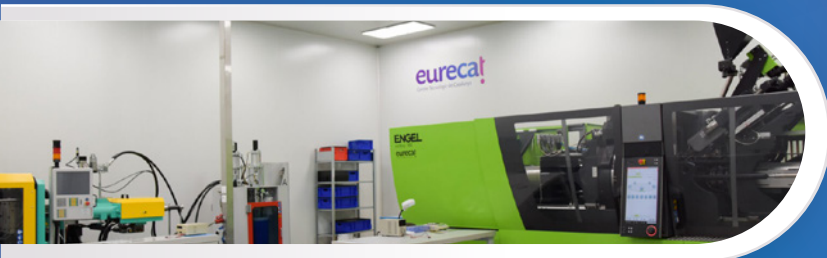
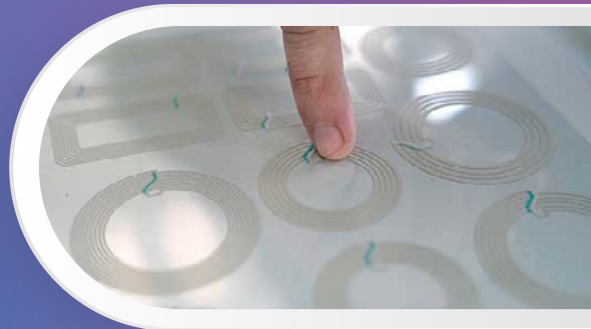


eurecat!



**Eurecat, innovating together
with companies and delivering
advanced technologies.
From idea to production.**

Applied R&D projects, specialized assessment, laboratories, functional materials and smart management systems for a more efficient, productive, and competitive industry.

www.eurecat.org | [@eurecat_news](https://twitter.com/eurecat_news)





Innovating with companies

Eurecat is the leading Technology Centre in Catalonia and the second largest private research organization in Southern Europe.

Eurecat has a turnover of €49,2M and a workforce of 650 professionals, it is involved in more than 200 R&D projects and has a customer portfolio of over 1,700 companies.

Eurecat R&D, innovation and consultancy and training activities range from Industrial Technologies (metallic, plastic and composite materials, manufacturing processes, autonomous and collaborative robotics, functional printing and fabrics, chemical, simulations and sustainability) to Digital Technologies (AI, Data Science, IT&OT, digital health, multimedia technologies), Biotech (omic science and nutrition & health) and Environmental Impact and Sustainability (Water, Air & Soil and Waste, Energy & Environmental Impact).

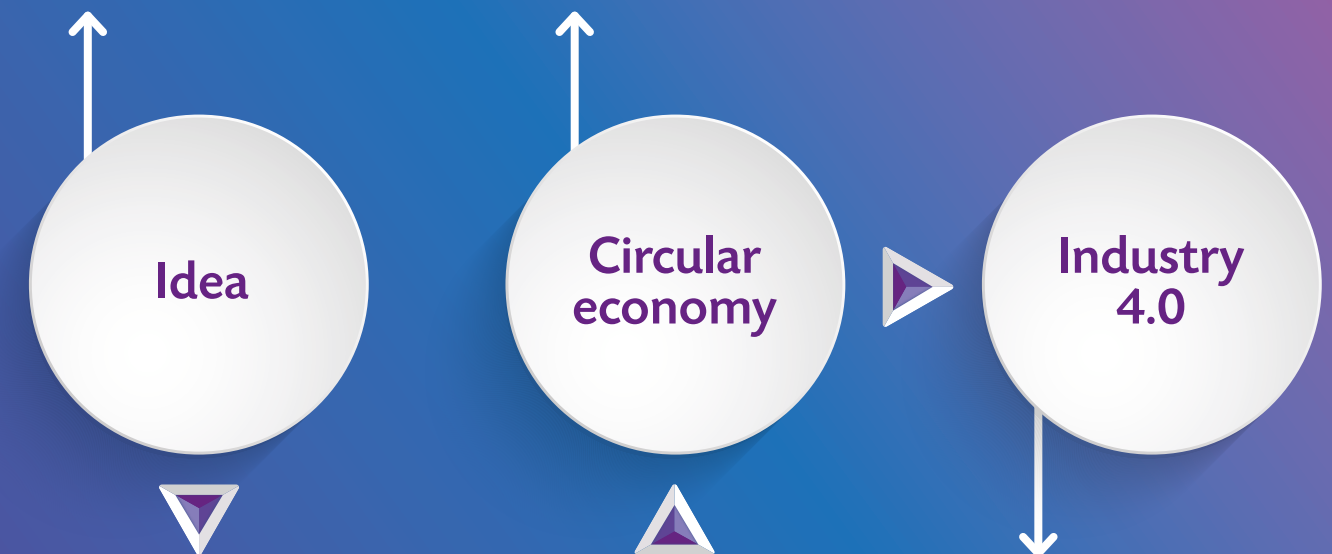
Additionally, Eurecat is recognized by the European Commission as a KETs (Key Enabling Technologies) Technology Centre so it can partner with SMEs on close-to-market research and innovation activities.

