

Magazine NEWSLETTER

January 2023



FLAMINGo - Fabrication of lightweight aluminium metal matrix nanocomposites and validation in green vehicles

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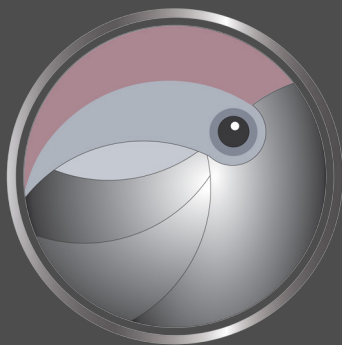
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1. We are the FLAMINGo



FLAMINGo



Who are we?

We are an experts' team consisting of 11 different partners across 8 European countries. Different universities, research organisations, SMEs, large enterprises, associations, and non-profit organisations collaborate to implement FLAMINGo.



What is our goal?

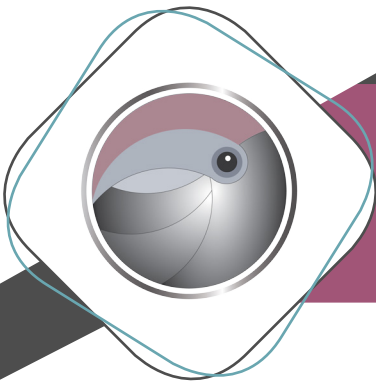
We aim to develop aluminium metal matrix nanocomposite components for electric vehicles to substitute the widely used steel metal in the automotive industry. This way we will reduce the overall weight of the electric vehicles while maintaining their structural safety achieving lower consumption cars. We utilise different types of technologies such as topology optimisation, metal alloying, casting, welding, and recycling to integrate lighter aluminium metal matrix novel components on electric trucks.



What is going on in the market?

The **automotive aluminium market** is expected to reach **97,8 billion euros in 2026** compared to 42,7 billion euros in 2016 and the average concentration of aluminium in cars is expected to grow from **179,2 kg in 2019 to 200 kg in 2025**¹. Moreover, the EU is targeting to implement 30 million cars by 2030, and by 2050 the aluminium demand in transport will be 55%. FLAMINGo is focusing on these estimations to embrace aluminium lightweight automotive solutions².

1. https://www.european-aluminium.eu/media/2714/aluminum-content-in-european-cars_european-aluminium_public-summary_101019-1.pdf
2. European Aluminium, Circular Aluminium Plan by 2030



2. Our 1st review meeting

On the 14th of September, the review meeting of the FLAMINGo project took place. At the end of the meeting, the Project Officer by the European Commission expressed his satisfaction with the activities that have been implemented in the first 18 months of the project and provided valuable feedback.

The meeting took place at the Veneto Region Brussels office in Etterbeek, Brussels, and was organized by the FLAMINGo Coordinator, MBN Nanomaterialia. All 11 partners (MBN, DGI, KAMP, ALKE, ISQ, EWF, Global Factor, AXIA, EXE, Constellium, and BRUNEL) presented the work that has been carried out in the first reporting period of the FLAMINGo. WP2 "Specification and Requirements" and WP3 "Production of Al-MMC masterbatches" has been successfully completed. Work packages for the topology optimisation, casting, demonstration activities, LCA as well as exploitation, and dissemination are still in progress. By the end of the first reporting period, WP6 "Extrusion production methods" is starting led by the Brunel University of London.



50%
Current Progress



3. 2nd Year of Activities

MBN
nanomaterialia®

During the second year, the production route for nano-additives by mechanical alloying was implemented by MBN, for several metal/nanoparticles systems, considering the performances delivered and related costs when used in the production of Al-MMnC by casting and extrusion. The production line has been tested at a pilot scale for the selected compositions based on SiC and TiC nano-reinforcements, the productivity reached in MBN for this nano-additive enables a corresponding cast size in the range of 500-1000kg of Al-MMnC. After the trials in the first year, the production of nano-additives focused on Silicon and Titanium Carbides, for which tested different suppliers trying to find a balance between

cost, processability, and performance in the cast. This involved also identifying the proper concentration of nanoparticles in the aluminium-based additive, as well as the processing conditions that minimize the production of dross in the cast. MBN tested the production of nano-additives starting from secondary aluminium. This demonstrated the feasibility of the approach, further assessing the full circularity of the FLAMINGo approach, although the sources of secondary aluminium are not mature enough to make this approach economically viable today. The activities of the work package concluded with the production and delivery of 34 kg of nano-additives that enables the production of 1.5 tons of Aluminum Metal Matrix Nano-Composite.



ISQ is contributing to the FLAMINGo project through the assessment and management of the risk of workers' exposure to nanomaterials and nanocomposites in partners' manufacturing lines, to promote the safe and sustainable use of nanopowders. In order to overcome the uncertainties and complexity of assessing and managing the Health and Safety risks of nanomaterials and nanoproducts, the implementation of a tiered approach has been implemented to screen the potential risks of workers' exposure when handling nanopowders and to design well-supported safety actions. This structured strategy includes the application of sequential nano-specific tools with a life cycle perspective for the

nanoproduct under development (tier 1), together with campaigns to monitor exposure within the laboratory or industrial plants (tier 2). During the second year of the project, ISQ has been focused on analysing data obtained from the campaign monitoring exposure of the MBN industrial line, where the nano-additive masterbatch powders are produced to be used as an input in the remaining manufacturing lines. Moreover, suitable control actions to reduce or eliminate the exposure risks have been discussed with MBN. The exposure monitoring campaigns of the direct chill casting process of both Brunel University London's laboratory and industrial direct chill casting lines were also performed, and data is being analysed to propose recommendations to limit workers' exposure, as well as to protect the surrounding outdoor environment.

