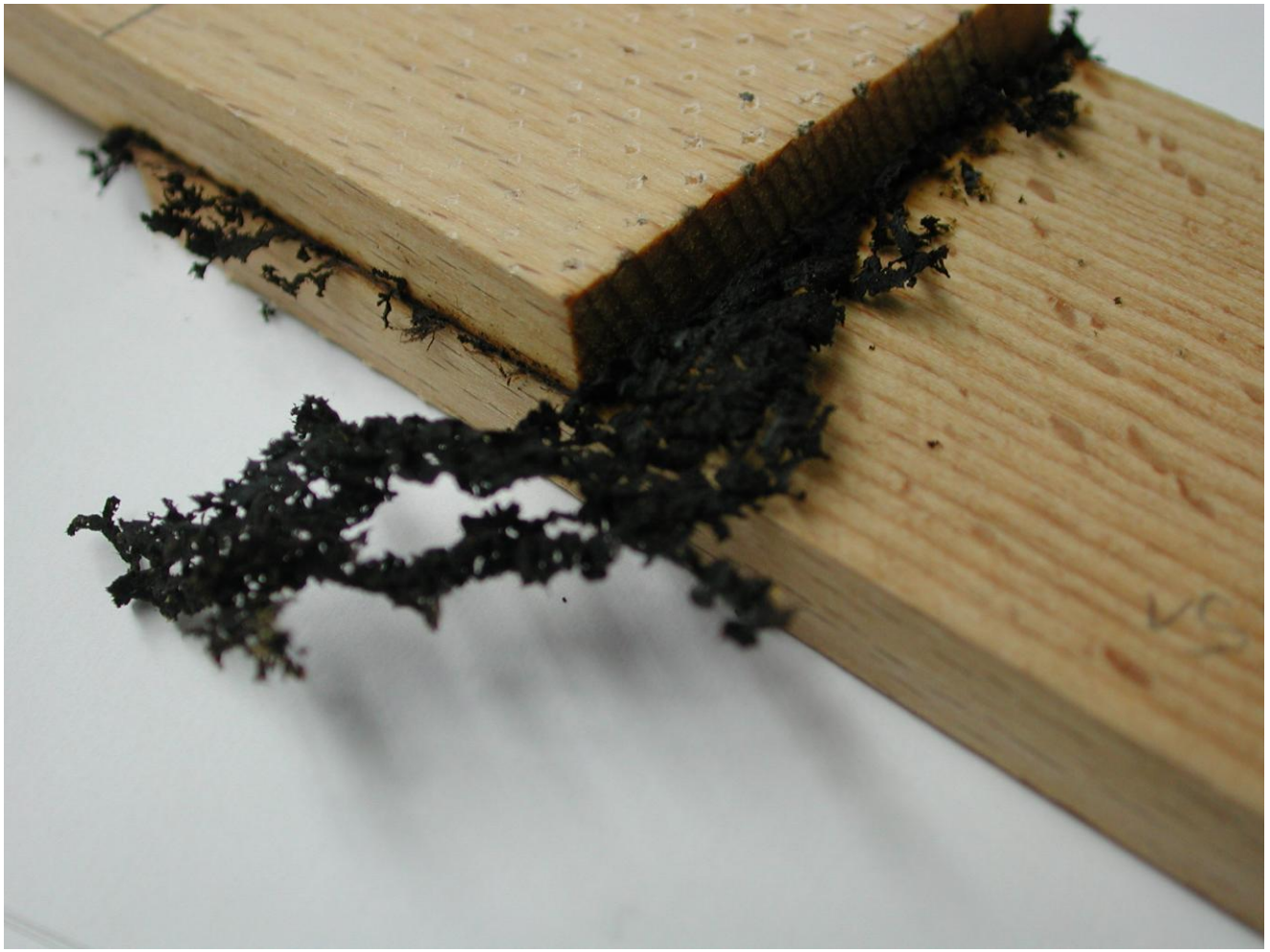
The welding process

- Thermal modification of wood
- Formation of an adhesive contact layer

