

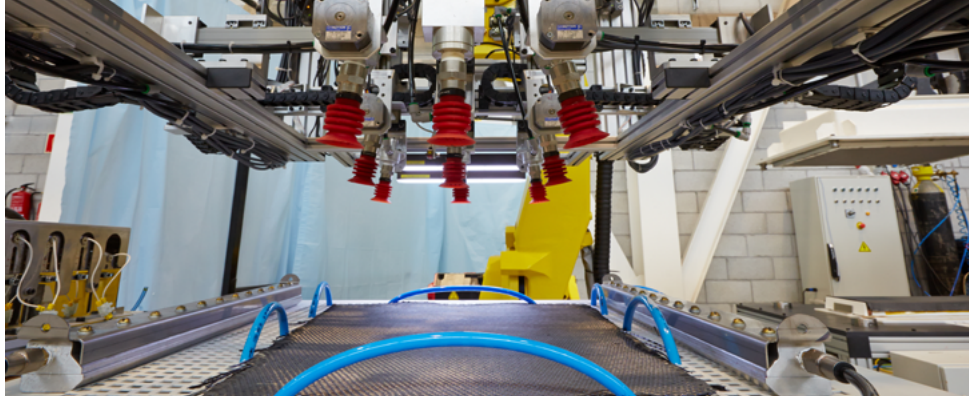
Smart
manufacturing

TECNALIA
composite materials



TECNALIA

composite materials



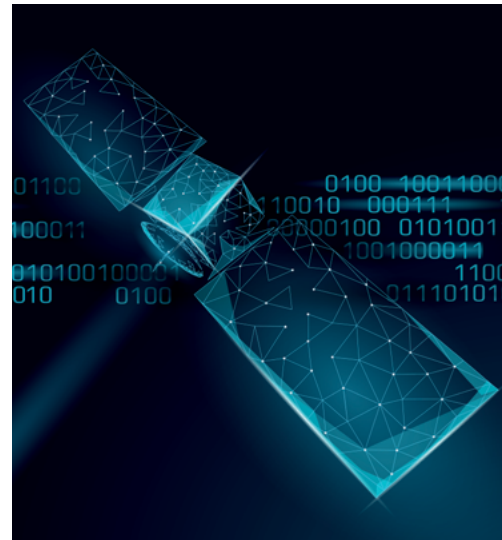
We develop innovative technologies for manufacturing and assembly of organic matrix composite structures and components to contribute to our customers' competitiveness.

The development of these technologies is driven by the common high-level challenges applicable to all market segments.

We offer innovative, fast, efficient, automated, robust and competitive manufacturing and assembly processes facing the component whole life cycle:

- **Design.**
- **Simulation.**
- **Prototyping.**
- **Manufacturing**
(including semi industrial upscale).
- **Optimization.**
- **Characterization.**
- **Recycling.**

Our vision and offer driven by technology



Composites / multimaterial structures & processes

We develop innovative technologies for **manufacturing and assembly of organic matrix composite structures and components** to contribute to our customers' competitiveness.

Strategic research lines:

- Composite structures fast manufacturing processes.
- Additive manufacturing.
- Composite processes 4.0. Monitoring and simulation.
- Waste materials recycling and valorisation.
- Composite-based lightening.

MULTIMEDIA



- *New structural concepts for railway vehicles*
- *Additive technologies for plastics and composites*
- *4.0 Composites production line*
- *CAPROCAST. T-RTM in-situ polymerization*
- *Fast and efficient carbon fiber preforming*
- *Automated, efficient and flexible manufacturing of components in high-performance composites*

OUR VALUE / CONTRIBUTION:

- Composite manufacturing processes automation.
- Resistive heating processes.
- Fast curing materials adoption.
- Thermoplastic composite manufacturing processes development.
- Prototypes manufacturing (preforms and components).
- Composite based components design and analysis.
- Tooling design and development.
- Continuous fibre additive deposition process development.
- Composite components manufacturing process simulation (Pam-form, Pam-RTM).
- Manufacturing processes critical variables monitoring and analysis.
- Composite-based lightening.

Sustainable and functional polymers

Our aim is to respond to the challenges most demanded by industry and mobility sectors: **sustainability and multifunctionality with cost competitiveness concept as strategic baseline.**

Strategic research lines:

- Sustainable polymeric materials.
- Functionalities development.
- Joining technologies.
- Process monitoring and control.