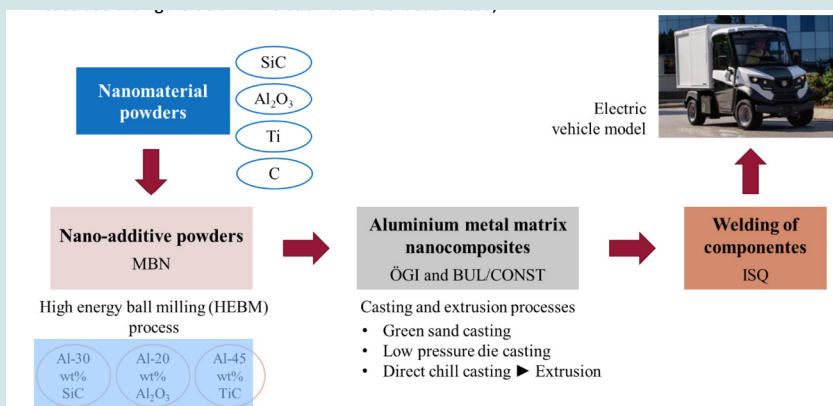


Figure: FLAMINGo manufacturing process overview

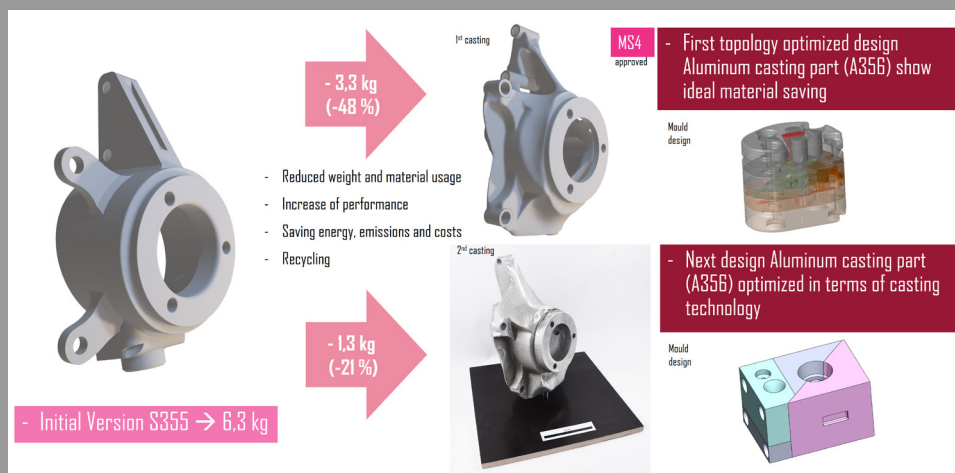


3. 2nd Year of Activities



During the second year of FLAMINGo, OGI cast the first variant of the topology optimised component (WP4) that showed an optimum material saving of 48 %. The next variant of the steering knuckle was not only optimised to lightweight construction but also in terms of casting technology. Moreover, in terms of topology optimisation, the modified 3D-geometry was selected to perform a mould filling and solidification simulation with MAGMASOFT®. The next step was to design a new shape and a new mould. Finally, the mould had a simpler structure (no undercuts) with only two subdivision levels compared to the first concept of the mould, which consisted of five parts. Afterwards, the new designed component

of the steering knuckle was cast with the same parameters and the same alloy Al Si7Mg0.3 as the previous one. Regarding casting, the recovery alloy (A357) combined with the SiC-nanoparticles and the T6-heat treatment is not the most economical but the most favourable. The results of the SEM investigations showed a uniform distribution of SiC-nanoparticles in the matrix of the samples with silicon carbides. The samples with silicon carbides showed better mechanical properties compared to the samples with aluminium oxides. Alternative masterbatch variants with Al-2ndary nSiC or Al-nAl2O3 showed that the skimmed dross was slightly heavier, showing significantly higher metallic content and forming more of a conglomerate than the SiC-variant. Moreover, a 3D-model with a casting system (Tesla valve) was designed, calculated, and simulated. The mould was produced in the 3D-sand printer. Overall, all mixing methods work well.



In the second year of the project, ALKE worked with the other partners to optimise the topology of the components to be used as demonstrators (steering knuckle and rear frame) and on an improved analysis of their geometries and joining techniques according to the components with which these parts will interface once they are integrated in the vehicle.

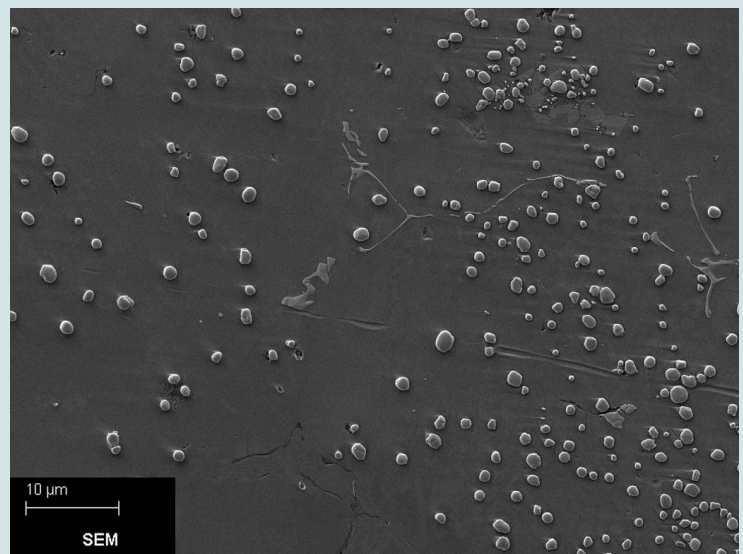


3. 2nd Year of Activities



During the second year of the project, Brunel University London (BUL) produced composite material castings, incorporating titanium carbide (TiC) and silicon carbide (SiC) reinforcement nano-particles. From the resultant cast material, properties were analysed and compared to those of current standard alloys. The casting procedure was optimised experimentally for different weight percentages of reinforcement particles added to the base alloy. In addition to this, 80mm diameter Direct Chill (DC) cast composite billets were synthesised using various melt stirring techniques. These billets also

incorporated TiC and SiC reinforcement particles. The billets were delivered to our project partner, Constellium, for the purpose of flow stress testing. A homogenous distribution of the TiC particles was achieved as can be seen in the SEM figure. Furthermore, pilot line castings of 150mm diameter DC cast composite billets were performed by Brunel. The pilot scale billets incorporated TiC reinforcement particles. The billets were characterised, and a grain refinement effect was observed. Moreover, BUL has taken part in activities for disseminating the project. These activities included submission of two scientific publications to The Mineral, Metals and Materials Society (TMS) and an oral presentation at the Future Materials 2022 conference in Rome, Italy.