We develop and implement wearables, robotics, sensorics, functional materials, innovative machines, data analytics and Applied Artificial Intelligence.

From idea to production

We design and develop the technology for new products by offering outstanding value propositions with a multidisciplinary vision that incorporates all of Eurecat's technology.

Tailor-made environmental experimentation (laboratory scale and pilot plant), Sustainable production: industrial symbiosis, instrumentation and process measurement.



We study and select materials according to the part requirements (resins, reinforcement, plastics, Al alloys, high strength steels, stainless steels ...).

We develop customized material solutions and implement non-conventional test development for specific properties analysis under specific conditions.

We carry out process and tool simulation to improve the design and prototyping and additive manufacturing process: ISF, FDM, SLS, SLA

We take companies to the new Industry 4.0 paradigm.

The combination of advanced manufacturing technologies and sensorics, data and analytics technologies has resulted in new terms that are already applied in different industrial sectors and represent the trends that will change the future of companies.

Plastic materials

Eurecat creates and develops new plastic transformation processes

- 1 We are innovation experts in plastic transformation processes, including state of the art techniques, such as ultrasonic processing & LSR injection moulding.
- 2 We master plastic moulding processes (injection moulding, thermoforming, extrusion, extrusion-blow moulding) thanks to the optimized in-house capabilities and improved equipment.
- 3 We foster collaborative innovation with companies all along the process: from idea generation to production tests and scale-up

Plastic processing pilot plant

In Barcelona, Eurecat has the largest pilot plant for new plastic transformation technologies in Southern Europe.

Plastic injection, along with other polymer moulding processes, continues to be the most important industrial process for the replication of parts; thanks to the freedom of shapes it provides and the low associated costs for large production volumes. Eurecat is a renowned specialist of these processes at both national and international levels.

We provide the industry with our experience and technical & R&D know-how, for the industrialization, testing and manufacture of pre-series.



Research lines & developments

New processes for Thermoplastic and LSR

- Processing Pilot Plant: Complete range of Plastic Injection Machines. From microinjection to 1500 Tn clamping force including LSR
- 50 Tn LSR Injection moulding inside ISO 8 clean room environment
- Support to innovation in plastic, from concept to manufacturing. 30 years of experience

Technology development for the functionalization of surfaces via nanotexturization in polymeric parts:

- Translation of nanotextured surfaces on Si-stamps to polymeric inlays via Nanoimprint lithography processes.
- Thermoforming and over-injection molding of nanotextured polymeric inlays to create functional surfaces on plastic parts.

Technology development for industrial integration of "Printing electronics" in plastic products

- Integrating printed electronics with plastic optics
- Use of IML and FIM to include electronics in plastic products
- Thermoforming of printed electronics
- In-house electronic printing & over-injection molding clean room (ISO 8) facilities

Lightweight

- Development of lighter structural parts through hybridization with continuous fibre reinforcements in thermoplastic materials

