VOL. 1 | JULY 2022 NEWSLETTER REVOLUTION,

All information from the 18 first months of Implementation



Words from the Coordinator

On behalf of the REVOLUTION Consortium, I'm delighted to welcome you to our 1st newsletter. When we are closing our first period of the project, I am happy to indicate that the REVOLUTION partnership will be able to provide optimal results will be able to implement in the industry. After our first face-to-face meeting on June 21-22, now, we are closing to demonstrate our materials in the real industrial environment and use-case components will be tested to analyse the effectiveness of developed technologies and materials in this second period of the project. Sharing the news with all of our ecosystems is



happiness for us. We know that all stakeholders of the automotive industry from the beginning of the supply chain to end-user, will transform the future together as well as REVOLUTION partners. (Emre Elmas, Coordinator)

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REVOLUTION: Supporting the Electric Vehicle REVOLUTION through maximising EV Range and End-of-Life Vehicle Recovery through optimisation of recycled plastics and advanced light materials

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REVOLUTION project



Overall Project View

What is **REVOLUTION**?

REVOLUTION focusses on overcoming the challenges hindering the use of recycled materials, but more broadly, restricting the widespread adoption of circular economy principles in the automotive industry. Forthcoming ELV directives are expected to recognise the potential for plastics to enable a circular flow of materials in the automotive sector. Implementing minimum postconsumer recyclate (PCR) targets in any new plastic components in vehicles are currently being discussed. The case studies will be supported by AI, machine learning and quality control system, enclosing the project in the digital technologies framework.

Aim

REVOLUTION aims to demonstrate automotive components, using polymer solutions that feature optimised recycled materials in order to increase light-weighting opportunities that extend the range and efficiency of Electric Vehicles and improve end-of-life separation of components to facilitate proper dismantling and the material's reuse, recovery, and recycling.

Use cases

Lower rear bumper: It is a coloured aesthetical part. Many times, it is difficult to attain the appropriate colour and gloss using postconsumer recycled materials and, at the same time, keep mechanical and physical properties. **Crash box:** Nowadays, most crash boxes are commercially produced using steel. The rear crash box demonstrated in REVOLUTION will be a 100% polymer solution.







Backseat Panel: This

component is currently made of a formed steel sheet that is welded to a metallic frame. REVOLUTION will build on CRF's previous efforts to convert this component to a SRPO, with a weight saving of ~55%.

B-pillar cover: During the REVOLUTION project, the manufacturing of a 2k dual-part will be transformed into a mono-material injection moulded component using postindustrially recycled PMMA.

ACTIVITIES DURING THE 18 MONTHS

Introduction

In the current situation, as **REVOLUTION** Consortium, we made a good progress in terms of developing optimised recycled material and component modellings, quality control and data collection system based on big data infrastructure and AI, and mapping our End-of-Life strategies. All these works will give a smooth path to **REVOLUTION** to reach its targets as lightweighting of EVs, decrease of CO2 emissions from transportation, reduction of manufacturing defects and increasing the usage of recycled

materials by smart industrial solutions in automotive industry.

Modelling & simulation

"Modelling for advanced materials", where the focus was to predict material compoistion provided material properties, via a machine learning algorithm. REVOLUTION's principal focus on this period has been to define and complete the ML pipeline blocks and including Injection Machine data within the pipeline. Nevertheless, the final pipeline configuration will include http requests to the database.





Assessment and Exploitation route

The scalation route

The last 18 months of development, the REVOLUTION project established its route for the upscaling of the process in the post-project period. The advances in this route included the development of the environmental and technoeconomic assessment for the reference case studies. The first exploitation route of the project had delivered at the end of the first year. The technoeconomic assessment and Life Cycle Assessment are under development now, with potential interesting results. The next period, all the assessment studies and the final exploitation route will be ready to be presented.

Next Actions

During the following 18 months, we will finalise the project implementation. At the end of the project, the case studies will be ready to be scalable and the assessment in technical, environmental and economical pathways finalised.



Another important millestone during the next period is the finalisation of end-of-life strategies. Closing the project, an open event with relevant stakeholders will be organised to present the relevant results of the project and explore the network for further collaborations in Automotive Industry.

SISTER'S PROJECTS



The EU-funded LEVIS project will develop multi-material structural parts using thermoplastic-based carbon fibre reinforced plastics/metal hybrid materials integrated with a structural health monitoring system. The aim is to achieve a significant weight reduction while keeping the mechanical in-service performance of the targeted parts. As such, new sustainable materials and suitable manufacturing and assembly procedures as well as advanced simulation methodologies and workflows and innovative sensing/monitoring technologies will be developed.