In the second year of the FLAMINGo project, Constellium continued to be involved in work packages related to extrusion production methods. Furthermore, Constellium also contributed to other activities such as the creation and validation of demonstrating materials and components. A risk assessment and clearance for the nanoparticle (NP) substances used in the project have been completed. ISQ has performed nano-particle safety monitoring while casting alloys with NP additions on the Scale 1:1 DC-Caster at Brunel University London. Constellium supported ALKE to transition the design configuration of the main demonstrator from steel to a high-strength aluminium structure. With the provided base

alloy properties, ALKE found no criticalities in the new design. The extrusion die that will be used to produce the main demonstrator profile was manufactured and is now entering its commissioning phase. Constellium also supported the Brunel team to define the experimental configuration required to perform a DC-casting trial with NP addition at Scale 1:1. Billets of Constellium's alloys mixed with NP were manufactured at scale 1:1 via DC-casting. Various mixing processes have been used to disperse and de-agglomerate the NP in the melt. Concerning the manufacturing of Al-MMnC profiles, preliminary extrusion of the NP-billet was carried out on an existing bumper beam die. The next step will be to evaluate the mechanical properties and ductility of the extruded NP-added material and compare it to the standard alloy properties. Flow-stress measurements were also carried out using sub-size billets produced by the Brunel team and based on Constellium alloys both with and without NP additions.



3. 2nd Year of Activities



Group Kampakas is responsible for the recycling activities of the FLAMINGO project, which will take place at the company's foundry premises. During the second year of the project, the company conducted preliminary tests and was also involved in activities aiming to improve the recycling process and support other partners, respectively. The need to use a small crucible to test the efficiency of several fluxes in refining the melt pool by the dross was pointed out in an effort to optimise the aluminium melt pool composition. The technology and parameters that are about to be used have been validated along with the potential compositions of the cleaning and drossing fluxes. More specifically, Al-scrap samples

with different wrought and casting Al-alloy series have been tested by OES spectroscopy probe analysis, as a reference point for the recycling assessment. Moreover, different Al-alloy samples have been melted in the induction and gas crucible furnaces, to test the melting process along with the pressure and temperature conditions. Approaching the end of the second year, Group Kampakas received Al-masterbatches with NPs, which are planned to be melted, after separation, at the company's facilities. As far as collaboration with other partners is concerned, a sample of secondary aluminium chips, suitable for masterbatches, as well as a price analysis of secondary aluminium in the market was provided from Group Kampakas to MBN.



Global Factor established an outline of a model to be evaluated, which includes all the phases and costs of the life cycle of an electric vehicle. In this way, the limits of the study were defined considering the important processes and activities that are carried out during the production of the car. The outline was used to conduct a first qualitative and quantitative study on the life cycle and life cycle cost analysis of electric vehicles. During the second year, Global Factor collected primary information from the partners and sought secondary information available in literature sources to obtain data on the project and compare it with a baseline. The baseline was established with reference to vehicles that have already

been developed to date. In addition, based on the information gathered, a first assessment of the environmental impacts generated by an electric vehicle was developed. These impacts that have been evaluated so far will serve as a point of comparison for the results to be obtained for the project that is still under development. The work done during the project until now has been described in internal reports. These include information about the methodology used, the limitations of the study and the first results obtained about the baseline and environmental impacts. A follow-up plan is in place for the continued collection of information and progress of the LCA and LCC study. In addition, training activities on LCA are being organised so that partners can learn more about the subject and the analysis applied in this part of the FLAMINGO project.



Regarding Standardisation and Regulatory Issues, a compilation of relevant standards and regulations related to the FLAMINGO activities was made such as early identification of the necessary requisites and standards to deliver FLAMINGO project activities and to assure post-market implementation as well as to allow future identification of possible standardisation gaps. To optimise collaboration between FLAMINGO partners and stakeholders and after a detailed check of the area of expertise and areas of interest of the consortium partners, several workshops and training activities are currently being organised in the framework of the project.



3. 2nd Year of Activities



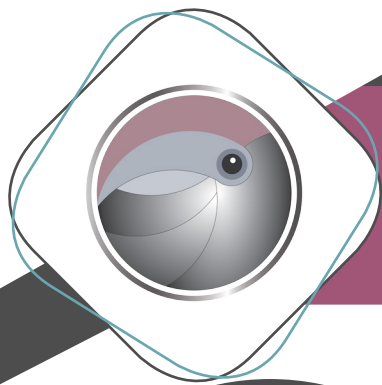
AXIA is leading WP9 for the Exploitation and Dissemination activities. They will manage to develop business plans and strategies for the successful market uptake of the partners' results. During the second year of the project, AXIA created customised business plans for the industrial and commercial partners of FLAMINGo as well as exploitation plans for the research institution of the projects. Moreover, they developed risk assessment plans by defining different types of potential risks that may affect the exploitation of the results with corresponding mitigation strategies. Intellectual Property management was carried out. AXIA communicated with the partners on how they intend to protect their novelties e.g., patents, and

set an initial draft plan for the IP protection of the key exploitable results. Market analysis and external environment analysis (SWOT, PESTLE) were also completed providing useful strategic advice to the consortium. Regarding the dissemination activities, AXIA has the overall view of all clustering, participation in events, and development of visual and printed materials in collaboration with EXELISIS. Currently, AXIA is working on the competition analysis of the industrial partners and on their strategic planning toward the successful commercialisation of their results.



EXELISIS continued to work on the dissemination and communication activities as well as on providing support on the exploitation activities during the second year of the FLAMINGo project. The first FLAMINGo newsletter was launched in January 2022 and the management of the website and social media (LinkedIn, Facebook, Twitter) platforms of FLAMINGo was implemented. Moreover, the first informative video of FLAMINGo was co-developed by EXELISIS and AXIA, and is available on AXIA Innovation's YouTube channel. In terms of stakeholders, connection with all projects funded under the same funding scheme was implemented and collaborative dissemination activities were agreed upon among FLAMINGo, LEVIS,

Fatigue4light, REVOLUTION, and ALMA projects. Specifically, EXELISIS coordinated the project cluster participation at the Transport Research Arena 2022 Conference in Lisbon. An interesting meeting between the FLAMINGo and European Aluminium took place in Brussels. The two groups discussed aluminium policies and future collaborative activities in the framework of the SALEMA EU project in which EA is participating. Another important milestone was the nomination of the FLAMINGo website at the EU web awards 2022 by EURid. Regarding the exploitation activities, EXELISIS has supported AXIA in several sub-tasks such as market and competitive analysis.