Success cases



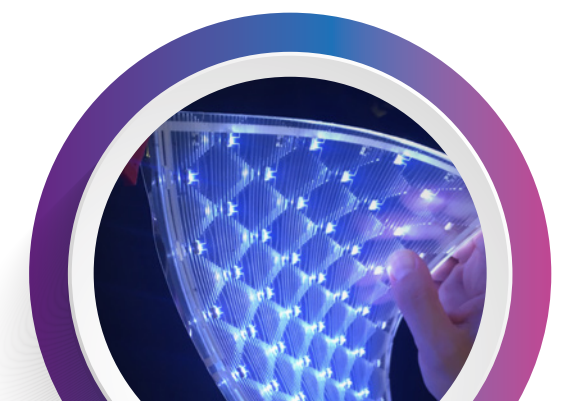
Predictive System to Recommend Injection Mould Setup with Process Optimization in Wireless Sensor Networks. This project incorporates 4 innovations into Industry 4.0:

- A data acquisition device installed inside the mould that receives information on the parameters that best determine the quality of the injection process.
- Codification techniques designed to enable wireless, safe, and stable data transmission in real-time in industrial environments.
- A data analytics service developed by Eurecat to monitor and optimize plastic transformation processes.
- An indoor geolocation service based on wireless sensors and advanced signal processing techniques, developed by Eurecat.



Advertisement displays manufactured by hybrid in-mould integration.

OptIntegral Project will develop and demonstrate advanced TOLAE LED displays for advertising and marketing purposes, manufactured by in-mould hybrid integration. The OptIntegral manufacturing process is a flexible and automated process enabling a diversity of LED display products competitive with EU-labour cost.



Metal and ceramic materials

We investigate the relationship between microstructure and properties, as well as the optimisation of industrial processes.

Mechanical Behaviour

- Advanced mechanical characterization of parameters relevant for cold and hot sheet metal forming.
- Formability studies.
- Cold cutting and stamping pilot plant.
- Hot stamping pilot plant.

Fatigue and fracture of materials

- Fatigue and fracture behaviour of mechanical alloys, ceramics and elastomers.
- Development of specific tests to reproduce the behaviour in service (impact, fatigue, fatigue-corrosion, etc.).
- Characterisation of components subjected to mechanical forces in laboratory and/or in service (instrumentation).

Corrosion and deterioration

- Corrosion and environmental effect on mechanical properties. Biocorrosion.
- Hydrogen embrittlement, stress corrosion and corrosion fatigue in structural components.
- In-situ identification of corrosion and superficial degradation mechanisms.
- Corrosion mechanisms study through potentiometric techniques.

Surface Technology

- Development and application of advanced functional coatings for different industrial sectors:
 - » PVD, CVD and Ion Implantation technologies
 - » Plasma-based surface treatments.
- Surface functionalization of materials, devices and components: Wear and corrosion resistance increase, low friction, anti-fouling properties, biomedical, aesthetic and decorative aspects, etc.
 - » Hard, wear resistant and low friction coatings for the metal-mechanical sector
 - » Corrosion resistant coatings
 - » Alternatives to hexavalent chrome coatings
 - » Bactericidal and viricidal coatings
 - » Biomedical coatings for prosthesis, implants and surgical tools
 - » Decorative and functional coatings for automotive industry

- » Coatings addressed to renewable energies: thermosolar, fuel cells, etc.
- » Transparent and functional coatings for optical and electronic devices
- Technological support in the selection and industrial implementation of coatings and surface treatments.

Light alloy forming

- Selection of alloys and thermal treatments for light alloy transformation processes: casting, stamping, forging, extrusion, etc.
- Degasification and cleaning of liquid metal in HPDC. Ultrasound treatments. Development of tailored high performance aluminium alloys with low carbon footprint.
- Sensorisation of processing tools and development of mechanisms adapted to process variations.

Tribology

- Assessment on wear, friction and lubrication to improve tribological behaviour of industrial tools and in service components.
- Wear mechanisms in forming tools: identification and characterisation of alternatives with improved performance.
- Laboratory tests design to reproduce wear mechanisms.
- Advanced surface characterisation.
- Contact fatigue and micromechanical tests.

Non Destructive Tests

- Inspection by penetrating liquids.
- Preparation and analysis of surface replicas.
- Coating thickness measurement.
- Acoustic emission.
- Thermography
- Computed tomography.

