

FLAMINGo

PROJECT PARTNERS



Fabrication of Lightweight Aluminium Metal Matrix nano-Composites and Validation in Green Vehicles

FLAMINGo FACTSHEET

The FLAMINGo project has delivered substantial advancements in the development of lightweight, high-performance materials for electric vehicle (EV) applications. By focusing on sustainable, innovative materials and advanced manufacturing processes, the project has made significant contributions to reducing the weight, improving the performance, and lowering the carbon footprint of electric and hybrid vehicles.

For more information about the FLAMINGo project, please visit the project website:

www.flamingo-project.eu



PROJECT DETAILS

Start date: 1 February 2021

Duration: 4 years

EU contribution: EUR 4.4 M



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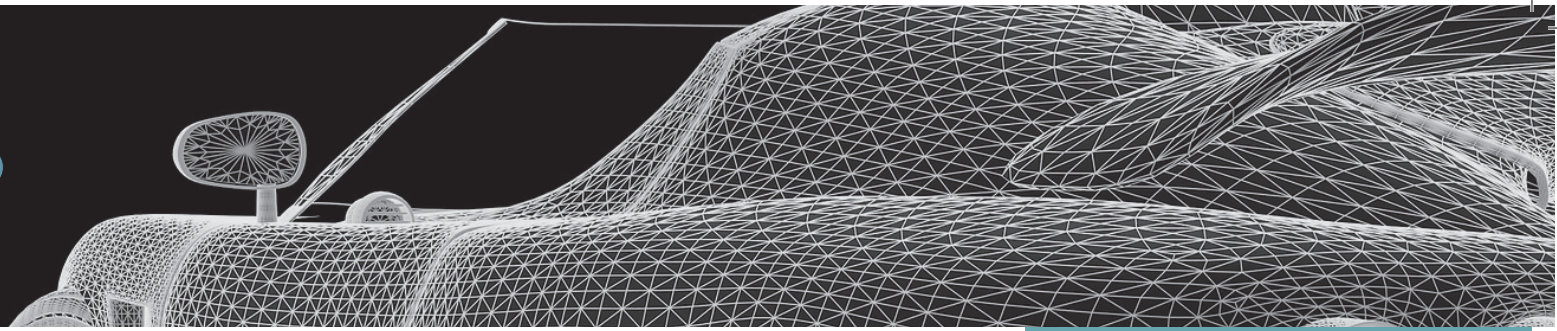


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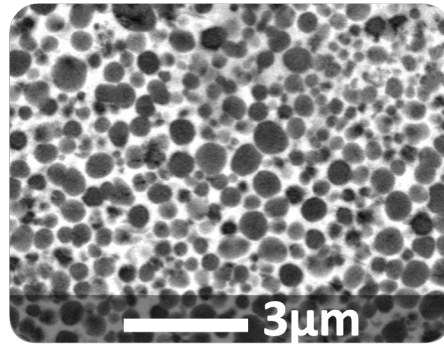


Funded by the European Union

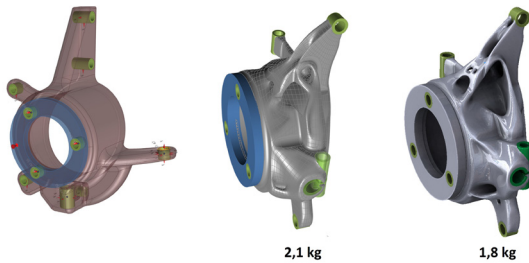


KEY DEVELOPMENTS & ACHIEVEMENTS

- **Nanoparticle Master Alloy Production:** MBN Materials successfully delivered 113 kg of nanoparticle (NP)-master alloy, leading to the production of 3 tons of Al-MMnC (aluminum-metal matrix nanocomposite), enhancing the material properties of lightweight automotive components.
- **Material Performance:** Brunel University of London measured a 15% increase in yield strength in the as-cast state and a 10% increase in the heat-treated state with the addition of TiC particles during lab-scale trials.



Finite element analysis (FEA) is used to model and optimize the microstructure of Al-MMnCs for desired properties



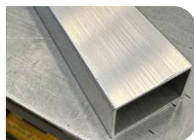
- **Weight Reduction:** OGI achieved a weight reduction of approximately 3.7 kg in the final version of the steering knuckle compared to the steel version. Using a bionic structure model for Finite Element Analysis (FEA) to optimize the microstructure of Al-MMnCs, the final component weight was reduced to 1.8 kg. A total of 26 parts were produced, including initial trial versions. Cast billets of TiC-enhanced Al-MMnC at a

full-scale DC-Casting facility, were developed by Constellium, optimizing the rear-frame design to achieve a 46.5% weight reduction compared to traditional steel frames. Constellium's efforts resulted in Al-MMnC extrudates for demonstrators, achieving the required performance without wear or damage to equipment.

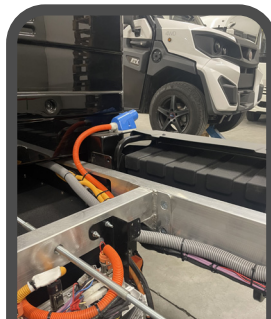
Final rear-frame profile design/Longitudinal section



Initial rear-frame profile design/ Final transversal



Installation in ALKÉ ATX4



- **Industrial Scalability and Safety:** Key safety assessments, led by ISQ, were completed, supporting scalable integration and application of these materials within standard automotive production lines, meeting industry safety and sustainability standards.
- **Recycling:** Kampakas recycled over 200kg of Al-MMnC reinforced with SiC and TiC nanoparticles, showcasing circular economy potential in advanced automotive materials.
- **Standardisation assessment:** EWF actively facilitated engagement with standardization bodies to support FLAMINGO's technical credibility and future exploitation.
- **Carbon Footprint Reduction:** gFACT calculated a 15% reduction in the carbon footprint. Over 200 kg of Al-MMnCs reinforced with SiC/TiC nanoparticles were recycled, incorporating 42% recycled content. This achievement aligns with global objectives to reduce greenhouse gas emissions and enhance the sustainability of automotive manufacturing processes.

INDUSTRIAL IMPACT

Through collaborative efforts, the FLAMINGO project has demonstrated how next-generation lightweight materials can improve vehicle performance while significantly reducing environmental impact. These advances have far-reaching implications, not only for the automotive industry but also for the future of sustainable mobility in Europe and beyond.

PROJECT FIGURES

- 113 kg of NP-master alloy delivered.
- 3 tons of Al-MMnC produced.
- Weight reduction of approximately 3.7 kg in the final version of the steering knuckle compared to the steel version, reducing the final component weight to 1.8 kg.
- 46.5% weight reduction by switching from steel to optimized aluminum for the rear-frame design.
- Over 200 kg of Al-MMnCs reinforced with SiC/TiC nanoparticles were recycled.
- 15% increase in yield strength in the as-cast state and a 10% increase in the heat-treated state with the addition of TiC particles during lab-scale trials.
- 15% reduction in carbon footprint in ATX4

