



Sustainable Modular Houses for People in Need

2021-1-EL01-KA220-VET-000025502

INTELLECTUAL OUTPUT 2

VET online course

“Sustainable Modular Houses for
People in Need”

Job profile / **Technician**

Learning Units & Outcomes



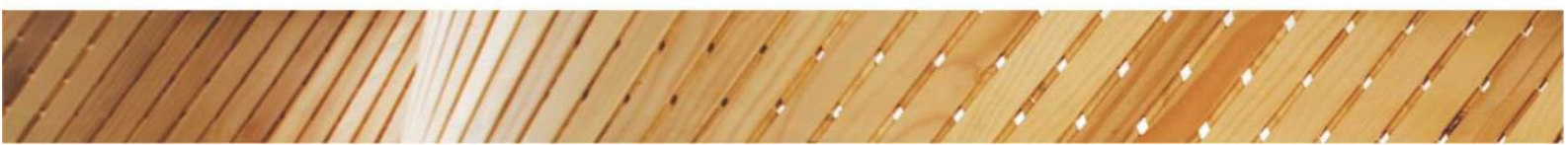
Job profile

Job Title	Technician for Sustainable Modular Houses for People in Need.
EQF Level	Level 3 Secondary Education
Job description	<p>The Technician is responsible for overseeing the off-site manufacturing of sustainable modular houses designed for people in need. They will work closely with architects, engineers, and construction teams to ensure that the modular houses are designed and manufactured to meet strict sustainability and quality control standards. The technician will also be responsible for ensuring compliance with fire safety regulations and implementing quality control procedures throughout the manufacturing process. They will need to have a strong understanding of sustainable design principles, off-site manufacturing methods, and construction techniques. Strong problem-solving skills and attention to detail are also essential for this role.</p>
Entry requirements	<p>EQF level 2 completed</p> <p>Basic MS office skills</p> <p>Interest in acquiring knowledge in the field of Sustainable Modular Houses</p>



Activities	<ol style="list-style-type: none"> 1. Designing and engineering sustainable modular houses for people in need using software and modeling tools. 2. Coordinating with architects, construction managers, and other stakeholders to ensure design compliance and quality control. 3. Preparing detailed technical specifications, drawings, and plans for off-site manufacturing of modular houses. 4. Conducting regular inspections and quality control checks during the off-site manufacturing process and on-site installation of modular houses. 5. Collaborating with local communities and organizations to ensure that modular houses meet their needs and requirements. 6. Providing training and technical assistance to local construction teams and volunteers in the installation and maintenance of modular houses. 7. Continuously researching and identifying new sustainable materials, construction methods, and technologies for modular housing. 8. Monitoring and evaluating the performance and sustainability of modular houses in use and recommending improvements or upgrades as needed.
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Level 3	Knowledge of facts, principles, processes, and general concepts, in a field of work or study following a secondary education.	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials, and information.	Operate in work-related contexts.
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Learning Units

A Learning Unit consists of a coherent combination of learning outcomes, subject to evaluation and autonomous validation. Learning outcomes consist of knowledge, skills and competences that are mobilised in actions through which the individual shows / demonstrates mastery of the acquired learning outcome, in accordance with certain performance criteria and context conditions.

Learning Units		Responsibility
Learning Unit (LU) 1	CONSTRUCTION ELEMENTS AND MATERIALS FOR TIMBER UNITS	Case Lemn Bernard (CLM)
Learning Unit (LU) 2	TECHNICS FOR OFF-SITE MANUFACTURING	Case Lemn Bernard (CLM)
Learning Unit (LU) 3	ASSEMBLY AND DISASSEMBLY OF TIMBER HOUSE UNITS	Chliapas S.A.
Learning Unit (LU) 4	ENVELOPE DETAILS OF MICRO UNITS (LAYERS OF WALLS, IMPLEMENTATION STEPS)	Chliapas S.A.



Learning Outcomes

The Learning Outcomes break down into knowledge skills and competencies that are mobilised in actions/achievements through which the individual shows/ demonstrates the required field of competence, according to a certain performance criteria and context conditions.

