FLAMINGo

Fabrication of Lightweight Aluminium Metal matrix composites and validation In Green vehicles

10th PRESS RELEASE

FLAMINGo participation at the Global Automotive Components and Suppliers Expo 2023

5th-7th December 2023, Stuttgart, Germany

The Enlight EVs cluster participated at the Global Automotive Components and Suppliers Expo 2023 (GACS) that took place on 5th-7th December 2023 in Stuttgart, Germany.

The ALMA, LEVIS, FLAMINGo and Revolution projects had the chance to present their results during a dedicated event that was organised by the cluster. The conference was perfect for raising awareness of lightweighting electric vehicle components and improving engagement with an industrial audience. Moreover, all project showcased various demos at the booth that was set up during the 3-days exhibition.

This automotive exhibition served as a platform to showcase cutting-edge global manufacturing expertise in the automotive industry. In particular, it highlighted innovations and advancements in automotive components and manufacturing, bringing together industry leaders, suppliers, and professionals from around the world.

ENLIGHT EVs

Developing innovative and sustainable solutions to reduce EVs weight

GLOBAL AUTOMOTIVE COMPONENTS AND SUPPLIERS EXPO 23

Funded by the European Union

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EnLight EVs Cluster Event

On 5th of December next to the GACS Expo, the Enlight EV Cluster held a conference, with more than 50 registered participants. The Conference took place at the International Congress Center, at the GACS Expo. The Conference started with an opening by Salima Abu Jeriban (Project Adviser for Clean Road Transport at the European, Climate, Infrastructure & Environment Executive Agency CINEA). Salima gave clear and informative descriptions along with brief introductions to each project.

The Enlight EVs cluster brings together EU funded R&D projects which develop innovative and sustainable solutions to reduce EVs weight. Those solutions can be rapidly applied in the automotive market to reduce EVs weight, while considering structural integrity, passengers' safety, and sustainability, through eco-design and circular practices.

The Cluster originally consists of 5 Projects: ALMA project, Greenvehicles LEVIS, Fatigue4Light, FLAMINGo project and REVOLUTION project, with four of them organising the event as summarised below.

Greenvehicles LEVIS

LEVIS
LIGHT MATERIALS FOR ELECTRIC VEHICLES

The first project that took the floor was Greenvehicles Levis. Levis is in the forefront of developing lightweight frame parts for electric vehicles (EVs) and focuses on eco-design and circular approaches. The project makes use of multi-material solutions that are based on metals and thermoplastic-based carbon-fiber-reinforced polymers (CFRPs), utilising scalable, low-cost manufacturing and joining techniques. Specifically, Levis combines effective dismantling and recycling techniques with Structural Health Monitoring (SHM) technologies to improve sustainability and structural strength. The topics of the presentation were: i. "From Concept to Reality: Levis' Circular Lightweight EV Component Innovations". During their presentation they gave insights of "Lightening EV battery boxes through multi-material solutions." They introduced materials like TP-CFRP, bio-carbon fibres, recycled carbon fibres, and aluminium for sustainable battery boxes. ii. The presentation on "Innovation & modularity for battery cell housing, interconnection, and monitoring" focused on busbar development, with insights from a life cycle analysis covering climate change and other factors. iii. Last but not least, they discussed the "Eco-design of steering column carrier group", where they explored sustainable materials, laser texturing, over moulding processes, and validation tests. The session wrapped up with a panel discussion providing a deep dive into these topics, fostering active audience engagement.

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ALMA Project

The next project that took the floor was the ALMA project. The ALMA project presented some interesting results with the presentation titled "Sustainable Lightweighting: redefining future of E-Mobility with Circular Design & Advanced Materials for Passenger EVs". The ALMA project emphasised on the importance of considering the end-of-life for EVs and materials. In the context of the ALMA project, the process of redesigning is of utmost importance. This involves finding a balance between meeting the technical requirements for safety and performance, while strategically planning for material separation within a multi-material platform. What sets ALMA apart is its application of affordable systems thinking, a method that considers the interdependencies of various components and processes. Notably, the project achieved a significant milestone by reducing the weight of their concept car by 1,850 kg, translating to an impressive 24% decrease in emissions. This accomplishment underscores the project's commitment to both innovation and sustainability in the automotive industry.

REVOLUTION Project

The next session was covered by the REVOLUTION Project representatives, with the Title "Embracing the Future: Digitalisation of Lightweight & Sustainable EV Components". The goal of REVOLUTION is to remove the obstacles that limit the use of recycled materials and, more generally, prevent the automotive industry's widespread embrace of circular economy principles. Revolution presented their use cases in material optimisation & component development. The case studies where the rear back seat panel, B-pillar Cover, Rear crash box & lower rear bumper. The project will also integrate sensors into the rear crash box in order to monitor the structural health of the service life.

FLAMINGo Project

The last presentation of the day was from the FLAMINGo Project. The FLAMINGo project had the Title Lightweighting by strengthening Aluminum & expanding its use in Manufacturing of Automotive Components. Mr Vasilis Maris, project Manager from AXIA Innovation gave insights of the FLAMINGo project. The main Impact FLAMINGo aims to make is to reduce the Vehicle weight by improving aluminum properties, while shortening the lead-time by deep integration of combined material modeling into the value chain of development and manufacturing. Monitoring and control to ensure structural integrity and safety of the FLAMINGo components and their adoption in Utility Vehicles, Electric Vehicles, and Aerospace applications is also at the spotlight of the project's goals, followed by compliance with circularity and zero-emission legislation. FLAMINGo managed to reduce the steering Knuckle up to 58% weight and the Rear Frame up to 35%. Moreover, the first use case was successfully delivered, being the steering knuckle developed through topology optimisation.