4. Our Collaborations

Enlight EVs Cluster

The FLAMINGo project has connected with the H2020 projects that are funded under the same "LC-GV-06-2020 - Advanced light materials and their production processes for automotive application" topic and creates a mutual impact on the projects' outcomes. FLAMINGo has linked up and agreed on cooperative dissemination activities with the LEVIS, REVOLUTION, Fatigue4light, and ALMA projects. Moreover, they collaborated as a cluster with the Horizon Results Booster Platform on establishing an official Project Cluster name called "EnLight EVs" and a logo.

Topic: LC-GV-06-2020 - Advanced light materials and their production processes for automotive application



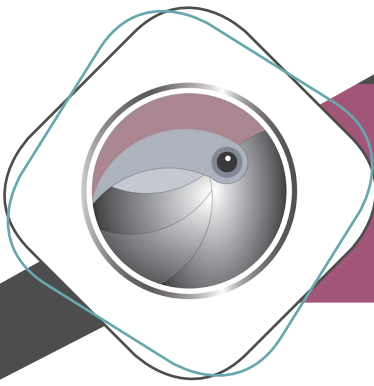
The EU-funded REVOLUTION project aims at overcoming the challenges hindering the use of recycled materials, but more broadly, restricting the widespread adoption of circular economy principles in the automotive industry. Forthcoming end-of-life vehicle directives are expected to recognize the potential for plastics to enable a circular flow of materials in the automotive sector. REVOLUTION will use machine learning and artificial intelligence to optimise the input of recycled materials and the injection moulding process to deliver high-quality parts. The project will bring together leading organisations from European strong-hold industries such as automotive, chemicals and plastics.

Visit REVOLUTION here: <https://revolution-project.eu>



The EU-funded project LEVIS aims to develop a new manufacturing route able to fill the current industrial gap present in mass-production automotive applications. By adopting an eco- and circular design concept from the design phase to the end-of-life stage, the LEVIS project will develop, verify and demonstrate lightweight structural parts in electric vehicles. Specifically, LEVIS aims at the development of structural parts in automotive using thermoplastic-based carbon fibre reinforced polymer (CFRP)/metal hybrid materials integrated with the structural health monitoring (SHM) system in order to achieve a significant weight reduction while keeping the mechanical in-service performance of the targeted parts. For that, new sustainable materials, suitable manufacturing/assembly procedures, advanced simulation methodologies/workflows, and innovative sensing/monitoring technologies will be developed, implemented, and validated.

Project website: <https://greenvehicles-levis.eu/>



4. Our Collaborations

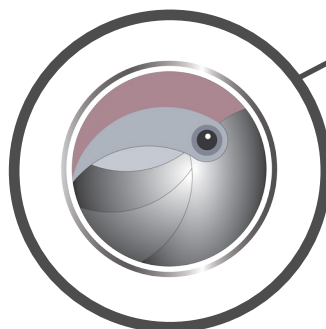
The EU-funded Fatigue4Light project plans to develop lightweight solutions for the chassis part of electric vehicles to enhance weight reduction compared to current solutions and increase vehicles' safety. The project will integrate new novel materials with high fatigue performance such as advanced high-strength steels, aluminium alloys, and hybrid fibre-reinforced composites. Additionally, it will develop new predicting models for the fatigue performance and design new methodologies for the reduction of materials' testing time. It will also investigate how cutting and welding processes could positively affect the overall fatigue performance of chassis components. In the project, six lab-scale and industrial end-user cases will be developed to validate the proposed solutions.

Visit Fatigue4Light here: <https://fatigue4light.eu/>



The EU-funded ALMA project aims to create a novel battery electric vehicle (BEV) structure for a passenger car with 45 % total weight reduction potential. The project will adopt circular economy approaches through the application of eco-design principles to develop a novel recyclable and affordable BEV platform. Specifically, the project will combine advanced high-strength steels, advanced sheet moulding compound and steel hybrid materials, characterised with multiscale model-based tools through a multi-material modular platform. The platform recyclability will be based on the separation of components at the end-of-life for repair and reuse.

Visit ALMA here: <https://almaproject.eu>





4. Our Collaborations

Other Collaborations



SALEMA EU project

The FLAMINGo project recently connected with the SALEMA EU. Raw materials are crucial to Europe's industrial economic base and contribute to the production of a broad range of goods and applications. To ensure the EU has access to critical raw materials (CRMs), the EU-funded H2020 SALEMA project will focus on alternative solutions for CRM-reliant high-performance aluminium (Al) grades required in electrical vehicles. SALEMA focuses on a circular approach using scrap metal as an alternative source of CRM and finding suitable CRM substitutes in alloying systems. Four industrial pilots will be conducted to demonstrate the newly developed Al alloys in five different car parts in five case studies. In simple terms, the SALEMA project develops a strategy of decreasing the critical raw material dependency (from magnesium and silicon) and creating a sustainable economic plan in the aluminium manufacturing industry of Europe. EXELISIS partner of FLAMINGo, communicated with the European Aluminium Association in Brussels (Partner of SALEMA EU) and managed to bring in contact the two projects to discuss possible dissemination collaborative activities.

Project website: <https://almaproject.eu/>

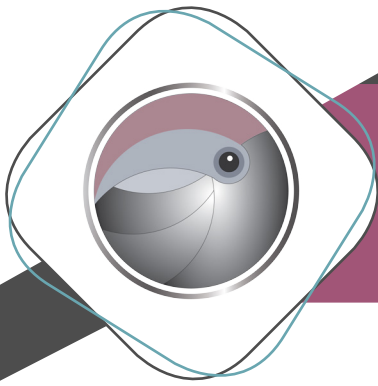
Topic: [SC5-10-2019-2020 - Raw materials innovation actions: exploration and earth observation in support of sustainable mining](#)

The EEA was established in 1981 in Brussels, as the voice of the aluminium industry in Europe. EAA is engaging with policymakers and a wide stakeholder community to communicate the outstanding properties of aluminium, secure growth, and optimise metal's contribution to meeting Europe's sustainability goals. Their environmental and technical expertise, economic and statistical analyses, sharing of best practices, and public affairs the EAA promotes the use of aluminium as the solution material towards sustainability goals, the profile of the aluminium industry, of the material and its applications among their stakeholders. EAA has more than 95 members including primary aluminium producers, downstream manufacturers of extruded, rolled, and cast aluminium, producers of recycled aluminium, and national aluminium associations with a total of more than 600 plants in 30 European countries.