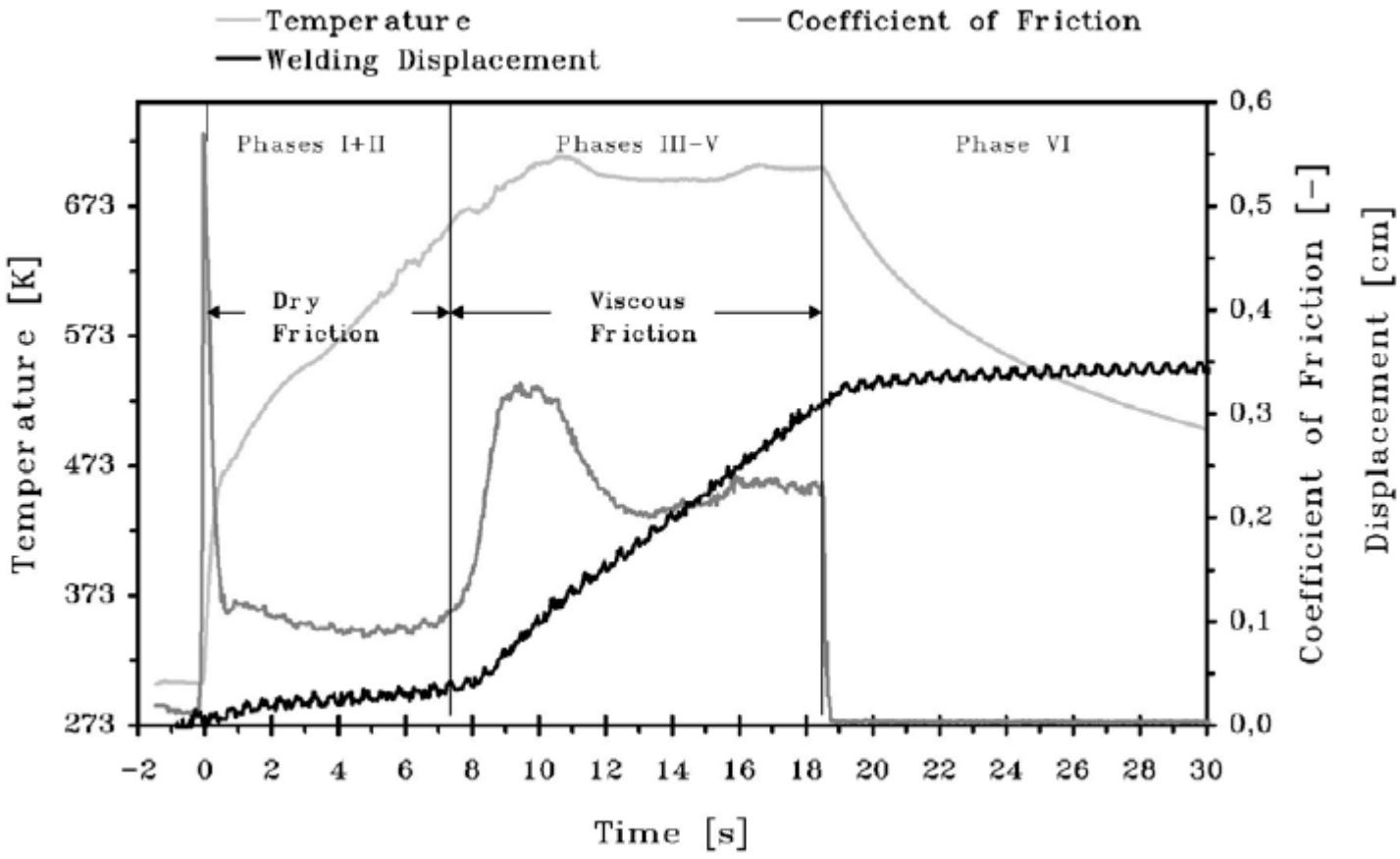
20°C 300°C 400°C



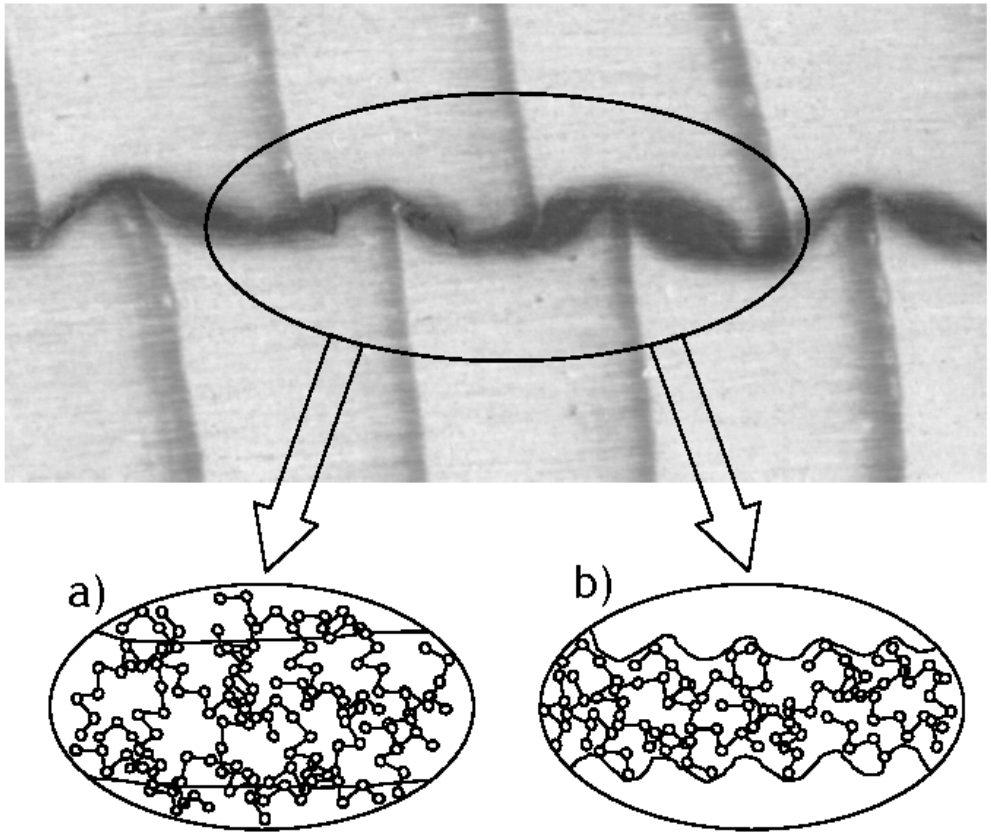
Expulsion of softened material



