

Equipment

Machining center

- **NC lathes**
 - SOMAB T400 prototype lathe with NUM 1060 NC
 - SOMAB T500 lathe with NUM 1060 NC
 - SONIM T9 lathe with Siemens 840D NC
 - MAZAK INTEGEX 250H AG, 5 axis turning milling machine with power skiving option
 - Instrumented wood peeling lathe (SEM)
 - Instrumented wood peeling microlathe (SEM)
- **NC Milling centers**
 - 3-axis milling DMG DMC65V with Siemens 840D NC
 - 3-axis milling DMG DMC85VL with Siemens 840D NC
 - 3-axis milling SCM with NUM 1060 NC
 - 5-axis milling machine Gambin Alcera 120CR with NUM 1060 NC
 - 5-axis milling Mikron HSM600U with Heidenhain iTNC530 NC

Surface treatments

- **PVD system**
 - 4 rectangular cathodes (16"x5") sputtering system by Kenosistec: 2 pulsed DC, 1 DC, 1 RF; planetary substrate holder; heating to 400°C
 - 2 circular cathodes (4") sputtering system: RF; heating substrate holder; PIII system (Plasma Immersion Ion Implantation)
 - 1 circular cathode (2") sputtering system: DC
- **BMI Low pressure thermochemical oven**
 - BMI furnace: max temperature 1200°C
 - BMI furnace: max temperature 1600°C

Characterization system

- **Composition**
 - Spark spectrometer Jobin-Yvon
 - Microanalysis X (EDS and WDS) Oxford
- **Imagery**
 - Scanning electron microscope JEOL (tungsten filament and FEG): [demo images](#)
 - Optical microscope: Keyence VHX, Alicona
 - Binocular visio to depth of field with a camera, system of measure integrated
 - Luxscan E-Scan (determine the class of resistance of sawing, a maximum length of 4 m, via the calculation of the module of elasticity and the density)
 - Luxscan X-Scan (mechanical and visual classification of sawing planed by cameras colors / levels of grey and a source of X-rays)
 - Camera LaVision Imager SCMOS
 - Ultra-High speed camera Photron FASTCAM SA-Z
- **Metrology**
 - Measuring instrument at 3D surface and surface finish: Somicronic Surfascan 3D
 - Optical profilometer Wyko Veeco NT1100
 - Roundness measurements device: Taylor Hobson
 - Portable measuring arm Romer
 - Coordinate measuring machine DEA

- Image dimension measurement system
- Wettability measurement
- **Measurement systems**
 - Numerical wattmeters
 - Monitoring systems: Artis, Digitalway
 - Kistler piezoelectric dynamometers and rotatives sensor for milling, micro-milling, turning, drilling
 - Rotary sensor with strain gauge for tapping: Artis
 - Displacement sensor: Laser keyence, sensor CF Micro-Epsilon
- **Mechanical characterization**
 - **Non-destructive systems**
 - Bing (System of vibratory analysis of the quality of wood)
 - Sylvatest (System of analysis of the quality of wood by ultrasonic wave)
 - Micro hardness
 - **Destructivetestingsystems**
 - 4 -point bending rig (100 kN)
 - Instron (100 kN)
 - Zwick (300 kN)
 - Vishay Equipment for Residual Stress Analysis

Specific apparatus developed for research

- Instrumented wood peeling line
- QSTD (Quick Stop Test Device)
- Micro-slotting Maching in-situ MEB
- Mechanical impactor for spindle characterization
- SMOF (optical Measurement system of Cracks. Automatic detection of the cracks of wooden veneers stemming from the microcomputing peeling lathe by camera)

Softwares

- CAD-CAM: Catia V5&V6, NX
- CAM: HyperMILL, PowerMILL
- Data aquisition and analysis: DasyLab, Matlab, Statistica
- FEA: SFTC Deform, Abaqus, Ansys, Comsol, Star-CCM+

Others

- Press (3m50 x 1m30 - on 2000 kN)
- Climatic surrounding
- Climatic room

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