CONSTRUCTION MATERIALS AND PRODUCTS

CREATING THE MATERIAL TO BRING IDEAS TO LIFE
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WE TRANSFORM TECHNOLOGY INTO VALUE, WEALTH AND FUTURE

IN TECNALIA WE BELIEVE IN ADVANCED SOLUTIONS THAT IMPROVE MATERIALS PERFORMANCE, REDUCE THE USE OF NATURAL RESOURCES AND INTRODUCE NEW FUNCTIONALITIES ENABLING THE DEVELOPMENT OF NEW HIGH ADDED-VALUE APPLICATIONS.

Did you know that...?

→ By 2050, the European construction sector could reduce its carbon footprint by 80% thanks to the application of new carbon capture and storage technologies. Source: CEMBUREAU

→ The Building sector is being transformed by industrialisation of larger, more durable façade elements which are also faster to install and above all, provide higher energy efficiency, waterproofing properties, sound insulation or fire resistance. Source: ANDECE

→ New concrete roads are not only safe and sustainable, but also require less maintenance and reduce fuel consumption. Moreover, they allow new functionalities to be introduced such as electricity transmission for de-icing, photoluminescence, high draining capacity or photocatalytic capacity to curb pollution in urban environments. Source: ANDECE

→ According to the United Nations Environment Programme, increasing energy efficiency combined with ambitious climate policies may deliver annual economic benefits in excess of 2 trillion USD globally through 2050, and addressing the shortage of resources would improve the competitiveness of businesses. Source: THINK 2030. SCIENTIFIC POLICY SOLUTIONS FOR A MORE SUSTAINABLE EUROPE

→ 20% of all plastic produced is used in the construction sector. Source: EUROPEAN COMMISSION

→ European plastic producing and consuming companies have agreed to recycle 50% of plastics by 2025. Source: BRITISH PLASTICS FEDERATION

We develop products, concepts and processes supported by innovative technologies to obtain the most efficient and sustainable solutions.

These new solutions guarantee more information, higher traceability, purity and efficiency in the recovery or material resources under the circular economy umbrella throughout the construction value chain.

CIRCULARITY, SUSTAINABILITY, NEW FUNCTIONS, ADVANCED MANUFACTURING PROCESSES FOR CONSTRUCTION PRODUCTS
We develop knowledge and transform it into highly competitive products.

**OUR ACTIVITY FOCUSES ON DEVELOPING AND GENERATING VALUE IN:**

- **Eco-cements and multifunctional building materials**
  - Eco-cement and eco-concrete.
  - Nano-additions, nanostructured additives and aerogels.
  - Multi-functional materials for construction including super-insulating aerogel-based mortars, concrete with embedded sensors of different types and for different purposes, electrically conductive concrete, embedded capacitive sensors for concrete, etc.
  - Predictive analysis using data analysis from cement-based product manufacturing formulations and processes.

- **Circular economy resources for construction**
  - Digital tools, advanced sensors and blockchain to identify, trace and monitor the quality of materials throughout the construction value chain.
  - Advanced technologies for purifying and processing construction and industrial waste.

- **Additive manufacturing in construction**
  - Topology optimisation.
  - Sensor-based and smart printing systems and processes.
  - Specific 3D printing materials.

- **Applied polymers**
  - Fireproofing formulations and solutions for composites and plastics.
  - Formulations focusing on improved performance and new applications for plastics and composites.

- **Bio-based materials**
  - Improved biological resistance of construction materials.
  - Recovery of lignocellulosic wastes for resins, adhesives, bio-based flame retardants and bio-based additives.
  - Formulation of coatings and paints for improved performance and new applications.
  - Production, functionalisation and development of applications based on cellulose fibres, Nanofibrillated Cellulose (NFC) and Nanocrystalline Cellulose (NCC).

- **Active adaptive envelopes**
  - Energy-efficient architectural envelopes.
Manufacturing
(Construction Products and Systems)

Ecodesign

Pre-demolition audits based on BIM and smart demolition

Raw material extraction

Use and maintenance

Repairs, advanced remanufacturing, reuse and smart recycling applying Artificial Intelligence (Complex metabolisable waste streams in construction)

Waste (RCD, complex waste streams and industrial by-products)

Traceability through the value chain
Technology for cement and cement products with lower CO₂ emissions thanks to reduced consumption of natural resources and energy, with improved performance and new functionalities, such as energy storage, sensor technologies, electric conductivity or superinsulation.

**ECO-CEMENT AND ECO-CONCRETE**
- Synthesis of new low-carbon cements; use and improvement of new additives; as well as development of mortars and concrete based on recycled materials and industrial by-products.
- Predictive analysis based on production data and product formulations.

**NANO-ADDITIONS, NANOSTRUCTURED ADDITIVES AND AEROGELS**
- Improved rheological properties and performance of cement-based materials through the development of new nano-materials, additives and aerogels.
- Computational design and nanoscale modelling of cementitious materials.

**MULTIFUNCTIONAL CONSTRUCTION MATERIALS**
- Mortars, concrete or other cement-based materials featuring functionalities related to self-repairing, superinsulation, self-cleaning, electric conductivity, energy storage and sensor technologies.