The welding process



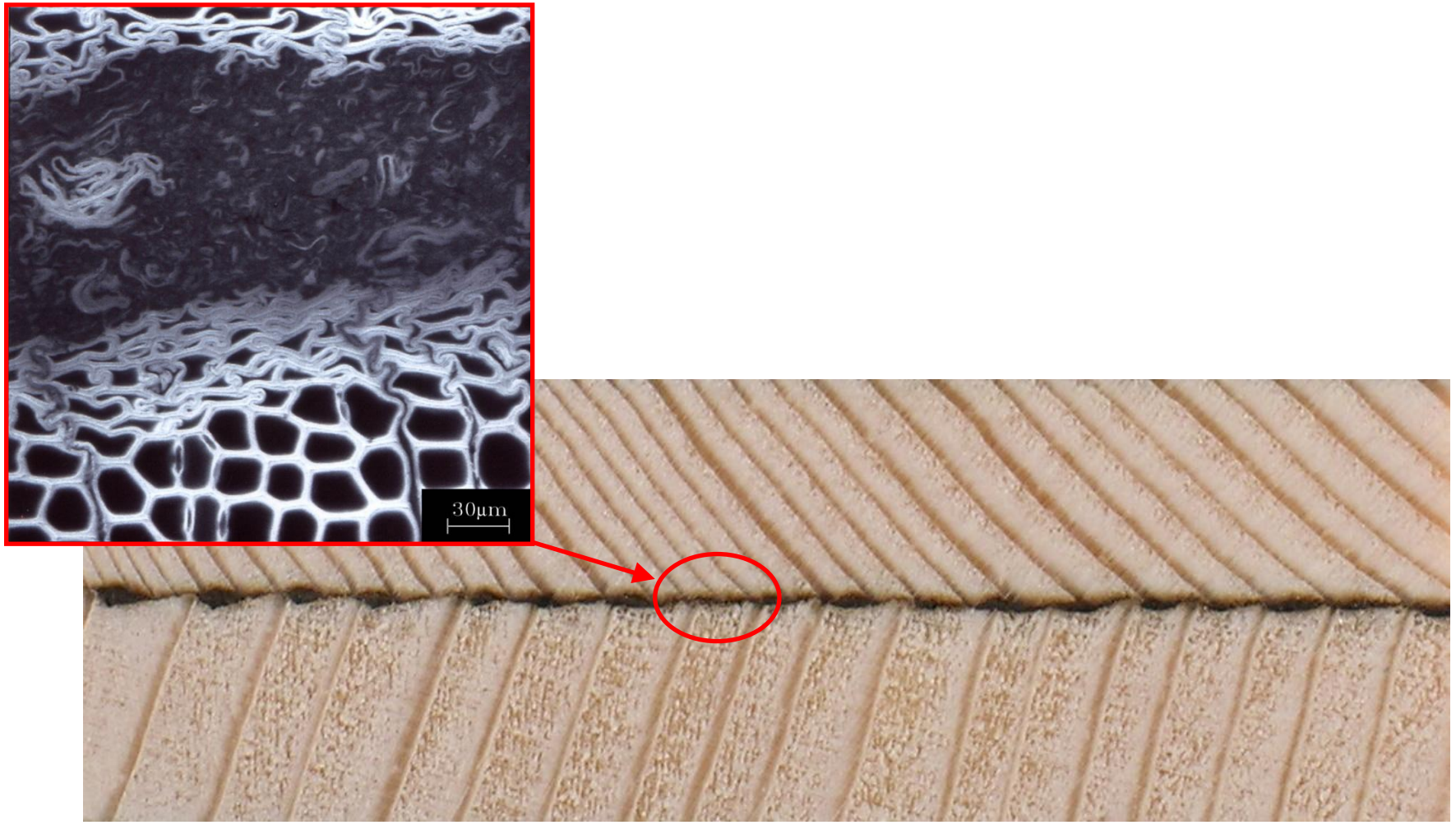
Mécanismes d'adhésion



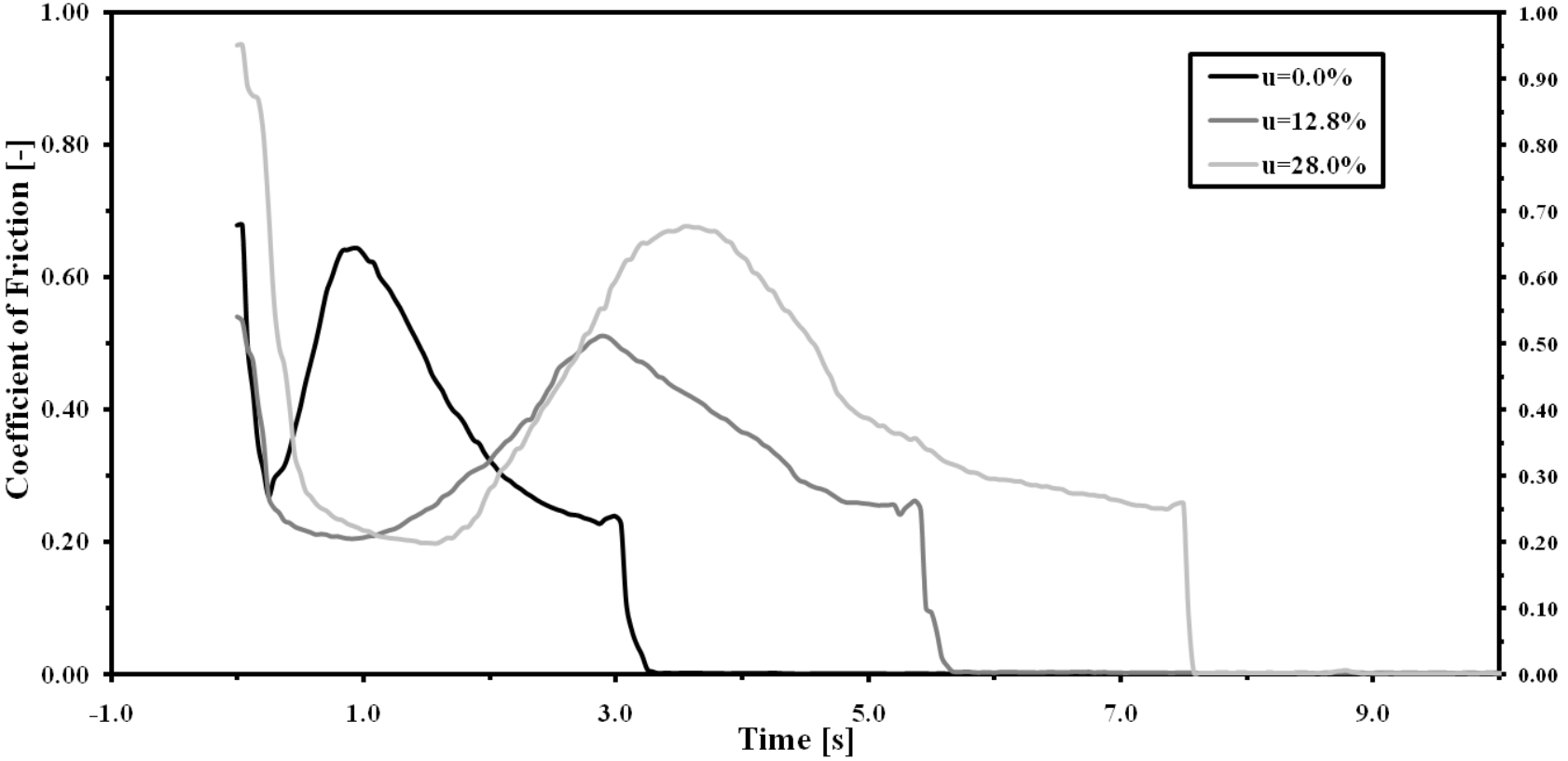
a) Liaison chimique entre des atomes et des molécules

b) Liaison mécanique par imbrication dans les aspérités des surfaces

Welded interface (Norway spruce)



