COMPOSITE STRUCTURES & MANUFACTURING PROCESSES

We search **for innovative, fast, efficient, automated, robust and competitive manufacturing and assembly processes** facing the component whole life cycle: design, simulation, manufacturing (including semi industrial upscale), optimization, characterization, and recycling.

STRATEGIC RESEARCH LINES

Composite solutions for weight reduction:

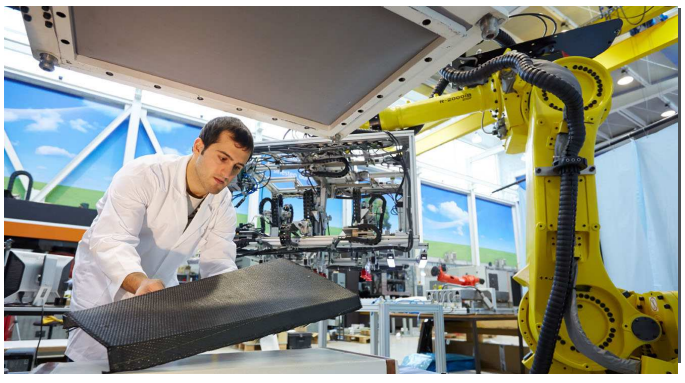
- Design of structures and components made of composite materials.
- Structural, Thermal and Dynamic analysis and Topologic Optimisation.
- Adhesive and Hybrid Joints design and analysis.

Fast Manufacturing Processes:

- Automated Cutting, 2D stacks preparation, 3D preforming & forming
- Fast heating.
- Textile technology and advanced preforming.
- Thermoset composites:
  - RTM.
  - Fast Curing prepregs.
  - SMC.
- Thermoplastic composites:
  - RTM (In situ polymerisation).
  - Automated tape laying.
  - Forming of tailored organosheets.

Composites 4.0/ Monitoring and simulation:

- Process modeling and monitoring: curing, injection, forming.
- Process simulation and materials characterization for simulation inputs.
- RTM digital twin.



Functions integration and joining technologies:

- Hybrid processing (compression + injection).
- Laser transmission, resistive and US welding.
- Mechanical & Adhesive joining.

Composite Materials Additive Manufacturing.

- Continuous long fibre.
- Integration of electrical function.

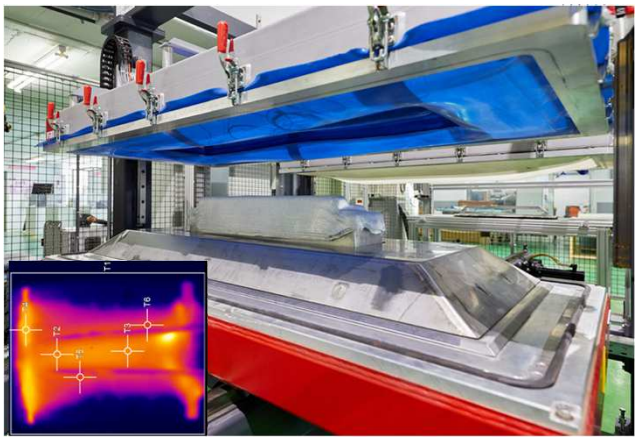
Waste Materials Recycling and Valorisation.

OUR CONTRIBUTION

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

COMPOSITE STRUCTURES & MANUFACTURING PROCESSES

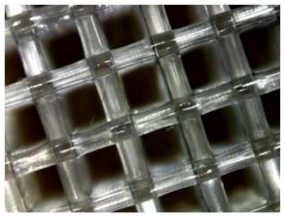
Pick & place automated cell.



