



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

[wood]

RESEARCH, DEVELOPMENT & INNOVATION AT THE UNIVERSITAT POLITÈCNICA DE CATALUNYA - BARCELONATECH (UPC)

The Universitat Politècnica de Catalunya - BarcelonaTech (UPC) specialises in the fields of engineering, architecture, science, and technology, including technologies applied to the wood sector. In this field, the main focus areas are:

- Forest management
- Felling and forest utilisation
- Transport and logistics
- Primary processing
- Secondary processing
- Commercialisation and distribution
- Recycling and valorisation

As a result of the UPC's recognised research track record in its areas of specialisation, we can offer a wide range of services:

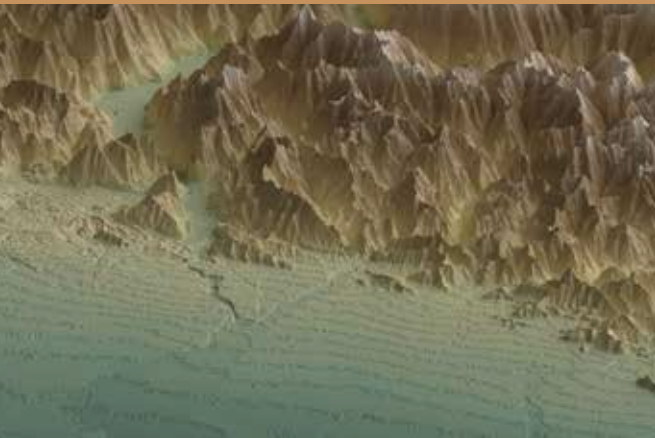
- R&D technology transfer projects
- Consortia for national and Horizon Europe projects
- Patents
- Technology assessment
- Specialised facilities

The UPC is a leading university in Spain in the volume of research and technology transfer to companies, and has become one of the major hubs of knowledge in Southern Europe.

[FOREST MANAGEMENT]

TERRITORIAL OBSERVATION AND ENVIRONMENTAL DIAGNOSIS

- Forest monitoring using satellite, radar and remote sensing
- Quantification of biomass and forest structure
- Detection of water stress, drought and soil degradation
- Identification of ecological points of no return



VULNERABILITY AND SELF-PROTECTION IN WILDLAND-URBAN INTERFACES

- Assessment of building vulnerability to fire
- Neighbourhood self-protection protocols
- Risk management in wildland-urban interfaces and inhabited areas
- Assessment of the vulnerability of tourist establishments near forests
- Evacuation modelling in wildland-urban interface environments

PREVENTIVE FOREST MANAGEMENT AND CLIMATE RESILIENCE

- Fire-prevention strategies in forest ecosystems
- Extensive livestock farming to reduce undergrowth and fire risk
- Preventive management of the forest landscape
- Climate resilience in forest ecosystems

TERRITORIAL ANALYTICS AND DECISION SUPPORT

- Integration of geospatial and environmental data for decision-making
- Decision-support systems for natural and technological risks
- Mapping of vulnerable elements

MODELLING OF FIRES, POLLUTANTS AND EMERGENCIES

- Prediction of fires and emergencies using artificial intelligence
- Simulation of the spread of fire and atmospheric pollutants
- Modelling using computational fluid dynamics (CFD)
- Real-time emergency planning

[FELLING AND FOREST UTILISATION]

UTILISATION AND INITIAL PROCESSING AT SOURCE

- Intelligent and portable sawmills for advanced timber cutting

[TRANSPORT AND LOGISTICS]

REAL-TIME OPTIMISATION OF LOGISTICS ROUTES

- Computational models for complex
- Adaptive route optimisation

[PRIMARY PROCESSING]

AUTOMATION OF INDUSTRIAL EQUIPMENT

- Development of industrial equipment and automation for the initial processing of timber



[SECONDARY PROCESSING]

STRUCTURAL SOLUTIONS AND REFURBISHMENT

- Structural timber solutions for building construction
- Refurbishment of occupied floor slabs using prestressed and adaptable timber systems
- Sustainable construction with wood- or cork-based materials

MODULAR CONSTRUCTION AND BIOCLIMATIC REFURBISHMENT

- Self-supporting plug-in timber structures that can be attached to existing buildings
- Cistern, photovoltaic and vegetation kits to expand space and improve bioclimatic efficiency

[SECONDARY PROCESSING]

HIGH-PERFORMANCE FAÇADES AND ENVELOPES

- Façade solutions with timber and biomaterials
- Impregnation of wood, bamboo and straw with natural retardants for façades with high fire resistance
- Façade solutions with urban acoustic absorption
- Modular timber façade system for intelligent climate regulation

URBAN REGENERATION AND GREEN INFRASTRUCTURE

- Design and connection of urban green and blue infrastructure corridors
- Maximisation of biodiversity and local climate adaptation
- Urban regeneration with bio-based materials
- Regenerative architecture linked to decarbonisation and bioclimatic improvement

INTELLIGENT SELECTION OF SUSTAINABLE MATERIALS

- Machine-learning algorithms for selecting circular materials
- Simulation with virtual reality and life-cycle assessment at the design stage

MONITORING, DURABILITY AND CONSERVATION OF MATERIALS

- Submicroscopic analysis of the physicochemical degradation of heritage
- Use of FE-SEM and Synchrotron techniques in wood, ceramic and mural-painting heritage
- Recovery of traditional restoration techniques

[COMMERCIALISATION AND DISTRIBUTION]

PRODUCT DIGITALISATION, SPECIFICATION AND TRANSFER

- Structuring of data and ontologies to facilitate the integration of construction solutions in digital environments
- Architectural modelling and graphic design integrated into BIM
- BIM plug-in tools for the digital assessment of life cycle, energy efficiency, stored carbon and environmental footprint
- Digital twins in construction
- Training and adoption of timber-construction technologies



[RECYCLING AND VALORISATION]

CIRCULARITY IN BUILDING CONSTRUCTION AND MATERIAL BANKS

- Robotic platforms and artificial intelligence to scan buildings undergoing demolition
- Quantification and cataloguing of recoverable components
- Creation of automatic BIM models to recover components as material banks

[RECYCLING AND VALORISATION]

CELLULOSIC MATERIALS AND BIODEGRADABLE DEVICES

- Printing of microcircuits on cellulose hydrogels
- Enzymatic manipulation with cellulases in cellulosic materials
- Transformation of cellulosic materials into advanced and eco-friendly bioproducts

VALORISATION OF WASTE, BY-PRODUCTS AND ADVANCED BIOMATERIALS

- Biopolymers derived from forest waste for the manufacture of sustainable bituminous mixtures
- Replacement of cement and lime in roads with residual ash from paper mills
- Circular valorisation of cork waste for wastewater treatment and energy generation
- Synthesis of smart thermoplastic elastomers from cellulose nanocrystals
- Formulation of bio-based flame retardants
- Cooling materials based on natural rubber as an alternative to hydrofluorocarbons (HFCs)
- Natural and waste rubber compounds for sustainable cooling based on elastocaloric and barocaloric effects, with high fatigue resistance, compressibility and performance
- Sustainable natural rubber compounds with cellulose nanocrystals to improve fatigue and wear resistance, replacing carbon black
- Advanced valorisation of tyre waste through the development of high-performance recycled rubber blends and thermoplastic elastomers with improved impact resistance, fatigue resistance and elastocaloric properties

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