Influence of Moisture on the welding process



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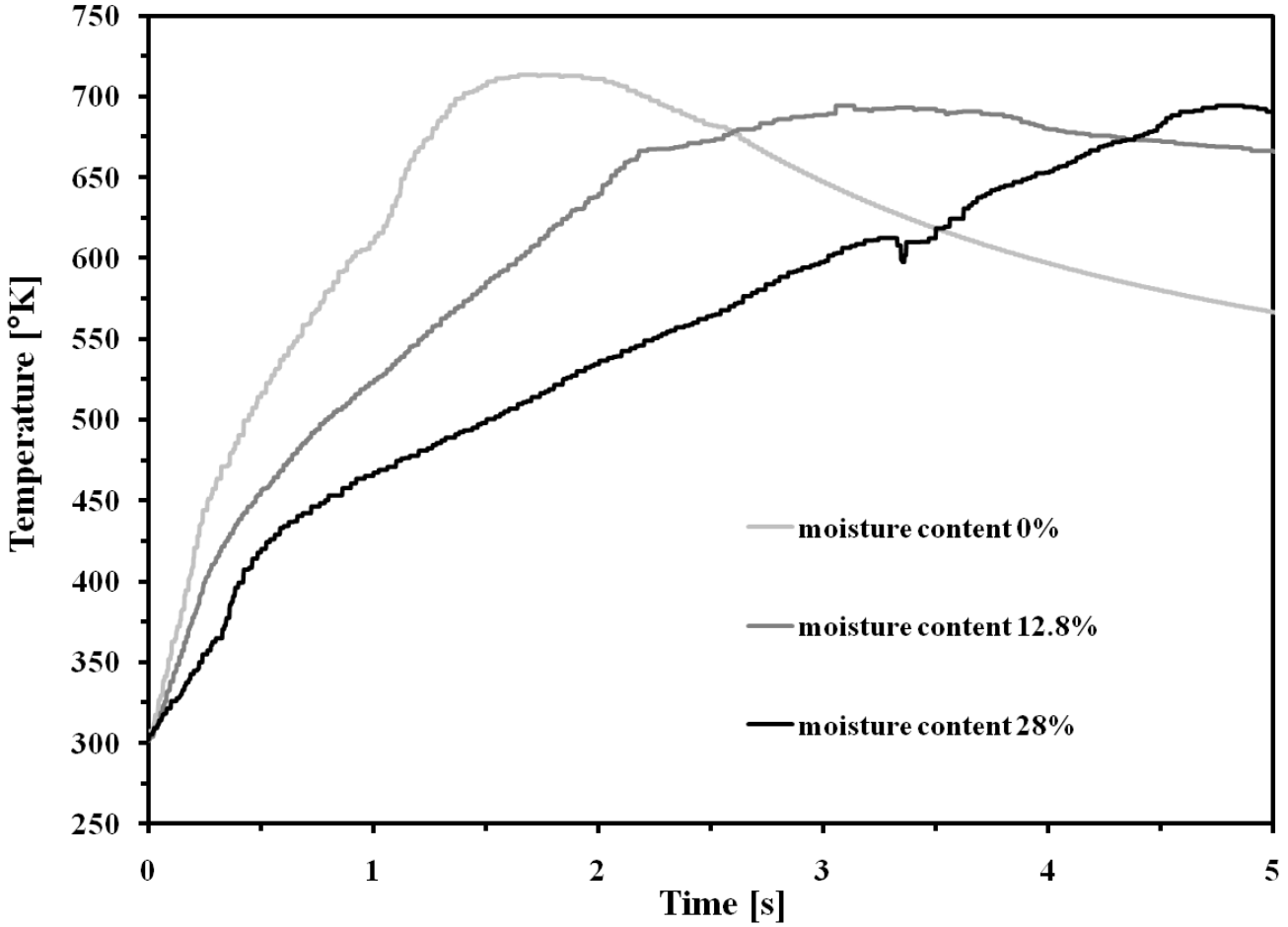