When it comes to ultimate goals of FLAMINGo we have to take into account the short term impact, the medium term impact and the long term impact. The short term impact at vehicle level are more off-road capabilities, enable more functions in utility vehicles, increase the working area of the fleet, enable more flexibility in vehicle configuration. Regarding the medium-term impact, we are targeting to optimise the weight of the car, the battery life and the engine performance to result in more sustainable vehicles.

Although the major impacts are already mentioned, some underlying impacts are to establish guidelines for workers using nanoparticles-enabled materials, establish recycling guidelines, in compliance with current aluminum recycling practices, provide the automotive industry with a wider portfolio of sustainable material and, last but not least, establish manufacturing guidelines for better replicability (casting and welding in particular).

With the Enlight EVs cluster conference coming to an end, Salima again took the floor to wrap up and congratulate the cluster projects for promoting knowledge and technology transfer between the sister projects.

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EnLight EVs Booth

Parallel to the Enlight EVs Conference, the Cluster was happy to present booth 5300 at the Global Automotive Components and Suppliers Expo 2023. During the 3 days our booth attracted numerous individuals expressing keen interest in our projects. The entire cluster presented state-of-the-art demonstrations showcasing their innovations.

Predominantly, the visitors to our booth were from the automotive and component manufacturing sectors. Noteworthy engagements included discussions with representatives from Toyota, BYD, and Ford Motor Company. Their inquiries mainly revolved around sustainability, the use of recycled materials, advancements in lightweight components, and improvements in the battery life of electric vehicles.

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Some insights from the FLAMINGo representatives

Mr. Vasilis Maris, from our consortium partner AXIA Innovation stated that: "The conference was a key initiative that aimed bringing together stakeholders from various industries to discuss the latest trends, share insights, and foster collaboration. Our main objective was to establish a forum where users could exchange knowledge and build relationships that would drive innovation in their industries. Among the best parts was the level of participation in this expo. The booth was well-attended, and the Q&A segments sparked insightful discussions. The Enlight EVs cluster managed to have a diverse range of speakers who provided valuable perspectives on their projects. The networking sessions was highly successful, with participants exchanging ideas and forming potential collaborations. We received positive feedback from attendees, and many expressed interest in future events and more information about the projects. The Global automotive Components & Suppliers Expo played a pivotal role in strengthening our relationships with stakeholders."

Vassilis Maris from AXIA Innovation stated:

"For me it was an excellent Opportunity to attend this major event and present the FLAMINGo Project. I appreciate the interest our booth received from stakeholders. At this point, I want to express my gratitude to the Cluster and our FLAMINGo project Consortium for their active participation and support."

Moreover, he gave some insights about the received questions at the booth: "We have been asked about the steering knuckle and its application on lightweighting electric vehicles". Questions focused around topology optimisation process, the design and the die casting which is conducted in order to achieve lightweighting. Here is what Vasilis Maris mentioned: "Visitors asked me about how the FLAMINGo project can increase battery and engine power when using lighter materials. For example, FLAMINGo is substituting materials such as steel to aluminum metal Matrix nanocomposites (Al-MMnC), achieving lightweight for our concept electric truck. In fact, we managed to achieve a reduction of the steering knuckle weight up to 58% and for the rear frame for around 35% ". Finally, he added: "For me it was an excellent Opportunity to attend this major event and present the FLAMINGo Project. I appreciate the interest our booth received from stakeholders. At this point, I want to express my gratitude to the Cluster and our FLAMINGo project Consortium for their active participation and support".

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Thomas Pabel from ÖGI

outlined the forthcoming phase, which involves casting prototypes for both left and right steering knuckles. These prototypes will undergo thorough component testing before being integrated into the ALKE truck.

Thomas Pabel from our consortium collaborator, ÖGI – Österreichisches Gießerei-Institut, detailed the upcoming phase, which involves casting prototypes for both left and right steering knuckles. Following comprehensive component tests, these prototypes will be integrated into the truck. Additionally, some visitors expressed interest in understanding the percentage of recycled content in the physical demonstrations showcased at our display counter.

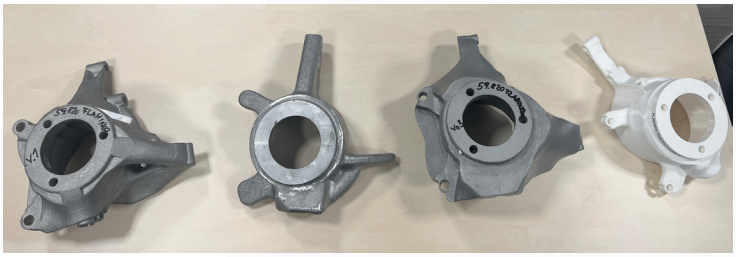

Figure 1: Topology optimised parts developed by ÖGI: i.: Focus on topology optimisation without SiC-NP, ii. Focus on castability in green sand casting, iii. Focus on castability in LPDC reinforced with nSiC-NP. iv. 3D-printed model, focus on max topology optimisation.

Figure 2: Aluminium-SiC & Aluminium-TiC Additive for Metal Matrix Nanocomposite.

Figure 3: Extruded parts developed by Constellium