MULTIMEDIA



- *Carbon nanotube sheets for enhanced functionality and performance of industrial components*
- *CAPROCAST. T-RTM in-situ polymerization*

Functional printing

Functional printing brings together **technologies that incorporate advanced functions to a product or component**, beyond its conventional (structural, thermal, etc.) functions, **through the deposition of inks on very different supports** (plastic, metal, wood, cardboard, glass or textile).

Strategic research lines:

- Materials / substrate selection.
- Ink formulation / re-formulation.
- Imprinting and hybridation process optimization.
- Functional characterization.
- Prototyping final products.

OUR VALUE / CONTRIBUTION:

- From the idea to the product prototype.
 - Electronic design
 - Selection and formulation of materials (substrate and additions)
 - Printing process development
 - Functional characterization / validation.
- Manufacturing / assembly time & cost reduction.
- Less weight and volume. Flexibility. Minimize raw material.
- Compact electronics and component smartization.

MULTIMEDIA



· Functional printing

JEC 2022 demonstrators



Circular TP project multimeral demonstrator



Heavily loaded suspension link based on one shot RTM, highly integrated and lightweight CF concept



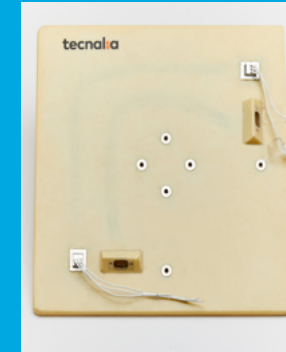
Automated production based on ultra fast tape laying



One shot T-RTM ribbed part



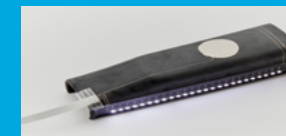
BIO-PUR resin matrix composite for structural applications



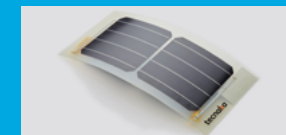
Fire resistant one shot sandwich panel with embedded functionalities



Plastic pedal reinforced with recycled carbon fiber



Embedded printed lighting circuit in epoxy composite



Composite part with integrated PV solar cells embedded



Fiber preforms based on additive manufacturing



Fibreuse demonstrator ski



Automotive part with nanomaterials for scratch resistance and aesthetical effects



New manufacturing concepts of composite structures based on additive manufacturing

Circular TP project multimaterial demonstrator

CF reinforcement based on tape laying and welded by laser VCSEL technology, providing the following advantages:

- Competitive composite / steel multimaterial.
- Good in-service and impact behavior with high toughness.
- Robust and validated processes.
- Conventional metal joining technologies maintained for the BIW.
- Recyclability of both thermoplastics and steel.



Fiber preforms based on additive manufacturing

Fiber preforms based on continuous fiber additive manufacturing with the following features:

- Complex preforms compatible with RTM / Infusion / thermoforming.
- Applications of complex geometries: isogrid structures, fittings, etc.



Heavily loaded suspension link based on one shot RTM, highly integrated and lightweight CF concept

Heavily loaded suspension link based on one shot RTM, highly integrated and lightweight CF concept with the following advantages:

- One shot RTM and highly integrated concept.
- Metallic inserts integrated with mechanical joints and structural adhesives.
- Lightweight CFRP concept.
- Fast stacking, cutting and 3D net shape preforming.



Fire resistant one shot sandwich panel with embedded functionalities

Fire resistant one shot foam / sandwich panel with different embedded functionalities:

- Heating layer integrated.
- Possibility of sensors integration.
- Data transmission / cabling integration.
- Integration of inserts for different interfaces.



Fibereuse demonstrator ski

FiberEUse project demonstrator: ski with a recycled glass fiber insert from HEAD.

- Thermally recovered glass fibre from EoL wind turbines to sport.
- PU/20%rGF injected parts for core inserts.
- Equal mechanical performance.



- 12% in mass of the foam could be reduced using the insert produced with rGF.

► [Link to FiberEUse brochure](#)

Automated production based on ultra fast tape laying

New production systems and processes for automated production based on ultra fast tape laying with the following advantages:

- Competitive, fast and automated manufacturing technologies.
- Competitive hybrid solutions to combine GF or CF composite with plastic.
- Low-cost raw materials (tapes) and process.
- Maximum optimization with variable thickness and customized stacking.
- Minimum or zero scrap.



Plastic pedal reinforced with recycled carbon fiber

FiberEUse project demonstrator: pedal bracket reinforced with recycled carbon fibre from BATZ.

- Thermally recovered carbon fibre from aeronautics to automotive.
- PA6/20%rCF pellets compounding.
- Plastic part produced by conventional injection.
- Equal mechanical performance.
- 40% lighter part.