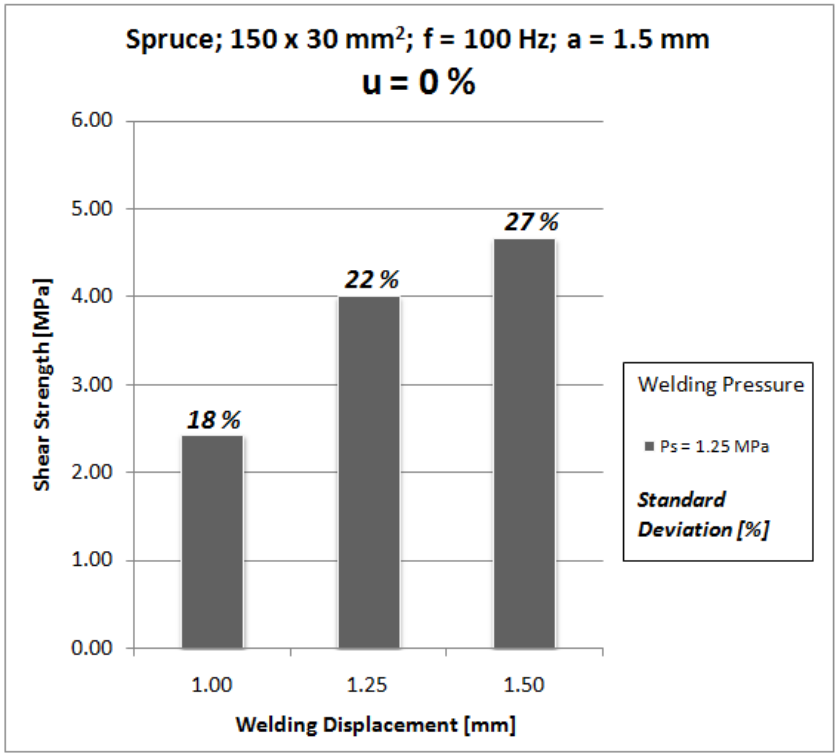
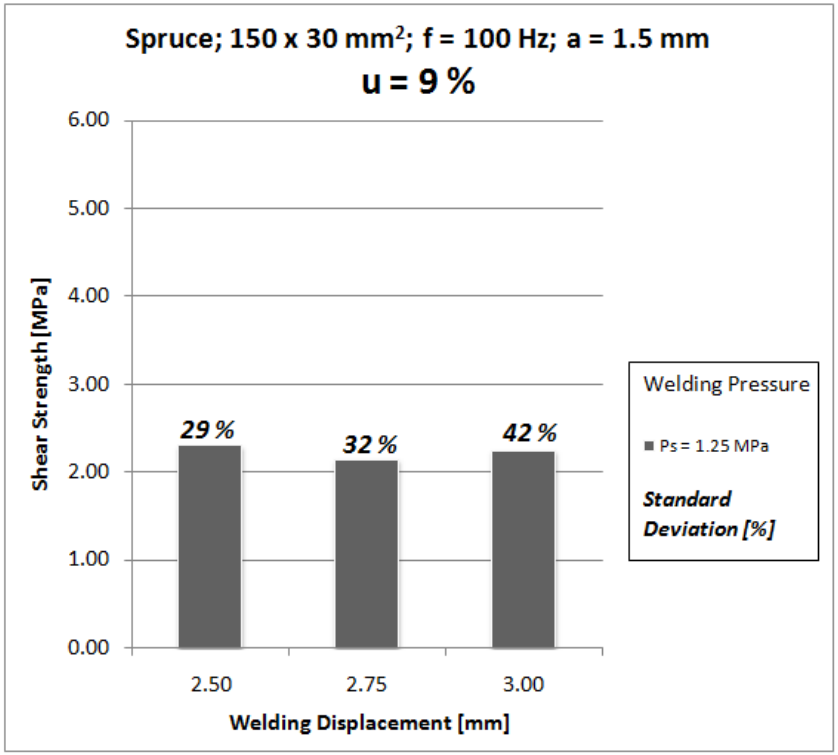
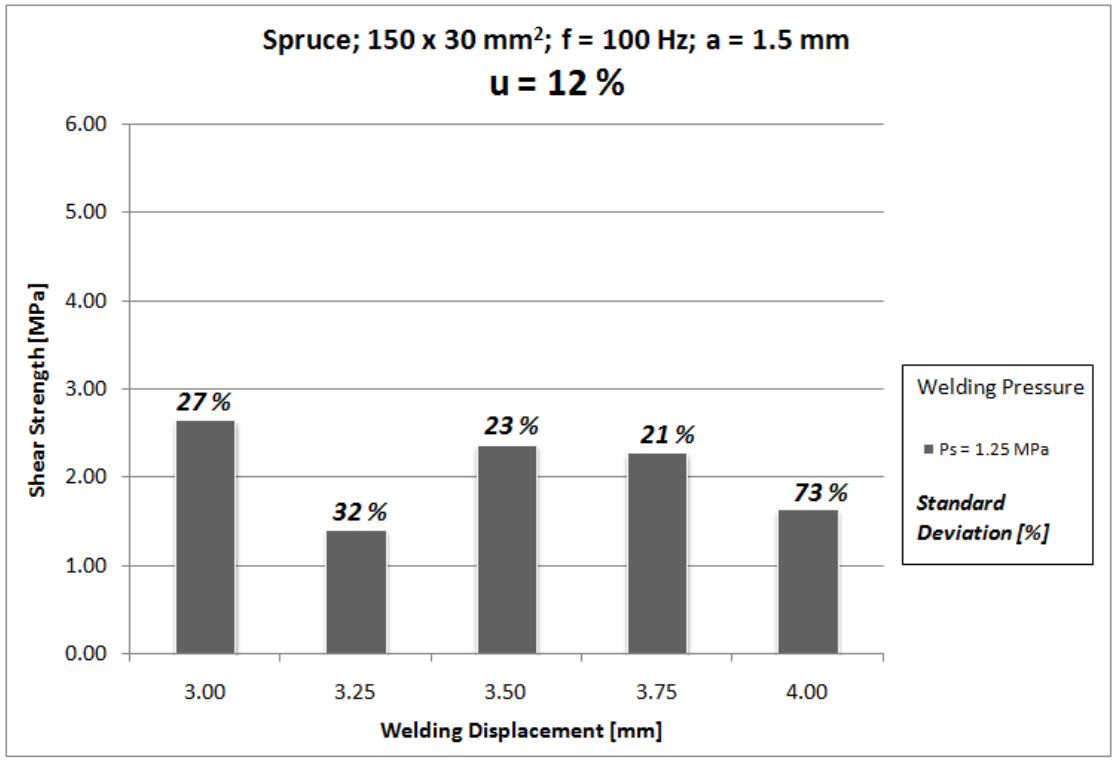
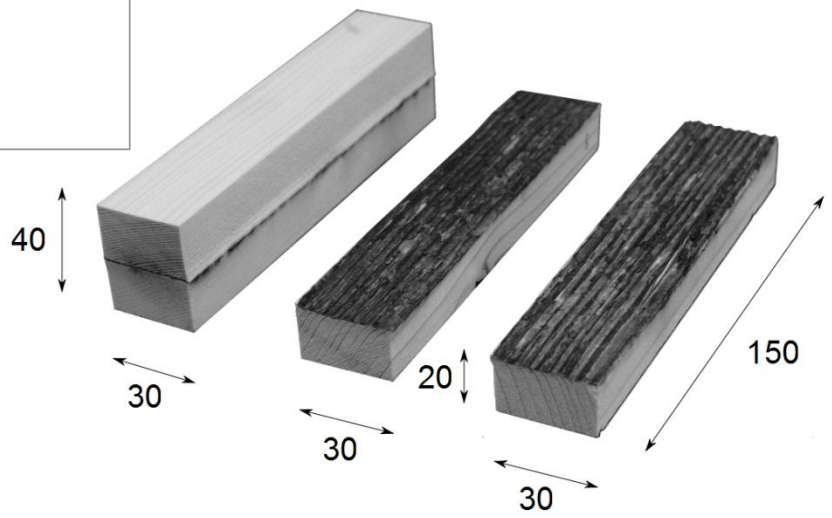