Association website: <https://www.european-aluminium.eu>



European Aluminium Association (EAA)



5. News and Updates

FLAMINGo is an EU Web Awards 2022 winner



eu Web Awards 2022 winner logo for FLAMINGo project

The FLAMINGo website which was developed by our Partners EXELISIS and AXIA Innovation was submitted for nomination at the .eu Web Awards 2022 organised by EUrid. After open online voting for months, the project was chosen among the top 3 finalists for the Laurels category. This category is dedicated to Pan-European projects. The awards ceremony took place on the 17th of November 2022 in Mechelen, Belgium at the Van der Valk hotel. The Dissemination manager of FLAMINGo Mr. Ilias Gkotsis and Mr. Tose Petkov from OGI attended the ceremony. The event started with a cocktail party with interesting discussions among the attendees. During the 3 hours ceremony, 6 different awards were awarded. The categories of the awards were the Leader

which represents national businesses, the Rising Stars for start-ups, the Laurels, the House of EU category for news and media, the Better World category for environmentally friendly organisations, and the best of, Eu category. FLAMINGo finally won the Laurels award and FLAMINGo was quickly presented to the audience by Mr. Ilias Gkotsis.

This was a great honor for the project and increased the dissemination of the project immediately. After the awards ceremony, Bridgestone company approached the FLAMINGo team to ask for further information. Moreover, Mr. Ilias Gkotsis was interviewed by several journalists that attended the event.



5. News and Updates



The .eu Web Awards 2022 ceremony at the Van der Valk hotel



5. News and Updates



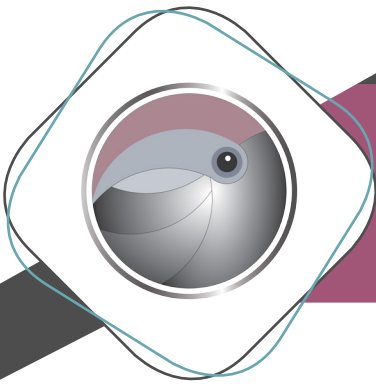
Mr. Ilias Gkotsis at the .eu Web Awards cocktail party



Mr. Ilias Gkotsis and Mr. Tase Petkov at the EU Web awards 2022



The .eu Web Award for the Laurels Category



5. News and Updates

Meeting with EAA at Brussels and Innovation Newsletter

On the 13th of September 2022, EXELISIS visited the European Aluminium Association (EAA) premises in Brussels for a meeting to discuss possible collaborative activities and disseminate the FLAMINGo project. The meeting duration held 1 hour with the dissemination manager of the project and the management board of EAA. The discussion focused on the role of EAA and activities, the FLAMINGo technologies and scope as well as the SALEMA EU project that EAA participates in. The SALEMA project focuses on lightweight solutions for electric vehicles (EVs) and is highly relevant to FLAMINGo. Moreover, an exchange of dissemination material between the two projects took place, and a roundtable on the aluminium recycling rate in EVs' body frame parts towards a neutral Europe with zero CO₂ emissions. As an overall output of this meeting was the future collaboration of FLAMINGo with EAA via our common partner Constellium and cross-over participation in both projects' events. FLAMINGo participated in SALEMA's workshop on the 9th of November and SALEMA will be a presenter at the FLAMINGo LCA workshop that will be co-organized with the sister project ALMA. FLAMINGo was also involved in EAA's Innovation Newsletter.



FLAMINGo at the EAA Brussels offices

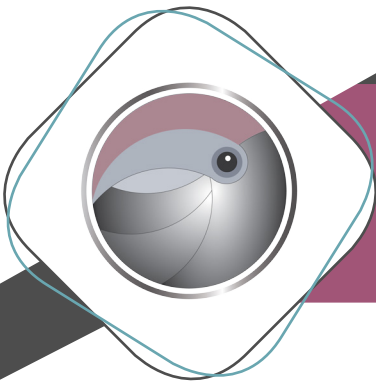
The video of FLAMINGo is out!



FLAMINGo at the EAA Brussels offices

The informative video of FLAMINGo is out and available online on AXIA Innovation's YouTube channel. EXELISIS worked with AXIA Innovation for the script text of the video and the visuals. The recording of the video took place at a recording studio in Athens, Greece. The video starts with the general points the EU is targeting concerning EVs and green energy such as the green deal, clean energy, and the target of the EU to implement 30 million electric cars to the market by 2030. The general scope of the project is to produce aluminum metal matrix nanocomposites for green vehicles. The main body of the video is dedicated to presenting the FLAMINGo consortium across 8 European countries and the technologies utilized within the project duration such as green sand casting, metal alloying, welding, topology optimisation, and recycling. In this short video you can find out the wider impact of FLAMINGo and how it will strengthen European industrial competitiveness. You can check the video in the shared link below. The wider impact of FLAMINGo can be also found in this video and how FLAMINGo will strengthen European industrial competitiveness. You can check the 3 minutes FLAMINGo video in the shared link below.

<https://www.youtube.com/watch?v=i8UE8XNPjWA>



5. News and Updates

TRA 2022 cluster session

There is currently a growing need to reduce the weight of electric vehicles (EVs) in order to achieve greater carbon neutrality.

At the moment, the need to reduce the weight of electric vehicles (EVs) to achieve higher carbon neutrality is increasing. A session was presented by the EnLight EVs Cluster (FLAMINGo, LEVIS, Fatigue4light, REVOLUTION, ALMA) that focused on the development of new materials, their integration into EV components, the design of these components, their efficient production, and recycling.

This session showcased the utilisation of advanced steels, novel aluminium composites, optimised recycled plastics and recyclable resins, and carbon fibers for the reduction of the overall vehicle's weight along with eco-design principles for advanced lightweight materials to be applied to different vehicle body parts.