Learning Unit 1

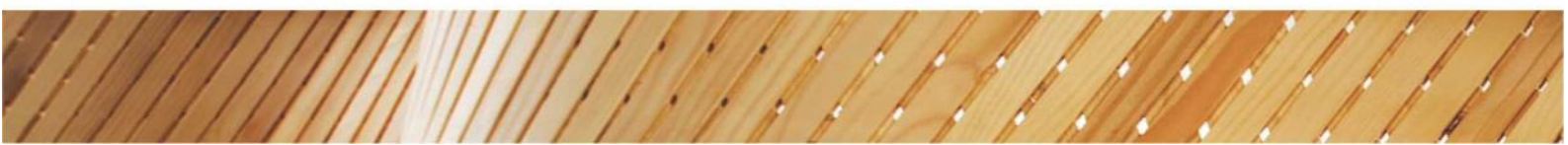
LU1 refers to the various components and substances used in the construction of timber modular buildings. These include timber frames, walls, roofs, floors, and cladding. The materials used for these elements may vary depending on factors such as design requirements, environmental factors, and building regulations. Common materials used for timber construction elements include laminated veneer lumber, cross-laminated timber, glued laminated timber, and engineered wood products. The selection of construction elements and materials is critical to ensure the durability, sustainability, and safety of the building.

Learning Unit 1	CONSTRUCTION ELEMENTS AND MATERIALS FOR TIMBER UNITS
Sub-Contents	<ul style="list-style-type: none"> ○ Types of timber commonly used in modular housing construction ○ Characteristics and properties of different types of timber ○ Manufacturing processes and techniques for timber elements and materials ○ Structural components such as beams, trusses, and columns ○ Wall systems and components including studs, sheathing, insulation, and finishes ○ Roof systems and components including rafters, decking, insulation, and finishes ○ Flooring systems and components including joists, subflooring, and finishes ○ Windows, doors, and other exterior components ○ Interior finishes and materials such as cabinetry, countertops, and flooring ○ Maintenance and upkeep of timber materials and components.



Learning Outcomes

Knowledge	Skills	Competences
<p>Understanding of the properties and characteristics of different types of timber materials</p> <p>Knowledge of the different types of timber elements used in construction, including beams, studs, and trusses</p> <p>Knowledge of the various timber treatments and finishes available to increase durability and prevent decay</p> <p>Understanding of how to read and interpret technical drawings and specifications related to timber construction</p> <p>Knowledge of the various types of connectors, fasteners, and adhesives used in timber construction</p> <p>Understanding of the structural principles and best practices for timber construction, including load-bearing capacity and earthquake resistance.</p>	<p>Ability to read and interpret technical drawings and specifications for timber units.</p> <p>Proficiency in the use of hand and power tools commonly used in timber unit construction.</p> <p>Familiarity with common timber types and their properties, as well as other materials used in timber unit construction.</p> <p>Knowledge of proper techniques for cutting, shaping, and joining timber pieces to create structural components for timber units.</p> <p>Competence in measuring, aligning, and installing timber components to ensure proper fit and function.</p> <p>Ability to identify and troubleshoot common issues that may arise during timber unit construction, such as warping, splitting, or misalignment.</p> <p>Familiarity with common safety practices and regulations related to timber unit construction.</p>	<p>Knowledge of timber properties, construction codes and standards, safety regulations, and material selection.</p> <p>Proficiency in the use of various tools and equipment, ability to read and interpret technical drawings and blueprints, and attention to detail in executing construction tasks.</p> <p>Ability to work collaboratively with a team, problem-solving skills, and effective communication abilities.</p> <p>Ability to identify and troubleshoot issues during construction, attention to detail and quality control,</p> <p>Problem-solving skills to find creative solutions to unexpected challenges that may arise during the construction process.</p>
Main action / achievement:		Workload
<p>The main achievement is the ability to select, handle and work with various materials and elements necessary for the construction of timber units. They must be able to read and interpret technical plans and blueprints, prepare and assemble the necessary components, and ensure the overall quality of the construction process. Additionally, they must be knowledgeable about safety regulations and practices, as well as be able to communicate effectively with other members of the construction team.</p>		25 hours





Learning Unit 2

LU2 refers to producing building components or entire building modules in a controlled factory environment, which are then transported to the construction site for assembly. This method of construction offers several advantages, such as reduced construction time, improved quality control, and increased efficiency. The techniques for off-site manufacturing include designing for modular construction, advanced manufacturing technologies, digital fabrication, and automated production lines. The use of these techniques can improve productivity, reduce waste, and lower costs.