**DIGITAL TOOLS TO QUANTIFY, TRACE AND ANALYSE THE QUALITY OF RECOVERED MATERIALS**
- Smart solutions helping to guarantee an effective closing of material resource cycles across the construction sector.

**ADVANCED TECHNOLOGIES FOR PURIFYING AND PROCESSING CONSTRUCTION AND INDUSTRIAL WASTE**
- Advanced processes for stabilising, separating, purifying or transforming construction and demolition waste, mining waste, industrial by-products or contaminated soils to be used as secondary raw material to produce and re-manufacture high added-value construction materials, using a combination of different technologies.

**CIRCULAR ECONOMY RESOURCES FOR CONSTRUCTION**
Smart solutions guaranteeing more information, traceability, purity and efficiency in material resources recovery under circular economy paradigms.
ADDITIVE MANUFACTURING IN CONSTRUCTION

Comprehensive solutions for automation of pre-manufacturing processes of concrete products and thermosetting polymer-based products using Additive Manufacturing technology.

TOPOLOGY OPTIMISATION

- Development of high-added-value construction products and equipment subject to topology optimisation for 3D printing and automation of construction processes.

SMART PRINTING STRATEGIES

- Development of smart printing strategies to implement associated processes, from design and processing to performance verification of the product during service.

SPECIFIC 3D PRINTING MATERIALS

- Development of construction materials specifically formulated for additive manufacturing (mortars, concrete and thermosetting polymers).

WE BRING MORE INNOVATIVE TECHNOLOGIES AND PRODUCTS TO THE CONSTRUCTION INDUSTRY
APPLIED POLYMERS

Sustainable functional polymers and composites which promote the circular economy approach and improve the properties and characteristics of systems.

FIRE-RETARDANT SOLUTIONS FOR COMPOSITES AND PLASTICS
→ Improved fire reaction and fire resistance in (virgin and recycled) engineering plastics and composite materials.

IMPROVED PERFORMANCE AND NEW APPLICATIONS FOR PLASTICS AND COMPOSITES
→ Design of plastic and composite materials from virgin, recycled or bio-based materials to achieve improved performance and advanced functionalities, as well as durability against ageing and resistance.
→ Design of formulations for 3D printing of thermoplastic and thermosetting materials.

BIO-BASED MATERIALS

We design materials that offer the best performance and provide advanced functionalities to the construction sector.

IMPROVED BIOLOGICAL RESISTANCE OF MATERIALS
→ Natural solutions with low content of biocides which improve the durability of materials against biological degradation.
→ Modification of cellulose fibres to inhibit the microbial growth.

RECOVERY OF LIGNOCELLULOSIC WASTE
→ Resins based on lignins, tannins and cellulosics as alternatives to polyols, phenolic resins, flame retardants.
→ Improved sustainability to comply with the most demanding regulations.

COATINGS AND PAINTS WITH NEW PERFORMANCE
→ Advanced functionalities including hydrophobicity, antimicrobial, fire-proof and intumescent properties.
→ Antistatic, easy-to-clean, thermal or durable coatings.

CELLULOSE FIBRES, NANOFIBRES AND NANOCRYSTALS
→ Manufacturing and functionalisation of cellulose nanofibres and nanocrystals to design new products with high content of bio-products.

Technologies aimed at recovering forest waste to manufacture new products (resins, adhesives, bio-additives). Optimisation of biological resistance, improved reaction to fire and formulation of more sustainable coatings. Manufacturing and functionalisation of cellulose fibres (nanocellulose) to develop new high value-added applications.
ACTIVE
ADAPTIVE
ENVELOPES

Architectural envelopes with high hygrothermal, acoustic and mechanical properties thanks to an approach which maximises industrialisation, pre-manufacturing and integration.

ENERGY-EFFICIENT
ARCHITECTURAL ENVELOPES

→ High performance, smart, adaptive, passive envelopes (façades, roofs) integrating renewable energies and new materials, applying and designing lightweight industrial solutions and/or NBS, as well as adaptive technologies.

We create innovative solutions for smart and efficient recovery of materials through the construction value chain.
Due to our ability to identify and develop **business opportunities through applied research.**

We have a multi-disciplinary team of talented, specialist, focused people that combine and bring knowledge together on the technologies of the sectors in which we operate in a unique manner.

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**WHY TECNALIA?**

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**SPECIALISTS IN MATERIALS AND PRODUCTS FOR THE CONSTRUCTION SECTOR**

Experts in design, development and performance of construction materials and products:

- Multifunctional low-carbon-footprint materials
- Advanced technologies for circularity of material resources in construction products
- Fire resistance optimisation
- Advanced properties: waterproofing, durability, superinsulation, self-cleaning, etc.
- Value recovery of lignocellulosic materials and nanocellulose functionalisation
- Formulation with biocides and synergistic products
- Smart adaptive envelopes
TECNALIA IS A BENCHMARK RESEARCH AND TECHNOLOGICAL DEVELOPMENT CENTRE IN EUROPE

MISSION
We transform technology into GDP

We turn technology into wealth to obtain beneficial visible results for companies, society, our environment and in short, for people.
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!