Manufacture of metallic powder by Centrifugal Atomization

- Production of high value-added customized metal powder, with spherical morphology and requested granulometry, for powder metallurgical processes, spray coatings, metal additive manufacturing
- Characterization of metal powders: particle size analysis, compacted density, bulk density, powder fluidity, composition, morphology, etc.



Success cases

Eurecat has patented a new faster and more robust process to characterize the fracture toughness of thin metal sheets.

The method supposes more than 50% of time reduction in the evaluation of the essential work of fracture.

The innovation developed by Eurecat and patented under the title **Device for preparing sheet specimens**, is the result of more than 10 years of applied research on a field where Eurecat is internationally recognized, such as sheet metal forming and the fatigue and fracture behaviour of high-performance materials. Such expertise has allowed to predict at lab scale the edge cracking and the crash resistance, through the measurement of the essential work of fracture. This new methodology developed by Eurecat can be easily implemented in customer's facilities, since it only requires the use of a universal testing machine. Its application is mainly focused on the automotive sector, providing knowledge to raw materials developers (steel, aluminium alloys, etc.), part makers and carmakers to optimize part performance.



Novel material characterisation and data driven analytics to predict and avoid edge-cracking in safety related automotive parts.

CuttingEdge4.0 project develops experimental tools and digital twins for the cutting process and incorporate Industry 4.0 data driven analytics based on Artificial Intelligence and machine learning solutions. The final aim is to transfer to the automotive industry tools and methodologies to predict edge-cracking in the early part design stages, detect edge-cracking defects and assure part quality during forming, boosting the applicability of AHSS-based automotive lightweight parts.

The solutions proposed by CuttingEdge4.0 will increase safety in automotive industry through the development of high performance parts and will influence positively in the employability and sustainability of the automotive industry and steel sector.

www.cuttingedge-project.eu



New textile materials and developments

- We accompany the company in the design and development of new textile structures, functional fabrics and new materials with unique properties.
- We identify new materials and evaluate their potential to generate new applications in line with the company's objectives.
- We design the final product and validate its properties until reaching the standard required by the company, with a focus on the end user.
- We examine the production parameters to ensure improvements in productivity and the viability of industrialization.



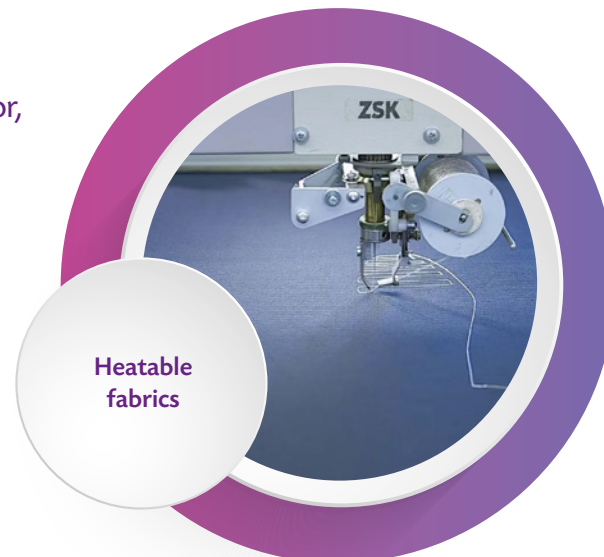
Multifunctional embroidery

Conceptualization and design

- Design and conceptualization of functional fabrics, adapted to target consumers.
- Search for new fibres.
- Identification of new composites based on natural or synthetic raw materials.
- Hybridization. Combination of fibres.