Learning Unit 2	TECHNICS FOR OFF-SITE MANUFACTURING
Sub-Contents	<ul style="list-style-type: none">○ Introduction to off-site manufacturing○ Types of off-site manufacturing techniques○ Comparison of off-site vs on-site manufacturing○ Factors influencing the choice of off-site manufacturing technique○ Lean manufacturing principles and practices○ Quality control in off-site manufacturing○ Health and safety considerations in off-site manufacturing○ Sustainability aspects of off-site manufacturing○ Case studies of off-site manufacturing in the construction industry.





Learning Outcomes

Knowledge	Skills	Competences
<p>Understanding of the principles of off-site manufacturing and the benefits of the technique.</p> <p>Knowledge of different types of off-site manufacturing techniques, such as panelization, volumetric, and hybrid.</p> <p>Understanding of the design and engineering requirements for off-site manufacturing, including the use of software and BIM.</p> <p>Knowledge of the various materials used in off-site manufacturing, such as timber, steel, and concrete.</p> <p>Knowledge of the manufacturing process, including quality control, safety procedures, and sustainability considerations.</p> <p>Understanding of the logistical considerations involved in the transportation and assembly of off-site manufactured components.</p> <p>Knowledge of regulations and standards relating to off-site manufacturing, including building codes, fire safety regulations, and environmental regulations.</p>	<p>Ability to operate and maintain manufacturing equipment and machinery</p> <p>Proficiency in reading and interpreting technical drawings and blueprints</p> <p>Understanding of manufacturing processes and how to optimize them for efficiency and quality control</p> <p>Knowledge of different types of modular construction techniques and how to apply them to specific projects</p> <p>Ability to work effectively in a team environment and communicate with colleagues, supervisors, and other stakeholders</p> <p>Proficiency in using computer-aided design (CAD) software and other relevant software programs for manufacturing and project management</p> <p>Knowledge of safety procedures and regulations for manufacturing and construction sites.</p>	<p>Knowledge of different off-site manufacturing techniques for timber construction.</p> <p>Proficiency in using manufacturing equipment and tools.</p> <p>Ability to read and interpret technical drawings and specifications.</p> <p>Knowledge of quality control procedures and standards.</p> <p>Problem-solving skills to troubleshoot manufacturing issues.</p> <p>Attention to detail and accuracy in manufacturing processes.</p> <p>Effective communication skills to collaborate with other team members.</p>
Main action / achievement:		Workload
<p>The main achievement is to be able to understand and implement efficient and sustainable manufacturing processes that can produce high-quality timber units in a cost-effective and timely manner. This includes mastering the use of advanced equipment and tools, optimizing production workflows, ensuring quality control, and maximizing resource utilization. The technician should also be able to identify and address potential issues in the manufacturing process to minimize waste and optimize efficiency. Overall, the main goal is to achieve a high level of productivity and quality while minimizing environmental impact.</p>		<p>25 hours</p>





Learning Unit 3

LU3 refers to the process of putting together prefabricated components off-site and then assembling them on-site, while disassembly involves dismantling the components for reuse or recycling. The process requires technical skills, knowledge of construction methods, and the use of specialized tools and equipment. The assembly process involves erecting the structural frame, installing the insulation, cladding, roofing, and other finishing materials, and connecting the mechanical, electrical, and plumbing systems. Disassembly involves the careful removal of components without causing damage, labeling and storing the components for future use or recycling. Proper assembly and disassembly are essential for ensuring safety, durability, and sustainability of the timber house units.