The session was hosted at the Transport Research Arena (TRA) Conference 2022 in Lisbon, Portugal. Five separate 15' presentations took place, one for each project, starting with a short introduction of each project and its differentiation points, and then each presenter focused on the core technologies of each project toward lighter EVs and circular economy.

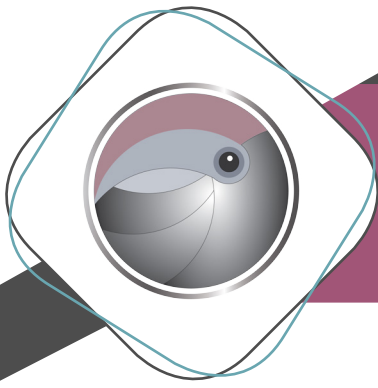
From the side of FLAMINGo, Mr. Lamberto Salvan from ALKE presented the project. At the end of the presentations, a roundtable session took place in which cross-cutting issues on materials, processes, circularity, eco-design principles, achievements, and improvements of the projects can be discussed.



Mr. Lamberto Salvan at the TRA 2022 Conference



Mr. Lamberto Salvan at the TRA 2022 Conference



5. News and Updates

Meeting with Quimmco Group



FLAMINGo meets Quimmco Grupo

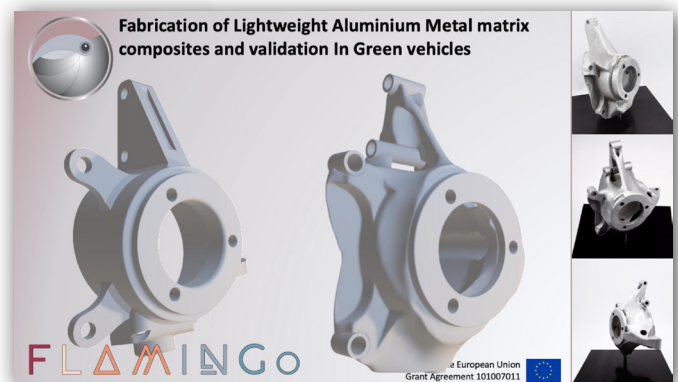
Quimmco Group is an industrial company servicing customers around the world who need high standards of quality, competitiveness, and innovation. Their products vary from turbine components, and blades to ring alloys 718 and tractors. They serve several market segments such as agriculture, automotive, chemicals, energy, and light construction equipment. Moreover, they are working with joint ventures and academic institutions on several research and development projects.

Quimmco, specializes in metalworking, precision machining, forging, castings, complex manufacturing assemblies, and formulation of polyols. On the 5th of April 2022, MBN and EXELISIS discussed with Quimmco, possible exploitation opportunities among them and FLAMINGo and exchanged Knowledge on the aluminium alloys for the automotive components and casting methods.

Topology optimised part

In FLAMINGo we achieved to design of a new aluminium nanocomposites automotive component through topology optimisation. With topology optimisation the performance of a component can be maximised. The goal of optimisation is the reduction of weight or the improvement of structural stiffness. The optimisation process starts with defining boundary conditions like loads, construction space, and additional tasks according to a specific part. The importance of each element for the system will be evaluated and the design variables will be varied. After several iterations, an optimum design is created.

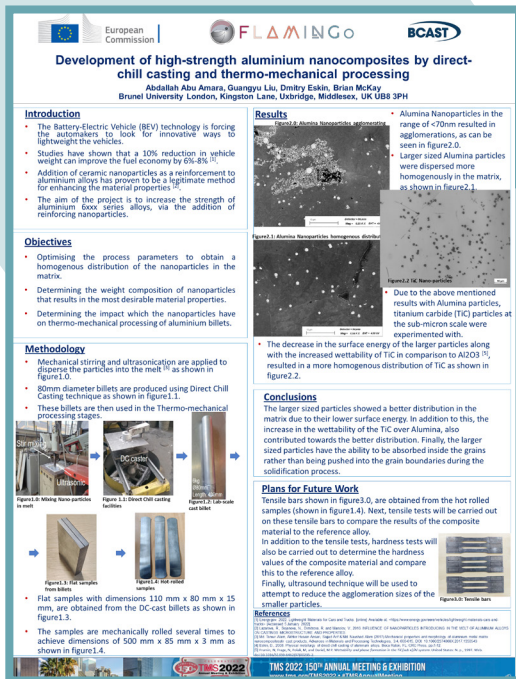
The final design of the component compared to a steel component in the market achieved an overall ~ 30% reduction, an increase in performance, and saving of energy and costs. FLAMINGo progresses well with adequate results toward the development of lightweight aluminium metal nanocomposites automotive components for EVs.



FLAMINGo's topology optimised component



6. Past Events by partners



TMS 2022 Brunel, 27 February - 3 March 2022, USA (Brunel)

Our partner, Brunel University of London participated in the TMS 2022 exhibition and disseminated through an on-demand poster the FLAMINGo H2020 project. The TMS Annual Meeting & Exhibition that took place on 27 February 2022 – 3 March 2022 in Anaheim, California, brought together more than 4,000 engineers, scientists, business leaders, and other professionals in the minerals, metals, and materials fields for a comprehensive, cross-disciplinary exchange of technical knowledge. TMS 2022 presented more than 90 symposia planned by all five TMS technical divisions and covered a wide range of topics related to minerals, metals, and materials science and engineering.

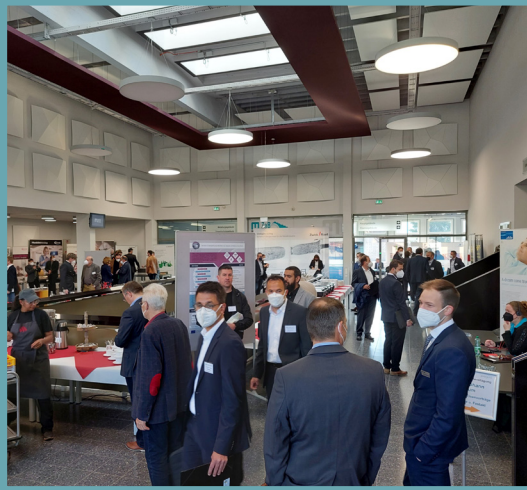
AC Styria Leichtbautag, 30 March 2022, Austria (OGI)

On the 30th of March 2022, our Partner Österreichisches Gießerei-Institut (OGI) participated in the ACstyria Mobilitätscluster GmbH "Leichtbautag" 2022. Each year, key players from industry, science, and research present strategies for reducing the weight of means of transport in practical presentations. OGI presented the FLAMINGo Project H2020 concept for the development of lightweight aluminium metal matrix nanocomposite components for Green Vehicles and their role in WP4 and WP5 related to topology optimization and casting.