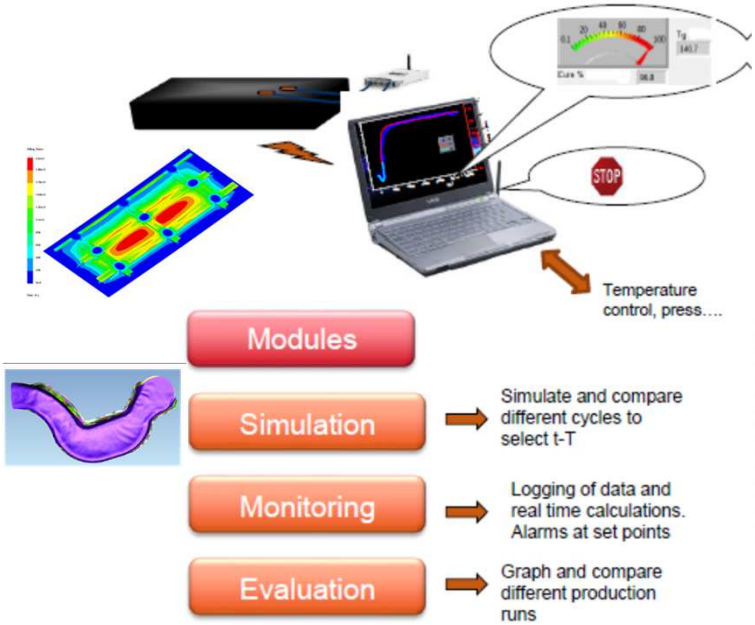
Hot forming equipment with fast heating solutions.

High speed tape laying cell.

Automotive application developed with T-RTM technology.



Composite Materials Additive Manufacturing.



Process monitoring and simulation - Sw developed by Tecnalia.

CONTACT:
Begoña Canflanca
Begona.canflanca@tecnalia.com
Ricardo Mezzacasa
Ricardo.mezzacasa@tecnalia.com

WE CAN DO SO MUCH **TOGETHER**

Our work is not understood without yours; we want to work together so your company can compete better. Because together, we can develop technologies that transform the present.

The future is technological, let's share it!

TECNALIA
T 902 760 000*
T +34 946 430 850 (International calls)
www.tecnalia.com

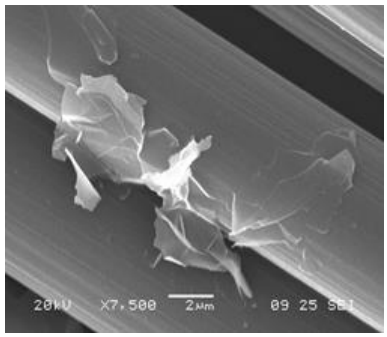
tecnalia Inspiring Business

MULTIFUNCIONAL MATERIALS AND STRUCTURES

We **develop multifunctional** polymeric systems and structures by combining different engineering disciplines and competences in materials, composites manufacturing, surface and joining technologies. **Materials that incorporate new properties and offer better performance**. Intelligent and/or multifunctional composites and/or plastic parts. Facing the component whole life cycle: design, simulation, manufacturing (including semi industrial upscale), optimization, characterization, and recycling.

Functional printing.

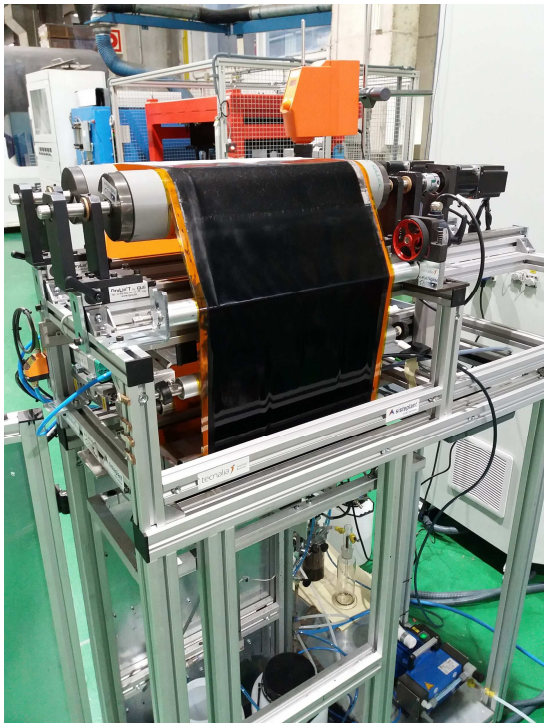
Electrospining.



Multifunctionality: Graphene deposited on a fiber.

