ENEA FAENZA RESEARCH CENTER
CERAMICS AND COMPOSITE MATERIALS

Fiber-Reinforced Composites: Advancing Sustainability in Mass Production

Fiber-reinforced composites are a key technology for enhancing sustainability in mass production.
The Sustainability Department of ENEA develops innovative composites at the Ceramics and Composite Materials Laboratory, located in Faenza and Brindisi.

These composites contribute to weight reduction and structural optimization.
Engineering plays a crucial role, along with the selection of cost-effective fibers such as glass and basalt, which have low embodied energy and a reduced carbon footprint.

Sustainable Production and Material Innovation

Sustainable production requires solutions that avoid energy-intensive processes and the use of critical raw materials. ENEA is actively developing new composite materials, leveraging advanced microstructural and mechanical characterization techniques.

Sustainable composites are based on:

1. Closed-loop recyclable resins
2. Bio-based materials (both resins and fibers)
3. Utilization of secondary raw materials

Another breakthrough innovation unlocking unprecedented performance is the strategic combination of different materials.
Structural elements are subjected to tension, compression, and tangential stresses, but composites are primarily efficient under tension.

By integrating composites with materials that exhibit high compressive strength, it is possible to develop structural elements that offer lower costs, extended service life, and a reduced energy and carbon footprint.

FENICE
Fire Resistant Environmentally Friendly Composites

ecosister

Brilliant

CAMPRES

Tantum Erg

Ongoing Projects and Application Areas

- *FENICE - FIRE RESISTANT ENVIRONMENTALLY FRIENDLY COMPOSITES*
  - Development of high fire-resistant composite materials for safer battery enclosures in electric vehicles.
- *ECOSISTER - Emilia Romagna Territorial Innovation Ecosystem*
  - Production of a high-TRL demonstrator, specifically a fire-resistant composite separator to enhance battery box safety.
- *CARBO-PLUS - Reconstructed Carbon Fabrics for Sustainable Composites Mass Production*
  - Industrial reuse of short carbon fibers as secondary raw materials for composites in shipbuilding and construction.
- *TANTUM ERGO - Enabling Technologies for Sustainable Production and Maintenance of Offshore Renewable Energy Components*
  - Research on composite materials suitable for offshore renewable energy applications and marine environments.
- *BRILLIANT - Biobased Fiber-Reinforced Composites: Validation and End-of-Life Treatment*
  - Weight reduction and utilization of carbon-negative reinforcements, validating the feasibility of natural fiber composites with recyclable resins.
- *CAMPRES - Composites for Advanced Mass Production of Energy Storage*
  - Development of thermoplastic composites for cost-effective battery enclosures.
- *NALUCOAT POC - Composite-Aluminum Laminates for Fire-Resistant, Sustainable Battery Boxes*
  - Development of fiber-metal composites for high-performance battery enclosures in sports cars.

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