► [Link to FiberEUse brochure](#)



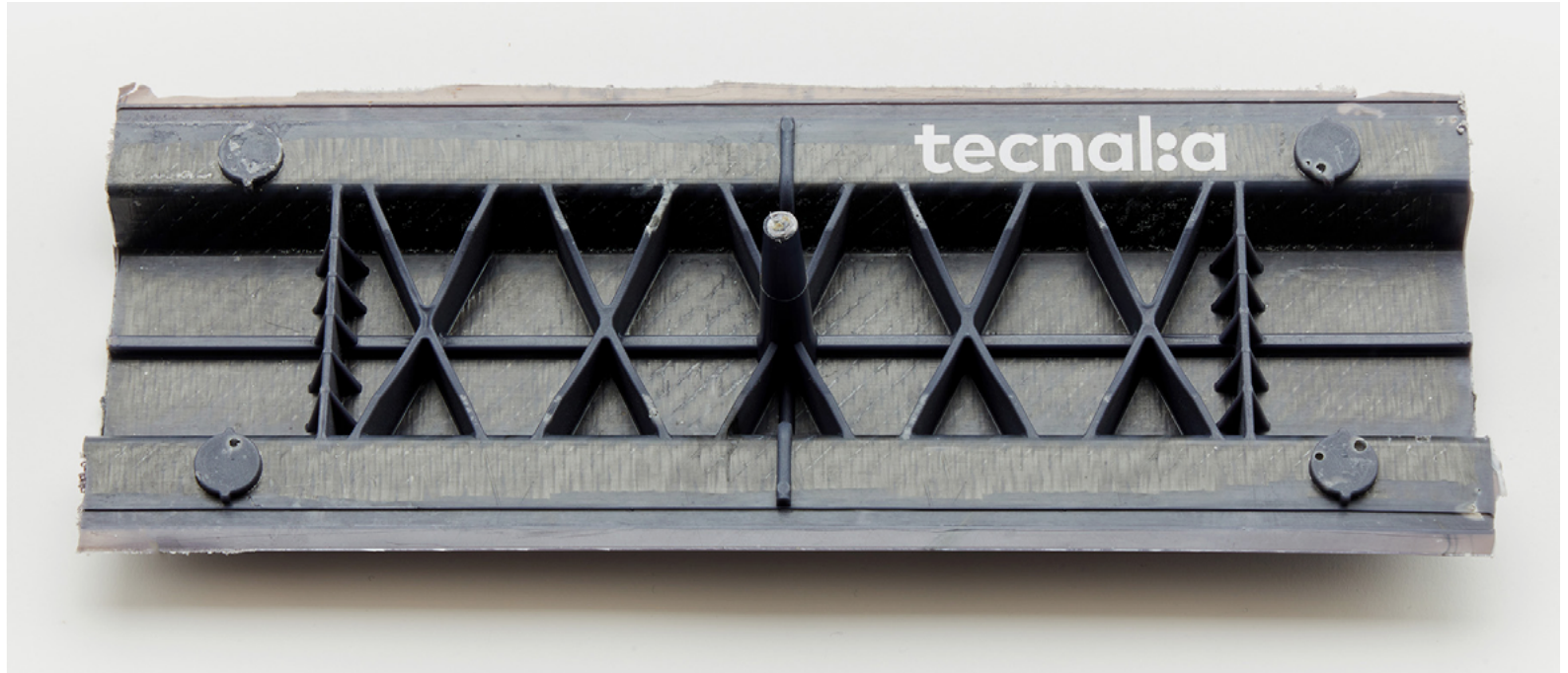
Thermally recovered
carbon fibre from
aeronautics to
automotive

One shot T-RTM ribbed part

One shot T-RTM composite part with high level of integration and low-cost material with the following features:

- Low-cost raw materials (matrix), i.e. matrix cost < 2 €/kg.
- Competitive and fast manufacturing.
- Improved recyclability of the composite.
- 3K system for in situ polymerization.
- "One-shot" manufacturing of complex parts.

🔗 [Link to Caprocast brochure](#)



High level of integration
and low-cost material

Automotive part with nanomaterials for scratch resistance and aesthetical effects

Izadi nano2industry project demonstrator: automotive pillar B part based on nanomaterials for scratch resistance and innovative aesthetical effects from MAIER.

- PMMA based nano-compounds.
- More than 140% improved scratch resistance compared to standard PMMA.
- Class A surface without painting.



- Nano textured surface to provide diffractive and plasmonic aesthetics finishes.
- Single step conventional injection.
- Reduction of production phases and costs.

