

LEAD PARTNER



PARTNERS



ENTERPRISES



APPLICATIONS

- Development of Fiber Metal Laminates (FML) and preceramic preregs to obtain fire-resistant panels and components and coupling to thermal-insulating and fire-resistant basalt felts, produced exploiting secondary raw materials (coming from recycling of traditional polymeric matrix composites).
- Development of engineered, multi-material, fire-resistant products and recyclable solutions based on the combination of new composite materials with traditional materials, focusing on the areas of interest of the project: aeronautics, naval and construction.

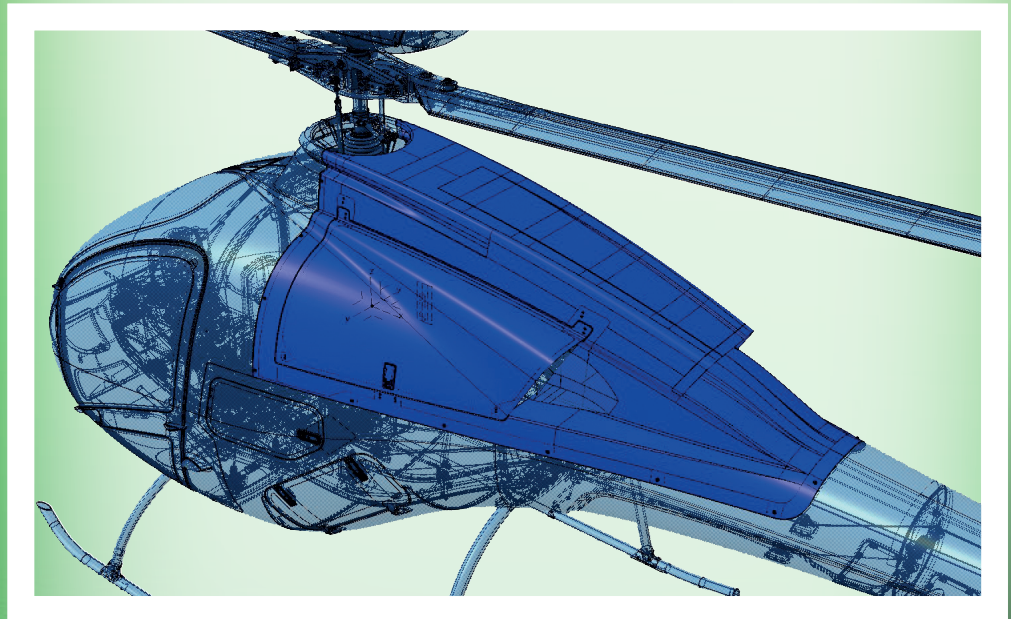
FULL-SCALE DEMONSTRATORS

- Transports: FML turbine bonnet and CMC (Ceramic Matrix Composite) exhaust pipe for Zefhir helicopter.
- Construction: Thermal-insulating / fireproof panels



FIREMAT

FIRE resistant MATERIALS & composites



The Project is co-financed by the Regional Operational Programme of the European Regional Development Fund (ERDF ROP 2014-2020) and by the Development and Cohesion Fund of Emilia-Romagna Region

CONTACTS

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THE PROJECT

FIREMAT aims at overcoming the main technological limits arising from the application of Polymeric Matrix Composites (PMCs), that derive from their low resistance to temperature, combined with their non-recyclability. On the other hand, ceramic matrix composites (CMCs), which boast excellent thermal resistance, are too expensive and time-consuming to produce.

FIREMAT developed new materials and processes, focusing on their integration into multi-material solutions, and on the engineering and development of design methodologies aimed at achieving smart-manufacturing. In addition, the project investigated durability, sustainability and environmental impact of the designed materials along with the patentability and go-to-market strategy. The TRL 4/5 already acquired on fire-resistant PMC in the EEE-CFCC project (eee-cfcc.it), was implemented at TRL 6 by improving formulations, processes, pilot-scale production of semifinished materials and full-scale demonstrative prototypes.

FIREMAT exploited the background and know-how of **ENEA TEMAF, ISTEC-CNR, CERTIMAC, MUSP** and **ROMAGNA TECH** (all partners belong to the High-Technology network of the Emilia-Romagna region) to produce long and short fiber-reinforced composites for **high temperature and fireproof applications, targeting exhaust pipe applications and fireproof thermal-insulating panels.**

GOALS

- reinforcing of the Emilia-Romagna composite materials sector, overcoming the current working temperature limits of polymer-based fiber-reinforced composites;
- promoting circular local economies by developing the use of cradle-to-cradle recyclable materials and secondary raw materials;
- supporting the industrial partners realizing real scale demonstrators;
- demonstrators in high-T composites, to prove their applicability up to 800°C.

The project realized two types of innovative heat-resistant materials:

- recyclable and fireproof **composites reinforced with basalt fiber** (for structural parts near the turbine engine of an helicopter and ventilated facades);
- **composites reinforced with long or short carbon fibers** (virgin/recycled) with a nano-structured refractory matrix (for thermal barriers and exhaust pipes)

ACTIVITIES

FIREMAT carried on collaborations started in the previous project EEE- CFCC.

The activity plan was organized in **5 phases**, developing new fire-resistant composites, optimizing the production processes and semifinished materials, developing real scale demonstrators, qualified and aged in the expected operating conditions. At project start, scientific and industrial partners agreed about the target performances and demonstrators (representative of heat shields, exhaust pipes and ventilated facades), to inquire about their feasibility and possible implementation at industrial level. The materials were characterized in terms of thermo-mechanical, thermo-physical and durability properties, then they were validated through experiments and FE modelling in the expected working conditions, applying international standards, in order to prove compliance with different applications and expected performances. Along with the R&D activity, FIREMAT set up an IPR policy and carried out know-how protection actions. The project communication and results dissemination activity continued from the beginning to the end of the project, to maximize the possible impact on local companies.

Phase 1: Composite based on basalt fibers and preceramic matrix
Coordinator - ENEA TEMAF (www.enea.it/en/faenza-laboratories)

Phase 2: Composite based on carbon fibers and inorganic polymer matrix
Coordinator - ISTEC-CNR (www.istec.cnr.it)

Phase 3: Materials qualification in expected working conditions
Coordinator - CertiMaC (www.certimac.it)

Phase 4: Materials engineering and component modeling
Coordinator - MUSP (www.musp.it)

Phase 5: Target definition, Go-to-market strategy, IPR management
Coordinator - ENEA TEMAF (www.enea.it/en/faenza-laboratories)

Dissemination Activity: Coordinator Romagna Tech (www.romagnatech.eu)

