

Project dates: September - December 2024 Title: Recycle marine plastic waste	
Tutor's name and coordinates Client – End-user: ENIT ENIT Technical Supervisor + contact: Aynur Guliyeva: <u>aynur.guliyeva@uttop.fr</u> Mohamed Abid: <u>mohamed.abid@uttop.fr</u>	Project origin Research, Innovation, Circular Economy, Environment protection



Project technical background:

This project aims to study solutions to compost / biodegrade plastic wastes and particularly marine plastic waste in order to get ride of oil sourced material and send it back to flora. This project is done in partnership with www.ReSEAclons.org located in southern France. This association has organized a plastic marine waste collect channel in partnership with fisheries, local communities, governmental organizations, citizens. The aim of the project is to study and optimize a way to recycle marine waste by using 3D printing technologies, to provide an alternative route to the recycling initiatives currently used, and to propose a solution to destroy the final polymer waste in order to make it nontoxic and bio assimilable for the environment.

Thus, the project shall investigate several aspects of the problem:

1. Project funding: This project implies the seek for funds (governmental, regional, other). This component of the project will consist in analyzing all the funding possibilities available, select the best option and implement it. It also implies to able to defend the project in front of funders or public institutions. A great experience for those who have in mind a future business development.

2. Material science and polymer chemistry: As part of this project, we propose an approach which will distinguish two types of waste: plastic waste with high technological value (PET, HDPE, PA, etc.) and waste with low technological value (PE, PP, PS...) or too degraded in the environment. Sorting will first be manual then it will be possible to use

automated sorting technologies. Plastics identified as having high technological values will be post-treated to create extruded wire or aggregates intended for additive and/or compression-friction manufacturing. In this way, it will be possible to create, either on a very local scale or on a more global scale, value creation loops in the circular economy by creating products of all shapes made from recycled plastic. The aging of different polymers will also be studied.

3. Tribological studies: Different tribological properties of different types of polymers (and blends of polymers) will be studied for compression-friction manufacturing. The goal is to understand better the tribological behavior of neat polymers and theirs blends to make stronger recycled materials by different technologies.

4. Circular economy: this project is deeply anchored in values such as respect. Respect of the environment but also respect for the people. We have to think the future development of this project with respect with local economies by restoring the scale of values through the different actors of the cycle. As a consequence, a whole part of the project shall be dedicated to integrating all the stakeholders of this newborn economical ecosystem. Our goal is to heel the society as we want to heel the marine life.

4. Up-cycling solution innovation: the up-cycling project is only the first step of the project. We would like to develop other innovative or even revolutionary approaches of up-cycling plastics.

Studied topics:

- Innovative project funding.
- Definition of requirements and technical specifications.
- Analysis of the existing method and determine their limits.
- Polymer science applied to marine plastic waste up-cycled characterization.
- Compression-friction study of different type of polymer.
- Experimental study of different blend of polymer (Tribological and physical-chemistry characterization).
- Circular economy study and development.
- Product development works in order to open up the application field of the upcycled material (3D printer).