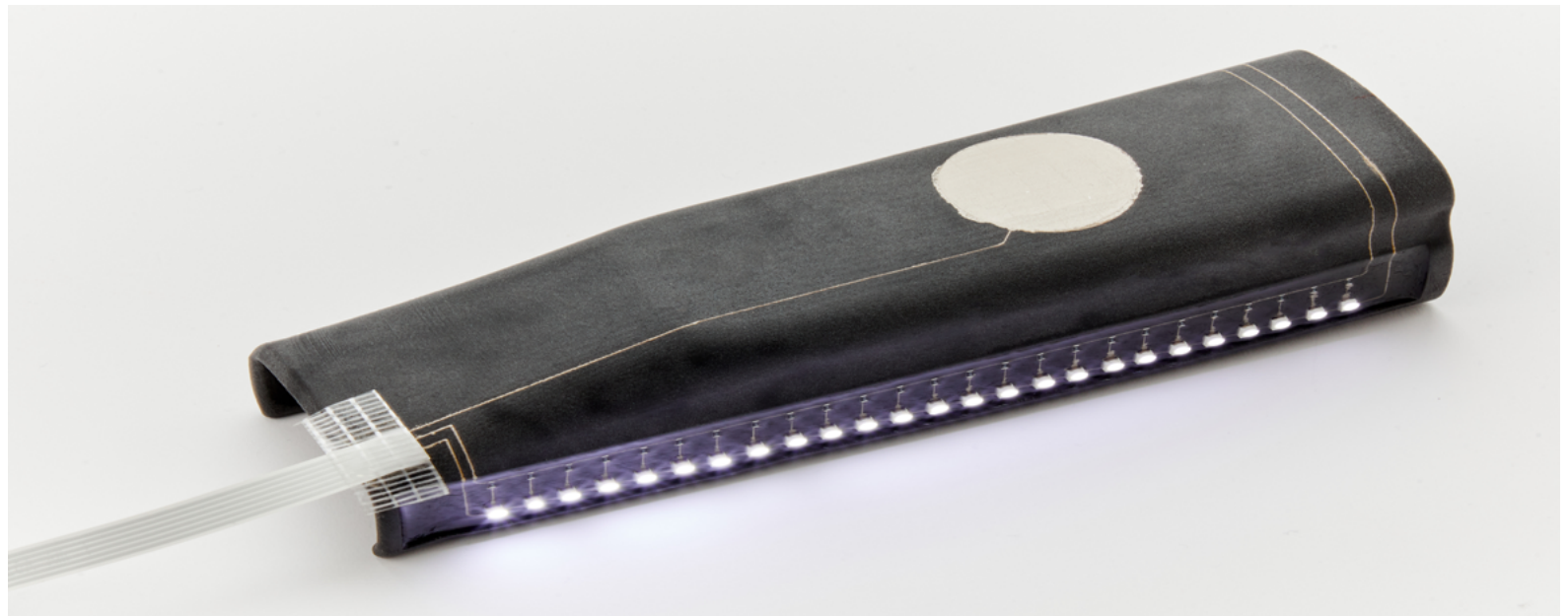
🔗 [Link to Izadi-Estcratch brochure](#)

Embedded printed lighting circuit in epoxy composite

Composite part with embedded printed features:

- Touch button.
- Illumination circuit.

The control electronics has been miniaturized to be fully portable and lightweight. Connectors are also fully embedded.



**Electronics
miniaturized to be
portable and
lightweight**

BIO-PUR resin matrix composite for structural applications

Composite part with novel bio-based polyurethane (BIO-PUR) matrix for high production rates automotive applications.

- Properties equivalent to commercial PUR.
- $T_g > 120^\circ\text{C}$.
- Low viscosity.
- Latency and fast cure.

► [Link to PUR brochure](#)



Composite part with integrated PV solar cells embedded

Composite part with integrated PV solar cells embedded with the following features:

- Fully integrated solution combining structural function / support and PV integration.
- Validated materials (resin / reinforcement fiber) for PV efficiency.



New manufacturing concepts of composite structures based on additive manufacturing



New manufacturing concepts of composite structures based on additive manufacturing with the following features:

- Combination of additive manufacturing with liquid moulding processes.
- Applications in complex structures (hollow, ribbed, etc.), moulds / tooling, etc.

Creating Growth Improving Society

tecnalia

MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE

CONTACT

Patxi Estensoro

Manufacturing Processes
and Materials Director

+34 686 450 643

patxi.estensoro@tecnalia.com

tecnalia.com