6. Past Events by partners



64th Austrian Foundry Conference, 28 - 29 April 2022, Austria (OGI)

On the 28th-29th of April 2022, the FLAMINGo partner Österreichisches Gießerei-Institut (OGI) participated in the 64th Austrian Foundry conference at Leoben, Austria, and disseminated the FLAMINGo Project. The conference honored 25 years of cooperation between the Austrian Foundry Institute and the University of Leoben, Chair of Foundry Science. New research topics have been taken up, which deal with the topic of climate neutrality as well as energy and resource-saving in foundries and in the application of castings on different levels. FLAMINGo develops lightweight aluminum metal nanocomposites-based components for electric vehicles and OGI is responsible for the casting methods within the project.

EuroBrake, 17 - 19 May 2022, online (MBN)

In May 2022, FLAMINGo's Project Coordinator MBN participated in the EuroBrake 2022 where several research works are presented related to vehicles and passengers' cars. MBN reached an influential audience of braking specialists, to share knowledge of the FLAMINGo project as well as to connect with decision-makers from leading companies around the world. The Eurobrake 2022 had over 650 attendees and 100 technical presentations across 20 sessions.



EUROGUSS, 8 - 10 June 2022, Germany (OGI)

From 8 - 10 June 2022, the EUROGUSS 2022 took place. The international die-casting industry met at the biggest trade fair for die-casting for the 14th time. The product range showed innovative solutions for die-casting processes like aluminum die casting, magnesium die casting and zinc die casting. The event also focused on topics like rapid prototyping, die-casting machinery, and material testing. The FLAMINGo partner OGI had a booth at the trade fair and disseminated the project results with flyer distribution. OGI partners were available to inform orally attendees about the project and its achievements so far.



6. Past Events by partners



Nanocommons Conference, 20 June 2022, Cyprus (ISQ)

NanoCommons, in collaboration with the EU NanoSafety Cluster projects, organized the “Nano-week” and NanoCommons Final Conference, in Limassol, Cyprus. The theme of the conference is the “Evolution of Nanosafety and materials sustainability as we transition into Horizon Europe”. ISQ on the 20th of June 2022 presented the FLAMINGo project at the conference and specifically about the risk-prevention design principles and safe-and-sustainable-by-design related to the nanoparticles that will be used for the development of the lightweight aluminium metal matrix composites.

IndTech, 27 - 29 June 2022, France (MBN & EXE)

On the 27 - 29 June 2022, MBN Nanomaterialia EXELISIS) attended the Industrial Technologies 2022 Conference (IndTech 2022) at Grenoble, France. IndTech2022 was an impetus towards improving the visibility of industrial technologies, identifying policy options as well as a space for networking and finding common goals among industry stakeholders. MBN had a booth at the event and distributed dissemination material of the project and EXE attended the conference in several rooms. The two partners had the chance to meet up physically for the first time due to the covid restrictions in the past months.





6. Past Events by partners



Castforge, 21 - 23 June 2022, Germany (OGI)

From 21-23 June 2022, the CastForge 2022 Trade Fair took place in Stuttgart in Germany. CastForge is the Trade Fair for casting and forging with processing. The industry meets every two years at Messe Stuttgart to present its range of products and services. Most trade visitors work in purchasing and procurement, business/corporate and operations management, manufacturing, production, or quality control, as well as in sales and distribution. OGI had a booth in the exhibition area and distributed FLAMINGo flyers.

75th IIW, July 17 - 22 2022, Japan (EWF)

The Japan Institute of Welding hosted the IIW International Conference on Welding and Joining in Tokyo on 17 - 22 July 2022. The central theme of the conference was "Innovative Welding and Joining Technologies to achieve Carbon Neutrality and promote Sustainable Development". The conference was scheduled for 6 days, from Sunday 17th to Saturday 22nd. EWF collaborated with ISQ and submitted an abstract. During the conference, EWF had an oral presentation to disseminate FLAMINGo.



Future Material Conference, 3 - 7 October 2022, Italy (Brunel)

Future Materials 2022 took place in Rome from 3 - 7 October 2022 and provided an international platform for the dissemination of advancement in the research and development of Future Materials. Future Materials 2022 featured talks on new materials and research directions, nanotechnology-driven solutions in materials engineering, commercialization opportunities and challenges, and other important interdisciplinary topics. Brunel participated in the conference and disseminated the project FLAMINGo and its AI-MMnC perspective through an oral presentation.



6. Past Events by partners



PM2022, 9 - 13 October 2022, France (MBN)

World PM2022 took place in Lyon from October 9 to October 13, 2022, focusing on the latest innovations in power metallurgy (PM) technology. It takes place in Europe every six years and features a world-class technical program as well as a large exhibition, revealing the most recent improvements from the global PM Supply Chain such as powder production, consolidation, and material applications. The meeting was attended by suppliers, end users, and producers. MBN Nanomaterials participated with a booth at the conference and disseminated, FLAMINGo through B2B discussions and by distributing flyers.

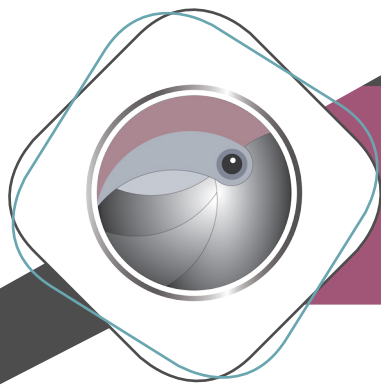
EFW Bi-annual GA, 18 October 2022, Portugal (EFW)

The General Assembly of FLAMINGo's partner, EFW took place on 18th October 2022 in Lisbon, Portugal. During the General assembly, several topics were discussed such as the EFW System Rules, European Union Tools, and EU Projects. Moreover, several Working group meetings took place regarding topics such as Training and Qualification, Certification, and Standardization election of the New EFW President and Vice-President. The event was held in Lisbon and the FLAMINGo project's standardization and training activities that will take place during the project were disseminated to all attendees.



