1A FISA	CU 6.5
Semester 6	4 School ECTS - 3 Company ECTS

CU 6.5: DESIGN AND IMPLEMENTATION OF PROCESSES

Director of studies: Alain RENAUD

General CU objectives:

• Design a digital 3D model of a product or a component of a living space

• Steer industrial means of production

• Manage the preparation of materials and resources necessary for production

• Organise and check the production of a workshop

• Apply safety procedures

• Ensure the exchange of information with the design

• Choose and implement an adhesive

• Check the quality of a, adhesive bond

Consists of:

- Module 1: CAM and Design of a digital model for construction
- Module 2: Knowledge of wood processing
- Module 3: Adhesives for gluing wood
- Industrial assessment

Hourly volume

In-person	*Self-directed study*
14.00 H Lectures	**40.00 H**
24.00 H Tutorials	
20.00 H Practicals	

Positioning of the CU in the School reference system:

semester 6: after CU 5.5

Units of skills

In accordance with the RNCP sheet

Updated on 11 April 2023

CU 6.5: DESIGN AND IMPLEMENTATION OF PROCESSES

Module 1: CAM and Design of a digital model for construction	**Coefficient 1**
Session leaders: Pierre-Jean MÉAUSOONE, Anis BOUALI, Sébastien AUCHET, Alain RENAUD, Marc JAFFRES	
Teaching assistants:	
Prerequisites: none	
Teaching materials: Reading list– Reference book– Projects– Tutorials	
Assessment methods: individual and in groups Evaluation of the use of machine tools (permit to use machine tools) / Manufacturing of products	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
	Principles of Numerical Control machine tools. Numerical control programming CAM applied to timber and its processing areas.	3.50	4.00	
Generate and modify a numerical control program in order to adapt it to a production situation. Characterise the different principles of the CAM. Design a digital model of a Construction or part of a Construction.	Representation tools (CADWORK): Use of timber and structural construction software packages – Exploitation of the software functionalities relating to the definition drawing with: * View * Construction of cuts, sections... * Presentation of the drawing: standard pricing, background, various writings, etc. * Editing BOMs – Product renderings – Production of macros.			20.00
		3.50	**4.00**	**20.00**

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Module 2: Knowledge of timber processing	**Coefficient 1**
Session leaders: Pierre-Jean MÉAUSOONE, Alain RENAUD, Marc JAFFRES	
Teaching assistants:	
Prerequisites: none	
Teaching materials: Course notes – Presentation slides – Reading list – Reference book – Files	
Assessment methods: individual In-class exam– File	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Define and characterise the different processes and means of production of the 1st processing. Define and characterise the different processes and means of production of the 2st processing.	Functional analysis of the sawmill circuit. Sawmill equipment following the timber circuit.	1.75		
	Log flow mode and material yield characterisation. Timber grading Organisation of panel production (OSB, MDF, CP, PPSM). Raw material optimisation methods.		4.00	
	Functional analysis of machines Interactions with other processes (finishing, sanding, gluing, etc.)		4.00	
	Machining settings (cutting and feed rates, feed per tooth, chip thickness) Characterisation of cutting tools Cutting theory (cutting mode, force and cutting power) The Material Tool Torque Tool lifespan Machining results (surface condition – machining quality, etc.) The cutting tool and its angular characteristics (reading for tool in hand and on machine) Characterise optimal settings Evaluation of cutting forces and calculation of power consumption	3.50	8.00	
		5.25	**16.00**	**0.00**

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Module 3: Adhesives for gluing wood	**Coefficient 1**
Session leaders: Emmanuel FREDON, Caroline SIMON	
Teaching assistants: Marie-Laure ANTOINE, Christelle PERRIN	
Prerequisites: CU 5.1, module M3, Chemistry refresher (CU5.3, module M1)	
Teaching materials: Course notes – Presentation slides – Reading list – Arche page – Reference book	
Assessment methods: individual and in groups Class assignment– Report	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Choose or recommend an adhesive for panels and solid wood (structural, non-structural, dry to wet climate). Research, decipher and exploit technical information or information from scientific studies in the field of adhesives. Recommend tests to characterise the performance of a bond according to standards and exploit experimental results	Structural and non-structural adhesives, general criteria for choosing an adhesive. Standard classification of adhesives. Physico-chemical classification of adhesives. Standardised testing and performance requirements.	1.75		
	Chemical description of binders. Corresponding uses (solid wood and panels), panel classifications, environmental criteria, emissions, costs.	1.75	4.00	
	Principles of cohesion and adherence. Bonding processes (panels and solid wood). Materials (gluing, pressing, etc.), specific times,. Factors affecting adherence (surface condition, extractables, density, temperature, humidity).	1.75		
		5.25	**4.00**	**0.00**

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Industrial **assessment**	**Coefficient**
Session leaders: Apprenticeship supervisor (in company), academic tutor, P-J. MÉAUSOONE	
Teaching assistants:	
Prerequisites: CU 5.5	
Teaching materials: Course note – Company documents, Technical Centre documents, standards, production files.....	
Assessment methods: Individual Report	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Characterise the implementation of serial and programmable production means Optimise production Qualify and organise the function of assembling products and components Characterise bonding and product implementation	Based on an industrial project (apprentice's company, company's customers or provided by the school), this project will put into practice on a concrete example the skills acquired during this teaching unit. Establishment of optimal machining conditions, installation, assembly and mounting of products. Give the manufacturing constraints according to pre-established manufacturing records. determine a process for measuring and controlling parts. Surface preparation and gluing, Respect the manufacturing requirements for gluing. Expected deliverables: 10-15 page report Depending on the company's area of expertise, the documents may be submitted either to the company or to the CU supervisor and the company Note: the project must be related to the company's activity. If the company's area of expertise does not meet the desired outcomes of this CU, the school will provide a project allowing the apprentice to work on the subject.			
		0.00	**0.00**	**0.00**