Influence of Moisture on the shear resistance

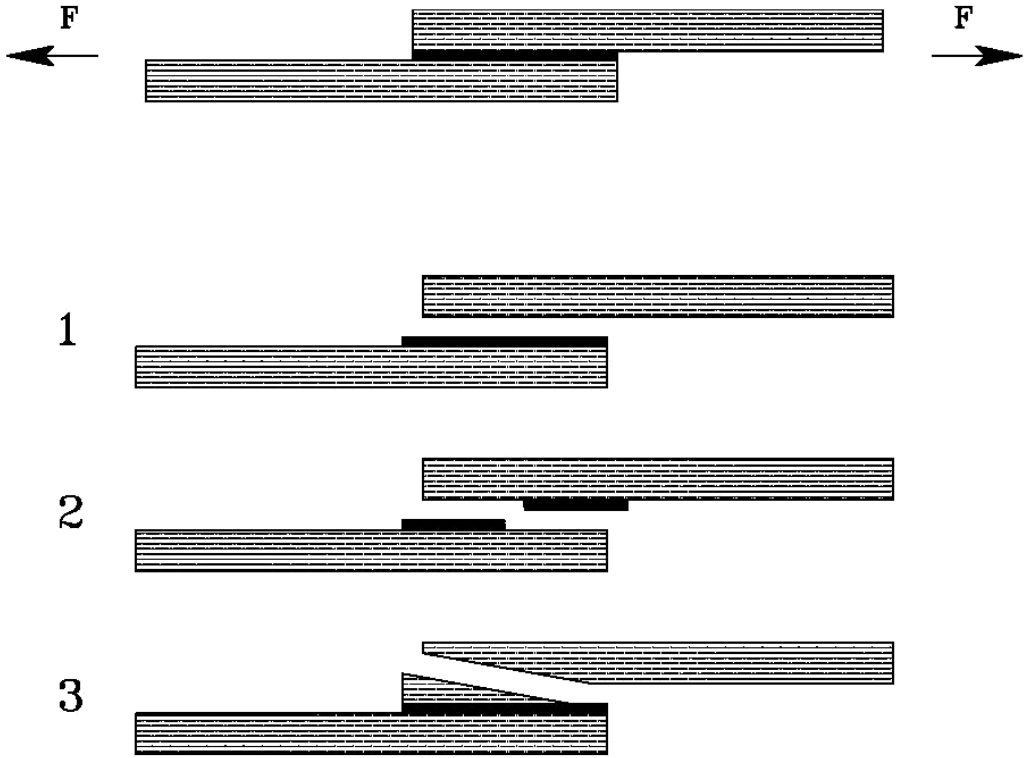





Spruce; 150 x 30 mm²; f = 100 Hz; a = 1.5 mm
u = 12 %
Shear Strength [MPa]
6.00
5.00
4.00
3.00
2.00
1.00
0.00
27 %
32 %
23 %
21 %
73 %
3.00
3.25
3.50
3.75
4.00
Welding Displacement [mm]
Welding Pressure
Ps = 1.25 MPa
Standard Deviation [%]

