European Project Semester

PROJECT OUTLINE

Project dates: March – June 2024

Title: Developing the low-tech products of tomorrow

Project activity areas:
Additive manufacturing of low-tech systems, Research & Developments, Product testings

Keywords:
3D printing, additive manufacturing, low-tech equipment, Product testings,

Tutor's name and coordinates
Client – End-user: *TERRATOOLS*
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Project origin
Research, Innovation, Up-cycling, Circular Economy, Environment protection, Ceramics, biomaterial, Industry 4.0, Low-Tech

Project technical background:

TERRATOOLS is a start-up specialising in innovation, particularly in the low-tech sector.

The aim of TERRATOOLS is to set up a sector in Occitanie and to contribute to its development by offering products such as desert refrigerators (a clay cooling system that uses the phenomenon of evaporation), earthen air-conditioning systems and economical irrigation/watering systems based on the porosity of mineral materials to distribute water.
Today, the process used is additive manufacturing for prototyping, and this system is envisaged as a potential means of production in the medium term.

In order to pursue its development, the company is looking to improve its equipment (software/hardware), test its products, but also improve existing products on the market by proposing new designs, materials, etc.

This is a very open project, offering the possibility of taking on new challenges with great freedom, where any solution can be proposed and studied.

Depending on the subject chosen, you will be able to :

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- Participating in the development of software to drive a 3D printer dedicated to the extrusion of pasty materials called Slicer™. It was initially designed for topographic printing, taking into account the specific rheological behaviour of a pasty material as it passes through the extruder of an extrusion additive manufacturing machine. This project calls on skills in software, robotics and materials science.
- Helping to improve the extrusion additive manufacturing machine so that it can print more complex and more precise parts. There is also the opportunity to think about the production line in order to secure the process of preparing the paste for extrusion.
- Discussing/developing/testing/characterising new materials to replace the clay traditionally used. These materials should be
    - made from renewable sources, preferably agricultural waste or recycled materials
    - adapted to current manufacturing processes
- Testing the properties of current prototypes (UV, humidity, temperatures, performance, etc.) in order to draw up a technical data sheet and suggest ways of improving products (design, materials, etc.) or the materials preparation chain. This project involves setting up experiments and justifying them. It requires skills in materials engineering to propose and implement modifications and improvements to these products.

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Studied topics:

This project is an open box. Each topics can be dealt

This project is an open box where each subject can be treated independently or in conjunction with others.
The aim is to offer students freedom of choice and development.
The overall thinking revolves around 3 products:

- The desert fridge
- Air conditioning system
- Irrigation system

The 4 main topics are :

- Software for the additive manufacturing machine (valid for all 3 products)
- Improving the additive manufacturing machine (valid for all 3 products)
- Development/testing of existing materials/new materials (composites) for one or more products, taking account of specifications
- Improvement and/or testing of one or more proposed products in order to suggest areas for improvement (choice of material, design, thickness, whether or not to bake, etc.) and produce a technical data sheet and/or make improvements.

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Software for the additive manufacturing machine (valid for all 3 products)

Improving the additive manufacturing machine (valid for all 3 products)

Desert fridge

Development/testing of existing materials/new materials

Improvement and/or testing

Produce a technical data sheet and/or make improvements

Air conditioning system

Development/testing of existing materials/new materials

Improvement and/or testing

Produce a technical data sheet and/or make improvements

Irrigation system

Development/testing of existing materials/new materials

Improvement and/or testing

Produce a technical data sheet and/or make improvements