Flexible printed antena.

Selfpowered external panel with storage capabilities.



Pilot plant for continuous manufacturing of CNT Buckypapers.

OUR VALUE CONTRIBUTION

- **Integral and customised solutions** to improve thermal conductivity, electrical conductivity, EMC behaviour of polymers and composites, fire protection,SHM, abrasion/erosion resistance, anticorrosion, energy storage, electronic circuits
- **Functional adhesives** development: Thermal Interface Materials, Self-repairing adhesives.
- **Functional coatings**
- Micro/nano **texturing**
- **Functional Printing**: from the idea to the functional prototype.
- Composite manufacturing processes knowledge, Prototype manufacturing and testing.
- Development of **interface & assembly solutions** (structural, thermal, electrical, EMI/EMC, radiation).
- **Pilot lines** for continuous production of CNT sheets and functional thermoplastic veils

MULTIFUNCIONAL MATERIALS AND STRUCTURES

STRATEGIC RESEARCH LINES

1 Encapsulation:

- **Additives**. High performance: Synthesis of Smart micro/nanocapsules adding value to coatings, adhesives, plastics, composites, foams….
- **Smart/funtional polymers**: ecofriendly (water based) multifunctional coatings.

2 Semi-elaborated products-Buckypapers:

Manufacture of **continuous nano-enabled products** in sheet form:

- for applications in composites, thermoplastics, membranas.
- Development of semi-elaborated products incorporating CNT sheets - filtration membranes, energy cell membranes, structural health sensors, Integrated heater elements.

3 Semi-elaborated products-Thermoplastic veils:

Veils:

- Fracture toughness, lightness, functionaity (photocatalitic, antibacterial, aesthetic,
- Direct electrospining on glass/carbon fiber.

Filters (water-air):

- Water contaminant adsortion. High specific Surface.
- Low pressure drop. High filtration efficiency.
- Controlled porosity and pore size.
- Functionality: antibacterial.

4 Joining technologies:

Adhesives

- Multifunctional adhesives.
- Active agents encapsulation: de-bonding, self-repairing.
- Adhesive joints design.
- Adhesive and sealants characterization.
- Training: European adhesive bonding DIN 6701.

Joining

- Laser transmission, resistive and US welding.
- Mechanical joining .
- Joints design and characterization.

5 Functional printing:

On a wide range of Materials/Substrate: ceramic, metallic, plastic, paper, textile, **2D1/2** surfaces and **complex 3D parts**

- Ink Formulation/re-formulation
- Printing process optimization.
- Protoypes fabrication. Examples:
  - ❖ Race bibs with geolocalization, antennae and health parameters
  - ❖ Heating elements by screen-printing for radiant big areas: tunnel interiors
  - ❖ Structural health monitoring of steel sheets by screen-printed piezoresistive coatings
  - ❖ Miniaturized alphanumeric codes for high temperature traceability: ceramic ink on metallic substrates by ink-jet printing
  - ❖ Printing by Microdispensing on 3D plastic surface for car interiors
  - ❖ Harness substitution by highly conductive inks on fabrics embedded in composites

6 Micro/Nano texturing:

- Added functionalities on a wide range of polymeric and metallic substrates: Superhydrophobicity/superhydrophilicity; Icephobic; Anti-condensation; Easy-to-clean; Adhesion control; Aesthetic properties.
- **Micro-nanoprinting**: Based on NIL processes, development and adaptation of the texture to injection moulding or to thermoforming to obtain large areas.
- **Inserts** and solutions for moulds on different materials: rigid (metallic substrate and glass) and flexible(silicones, acetates, polyimides, etc..)
- Injection moulding and thermoforming with nanostructured inserts.

Electronic Housing for UAV.

CONTACT:
Sonia Florez
Sonia.florez@tecnalia.com

WE CAN DO SO MUCH **TOGETHER**

Our work is not understood without yours; we want to work together so your company can compete better. Because together, we can develop technologies that transform the present.

The future is technological, let's share it!

TECNALIA
T 902 760 000*
T +34 946 430 850 (International calls)
www.tecnalia.com

tecnalia Inspiring Business