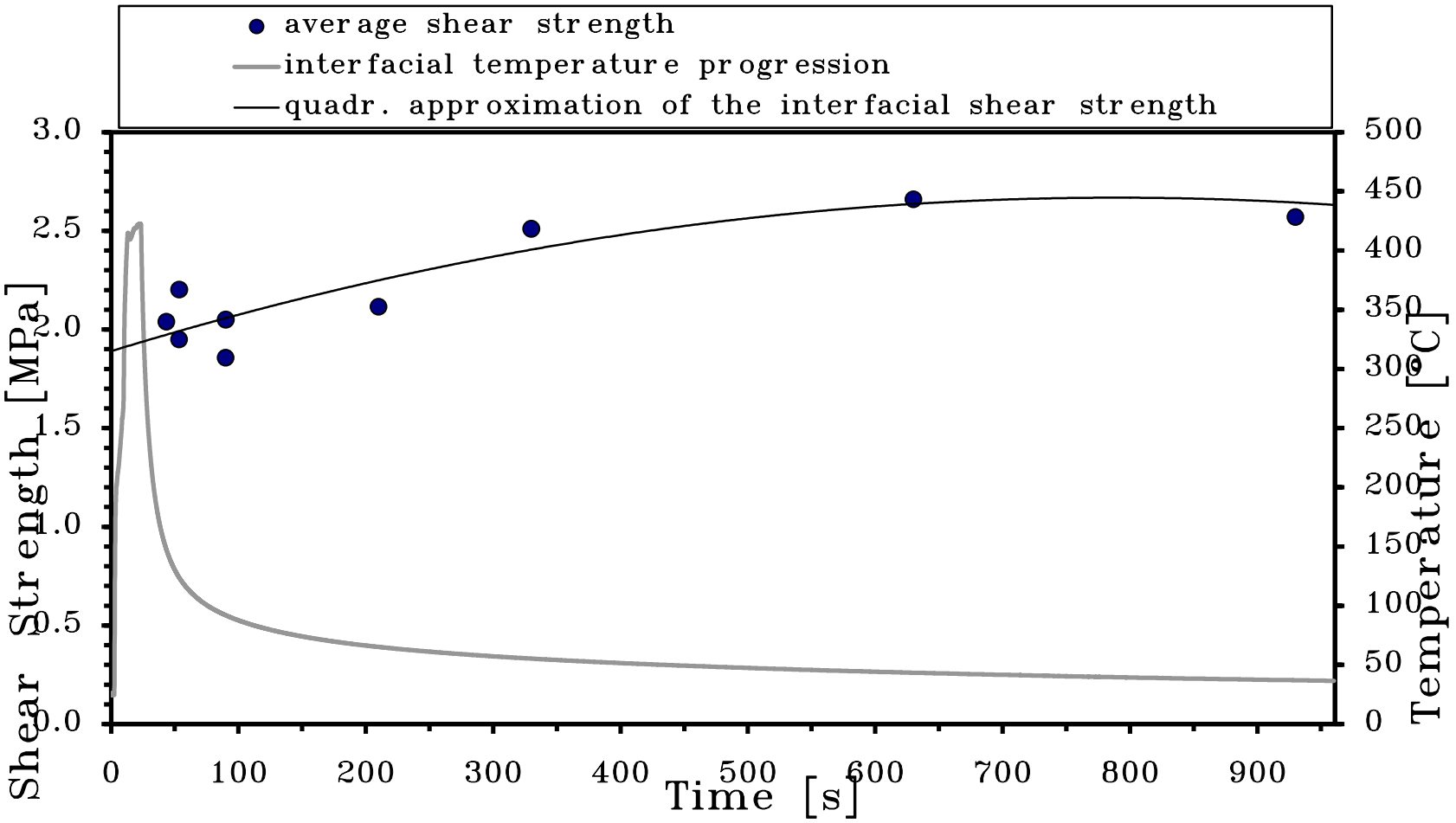

40
30
30
20
30
150

Failure mechanisms



Failure mechanisms

Evolution of interfacial shear strength



Multilayered compounds

Crosswise welded boards forming a plywood beam (spruce)

Potential fields of application: laminar connections, prefabrication

Timber construction, furniture industry

Examples for aimed application :

Laminated wall & ceiling elements

Plywood made of boards

Parquet flooring

Thank you for your attention !