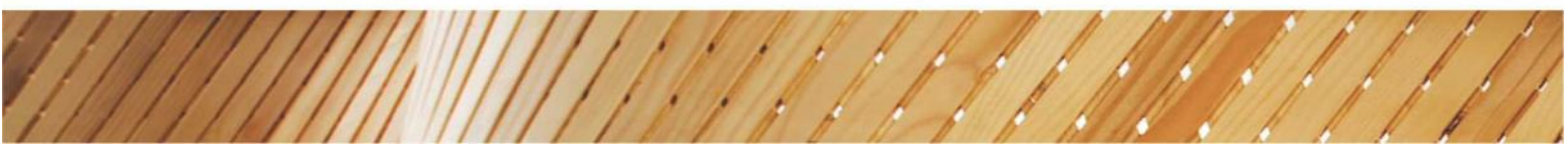
Learning Unit 3	ASSEMBLY AND DISASSEMBLY OF TIMBER HOUSE UNITS
Sub-Contents	<ul style="list-style-type: none">○ Overview of assembly and disassembly procedures for timber house units○ Identification and use of tools and equipment for assembly and disassembly○ Preparation of the site for assembly and disassembly○ Connection and securing of different elements of the house unit (walls, roof, floors, etc.)○ Handling and lifting of heavy materials and components○ Safety measures and precautions during assembly and disassembly○ Inspection and testing of the assembled unit for quality control○ Disassembly procedures and techniques for future reuse or recycling.





Learning Outcomes

Knowledge	Skills	Competences
<p>Understanding the different types of timber house units and their assembly and disassembly processes.</p> <p>Familiarity with the tools and equipment required for assembly and disassembly, as well as their proper use and maintenance.</p> <p>Knowledge of the different types of joints used in timber house units, and their strengths and weaknesses.</p> <p>Understanding of the various factors that can impact the assembly and disassembly of timber house units, such as weather conditions and site preparation.</p> <p>Knowledge of the safety protocols and procedures that should be followed during assembly and disassembly of timber house units, including proper handling of materials and equipment.</p>	<p>Ability to read and interpret assembly and construction drawings and specifications.</p> <p>Proficiency in the use of hand and power tools, such as saws, drills, and hammers.</p> <p>Skill in measuring and cutting materials to precise dimensions.</p> <p>Familiarity with timber frame construction and joinery techniques.</p> <p>Knowledge of safe and efficient assembly and disassembly procedures for modular timber houses.</p> <p>Proficiency in working as part of a team to complete construction projects on schedule.</p> <p>Ability to troubleshoot and solve problems related to the assembly or disassembly of timber house units.</p> <p>Strong attention to detail and commitment to producing high-quality work.</p> <p>Familiarity with relevant health and safety regulations and guidelines.</p> <p>Ability to communicate effectively with other members of the construction team and clients.</p>	<p>Knowledge of construction and safety regulations for timber housing assembly and disassembly.</p> <p>Ability to read and interpret technical drawings and assembly instructions.</p> <p>Familiarity with various tools and equipment used in assembly and disassembly.</p> <p>Experience in handling and assembling different types of timber units.</p> <p>Attention to detail and ability to identify and troubleshoot any issues during assembly and disassembly.</p> <p>Communication and teamwork skills to coordinate with other technicians and professionals.</p>
Main action / achievement:		Workload
<p>Upon completion of training in assembly and disassembly of timber house units, the technician should be able to demonstrate skills in safely and efficiently constructing, disassembling, and transporting modular housing units. The technician should also have a thorough understanding of the assembly process, including the use of appropriate tools and equipment, as well as the ability to troubleshoot and make necessary repairs. Additionally, they should be knowledgeable about relevant regulations and safety standards in the industry.</p>		25 hours

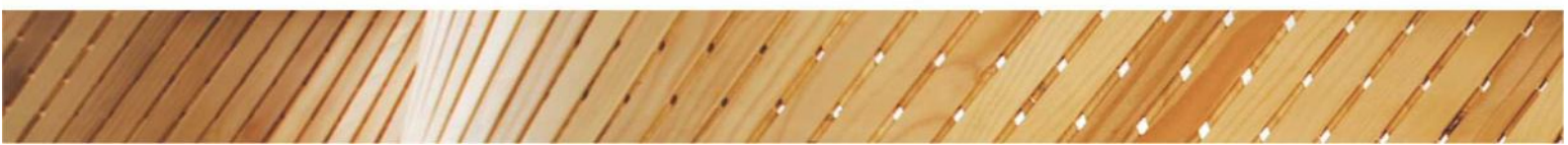




Learning Unit 4

LU 4 refers to the external layer of the building that separates the interior from the exterior environment. In modular construction, the envelope is made up of several layers, including the insulation, structural sheathing, and exterior cladding. The insulation helps to maintain a comfortable interior temperature, while the structural sheathing provides stability and rigidity to the unit. The exterior cladding is the visible layer that provides protection from weather elements and can be made from a variety of materials, including wood, metal, or fiber cement. The implementation steps involve the installation of the various layers in a particular sequence, ensuring a tight and efficient envelope. This process includes the installation of the insulation, sheathing, flashing, and cladding in a manner that prevents air infiltration, thermal bridging, and water penetration. Proper implementation of these steps is essential in ensuring the durability, energy efficiency, and comfort of the micro unit.