The EU-funded **Fatigue4Light project** plans to investigate lightweight solutions adapted to the chassis part of electric vehicles that will render them up to 30 % lighter and safer. The project will introduce new materials with high fatigue performance such as advanced high-strength steels, aluminium alloys and hybrid fibrereinforced composites; moreover, It will develop new models for predicting fatigue performance and design new methodologies for reducing material testing time. Attention will also be given to how cutting and welding processes could positively affect the overall fatigue performance of chassis components. Ultimately, six labscale and industrial demonstrators will be developed to validate the proposed solutions.



Future projects to engage During the next 18 months, the objective is to engage other projects under the same topic as i-HeCoBatt, MARBEL, Multi-Moby, ALLIANCE, among others.



The EU-funded ALMA project will develop a novel battery electric vehicle (BEV) structure for a passenger car with 45 % weight reduction potential. The project will adopt circular economy principles through the application of eco-design strategies to create a novel recyclable and affordable BEV platform. Specifically, the project will design a multi-material modular platform made by combining advanced highstrength steels, advanced sheet moulding compound and steel hybrid materials, characterised with multiscale model-based tools. The platform will be recyclable since it will be possible to separate components at the end-of-life for repair and reuse.



Aluminium composite materials are an industrial solution with multiple applications. As a result, the industrial manufacturing sector is in constant search for ways to improve their production. Among others, the battery-electric vehicle (BEV) technology is a significant factor for the intensification of their use. To address these challenges, the EUfunded FLAMINGo project will propose a novel metallurgical and forming combined approach for making automotive parts. **FLAMINGo will focus on** manufacturing strengthened aluminium (AI) metal matrix composites with elevated properties compared to current AI alloys used in automotive. By substituting steel components in BEV automotive parts, the project also aims to achieve a substantial weight reduction.

PAST & UPCOMING EVENTS

EU Project Opportunities for Future and Digital Transition *Ankara, May 2022 (Farplas Team)*

The event was organised to introduce European Union Programmes and project opportunities and to share project experiences by Turkish stakeholders within **EC Horizon Framework** Programmes. The event was organised by Instrument for Pre-accession Assistance III Programme in Turkiye. R&D Manager of Farplas and Project Manager of **REVOLUTION**, Yavuz Emre Yağcı, has participated in "Project Opportunities for Future and Digital Transition" panel to share Farplas's digitalisation journey, objectives of REVOLUTION Project and experiences from the Project.

Press-k conference

Clariant was participating (15th June) in a conference with more than 25 journalists in Rotterdam. Clariant exposed its contribution in validating & developing fit-forpurpose solutions that can help push plastic materials beyond current performance and sustainability boundaries, and help to meet minimum recycling targets for plastic components in vehicles as expected in the upcoming EU legislation.





ECOMONDO 2021

During the past year 2021, a General fair on sustainability major showcase to share the work of the projects (ECOMONDO) took place in Rimini (Italy). It was an opportunity to spread the concept of REVOLUTION and the work of the EC through funded projects to the public interested on circularity in Italy and to stablish initial contacts with sibling H2020 projects.



Material meets Engineering (MME) 2022

Event organised by Lyondellbasell

This year, REVOLUTION will participate in the event "Material meets Engineering". Our colleague from Farplas, Emre Yavuz, will present a module titled "Sustainable approaches in Automotive injection moulding in the era of digital transformation and circularity" A roll up banner and a video will be presented during the event. A brief of the video appears below.



REVOLUTION SUPPORTING YOUNG CAREERS

"Revolution supports me to improve my network and reputation in Europe. Also, after contributions and completion of the main project achievements will be disseminated, therefore I will be beneficial in environmental point of view for our planet." Tugba Okay

Working with MLOps and neural network techniques allows me to train in highly demanded areas and learn new ways of approaching optimization problems. Lucía Gálvez-Postigo

"...on my professional career it is a project that helps me to have a global vision, to work with other people from different countries and to manage activities in a very global project." Janire Goenaga "I gained vast knowledge and experience thanks to our respective partners and their fruitful sharing ... I enriched my material science & process development knowledge and interpretation capability ... I gained the circularity point of view and internalized sustainability concerns as a valuable part of the REVOLUTION project." Ramazan Yildiz

"I being a mechanical engineer, see this project as the best opportunity to boost my skill set. The components to be developed and the tasks to be carried out demand nothing but the top tier skills out in the market today, spanning the fields of machine learning, crash & optimization, component and process modelling." Abdullah Ejaz Mir





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