EFW 3D Additive EXPO, 9 November 2022, Portugal

On 9 November 2022, the 3D ADDITIVE EXPO took place in Batalha, Portugal. The event was a unique opportunity to get in touch with the multifaceted universe of 3D printing and additive manufacturing. For the first time in Portugal, a fair was held entirely dedicated to additive manufacturing, 3D printing, and robotics. More than 100 companies participated in an area of 10.000 m2. EFW had its own booth and disseminated the FLAMINGo project.



7. Future Events by Partners

◆ TMS 2023, 19 - 23 March 2023, San Diego, USA (Brunel)



The TMS Annual Meeting & Exhibition will take place on 19 - 23 March, 2023, in San Diego, California, USA brings together more than 4,000 engineers, scientists, business leaders, and other professionals in the minerals, metals, and materials fields for a comprehensive, cross-disciplinary exchange of technical knowledge. More than 4,600 abstracts have already been submitted—all from attendees who plan to present their

work in person at TMS2023. The Brunel University of London, partner of FLAMINGo, will have an oral presentation of the project to disseminate to the attendees.

◆ GIFA 2023, 12 - 16 June 2023, Dusseldorf, Germany (OGI)

GIFA is the world's most important international trade fair for specialized casting technologies that showcase all aspects of future-oriented innovations. The GIFA is the platform for excellent Business activities and is the indicator for the innovations which will orientate the future. OGI will participate in the event on 12 - 16 June 2023 with a poster presentation and will disseminate FLAMINGo through B2B meetings.



◆ ECDNT 13, 3 - 7 July 2023, Lisbon, Portugal



The European Conference on Non-Destructive Testing (ECNDT) is considered the major international event for EFNDT and its member societies. The conference that will take place on 3 - 7 July 2023 in Lisbon will include a technical and scientific program that presents the latest developments in the field of research and development as well as the application of NDT in all major industrial areas. The conference and the exhibition are combined the best promotion of NDT and at the same time offer unique opportunities to establish contacts and exchange experiences and ideas between participants and visitors. ISQ will participate in the conference and will present orally the FLAMINGo project. They will have a poster of the project to discuss with multiple attendees the welding and NDT technologies used in the project.

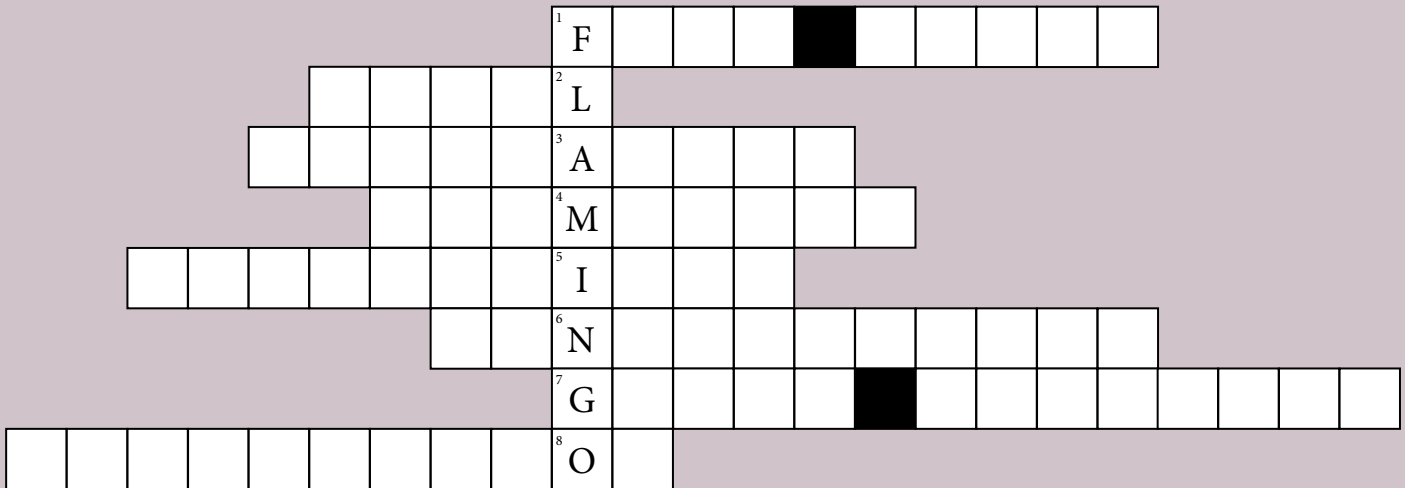
◆ ICWAM 23, 23 October 2023, Metz, France

ICWAM 2023, will be an International Congress on Welding, Additive Manufacturing, and associated non-destructive testing. The conference will include keynotes, lectures, an e-poster session, and an online exhibition. The program is designed to create interaction among attendees and to promote an active dialogue between academic researchers and industrial representatives in order to bridge the gap between academia and pressing industrial needs.





8. Crossword Puzzle



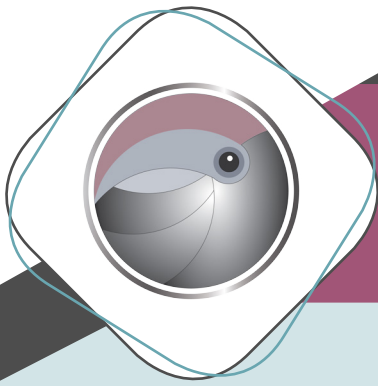
1. It consumes fewer fuels
2. Type of nanocomposites in FLAMINGo
3. A novel solution
4. Substitute for steel
5. Components with reduced weight
6. Metal matrix nanostructures
7. The overall group where electric vehicles belong
8. "Topology"

♦ **Answers (use mirror to see the words, be careful the words are mixed)**

OPTIMIZATION | FLAMINGo

METAL | ALUMINIUM | NANOCOMPOSITE | INNOVATION | GREEN VEHICLES | LIGHTWEIGHT |





9. Contact Info

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FLAMINGo - Fabrication of lightweight aluminium metal matrix nanocomposites and validation in green vehicles



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