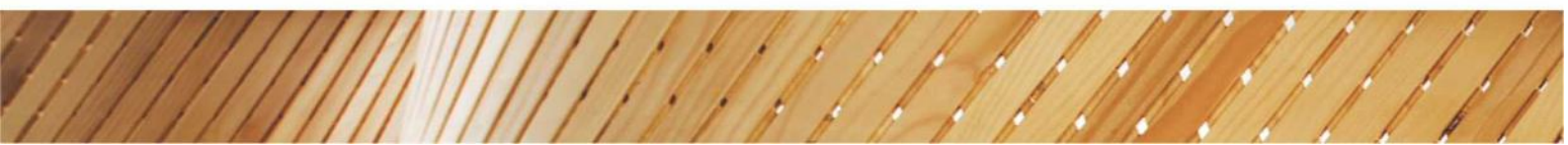
Learning Unit 4	ENVELOPE DETAILS OF MICRO UNITS (LAYERS OF WALLS, IMPLEMENTATION STEPS)
Sub-Contents	<ul style="list-style-type: none">○ Introduction to envelope details in modular construction○ Basic elements of envelope details - walls, roof, and floor○ Layering and implementation steps for walls○ Layering and implementation steps for roof and floor○ Insulation, vapor barriers, and air sealing○ Best practices for achieving a high-performance envelope○ Quality control and testing of envelope details





Learning Outcomes

Knowledge	Skills	Competences
<p>Understanding the design principles and components of a building envelope, such as walls, roof, and foundation.</p> <p>Knowledge of the different types of wall systems, such as panelized and modular, and their advantages and disadvantages.</p> <p>Understanding the various materials used in building envelope construction, such as insulation, vapor barriers, and air barriers.</p> <p>Knowledge of the energy performance of different envelope details and systems, and how to optimize energy efficiency.</p> <p>Understanding the importance of moisture management in building envelope construction and the risks associated with moisture damage.</p> <p>Knowledge of building codes and regulations related to building envelope construction.</p> <p>Understanding the importance of proper installation and quality control during envelope construction to ensure long-term durability and performance.</p>	<p>Ability to read and interpret technical drawings and specifications related to micro unit envelope construction.</p> <p>Knowledge of different materials and their properties used in envelope construction, such as insulation, sheathing, and cladding.</p> <p>Ability to properly handle and install materials used in envelope construction, including selecting and using appropriate tools.</p> <p>Knowledge of the installation sequence and techniques for envelope components, such as air and moisture barriers, windows, and doors.</p> <p>Ability to assess and troubleshoot potential issues in envelope construction and make necessary repairs or adjustments.</p> <p>Understanding of the importance of energy efficiency and sustainability in envelope design and construction.</p> <p>Ability to work collaboratively with architects, engineers, and other professionals to ensure successful implementation of envelope design.</p>	<p>Knowledge of various wall assemblies and construction techniques.</p> <p>Ability to read and interpret construction drawings and specifications.</p> <p>Familiarity with building codes and regulations related to insulation, air barriers, and vapor barriers.</p> <p>Proficiency in using tools and equipment for cutting, measuring, and installing materials.</p> <p>Attention to detail and ability to maintain quality control throughout the installation process.</p> <p>Knowledge of proper safety procedures and protocols.</p>
<p>Main action / achievement:</p>		<p>Workload</p>
<p>The main achievement would be to gain the skills and knowledge necessary to construct a well-insulated, airtight, and moisture-resistant building envelope using sustainable materials. This would include understanding the different layers of walls, implementing proper insulation techniques, and selecting appropriate materials for each layer of the envelope. The technician would also need to understand the importance of air and vapor barriers, as well as the proper installation of windows and doors to ensure a high-performing and durable building envelope. Ultimately, the main achievement would be to create a comfortable and healthy living space while also minimizing energy consumption and reducing the environmental impact of the building.</p>		<p>25 hours</p>





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