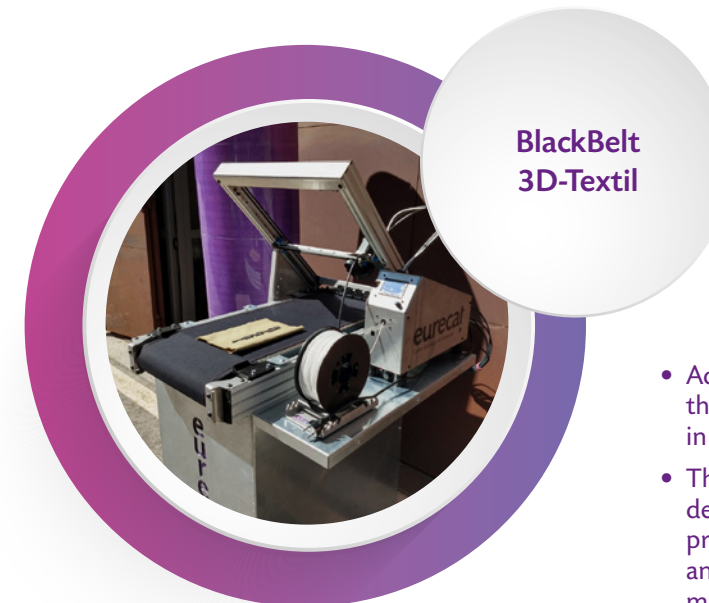
In collaboration with companies in the textile sector, we create new products with functionalities that contribute to consumer satisfaction.

- Ergonomic products with a comprehensive approach.
- Fabrics to monitor biosignals.
- Heatable fabrics.
- Fabrics with shape memory.
- IoT STRUCTURES.
- 3D Fabrics
- Technology and production feasibility studies.
- Proof of concept.



Heatable fabrics

We offer advanced solutions for the automation and optimization of tasks in the textile sector.



BlackBelt 3D-Textil

- Additive manufacturing system on fabric that allows the integration of 3D printing technology in the textile world.
- The BlackBelt-Textile, adapted with a fabric suction system developed by Eurecat (patent pending), allows continuous printing on fabric. In this way, three-dimensional prints and reliefs are obtained on fabric rolls for subsequent manufacturing.
- Distributor in Spain of the BlackBelt machine from BlackBelt company 3D B.V. Uniqo Custom Engineering.

We have state-of-the-art laboratories and infrastructures.

Eurecat collaborates with the Centre for Research and Transfer of Textile Technology of Canet to carry out quality control tests, among others, in accordance with current standards.



Chemical

Specialists in chemical technologies

Our specialized chemical technologies unit at Eurecat helps boost the competitiveness and sustainability of industrial companies.

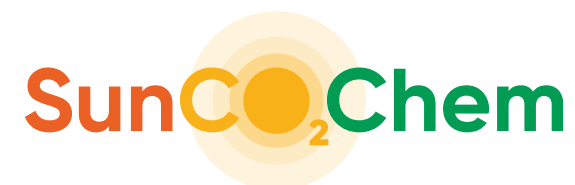
We carry out applied research projects and innovative technology transfer in catalysis and synthesis to make processes more sustainable, such as in the production of liquid fuels, CO₂ transformation, valorisation and characterization of by-products, as well as the production of value-added products.

We develop advanced materials, membranes, technologies for product encapsulation, nanotechnology, characterization of polymers and coatings.

We work on large projects to monitor and reduce environmental impact, to monitor air and water quality controls, as well as industrial effluent and industrial biotechnology treatments. We study the toxicity and environmental impact of emerging pollutants.



Success cases



Development of a photoelectrocatalytic tandem reactor (TPER) to manufacture chemical products from renewable energies based on CO₂, water and sunlight, integrating the capture and conversion of CO₂ in a single dispositive.

The SunCoChem project, led by Eurecat, aims to provide the chemical industry with an **alternative to produce oxo-chemicals without using raw materials derived from carbon or oil.**

Based on the single-unit CO₂ **capture and conversion architecture** to design a self-sufficient device, SunCoChem's innovation manages to reduce costs, reduce CO₂ emissions and improve the efficiency of converting energy from sunlight to chemicals. In addition, the project-driven solution will have a significant impact in reducing the dependence of the European Chemical Industry (ECI) on carbon raw materials.



Composite Materials & Technologies

We innovate & improve the ratio
weight – performances – cost through our 5 pillars:



Advanced Composite Manufacturing

Specialists on thermoplastic and thermoset composites design and manufacturing for lightweight components with advanced manufacturing technologies and simulation tools applying the circular economy and sustainability.

- FEM analysis & characterization tests.
- Tailor-made structural textiles and preforms.
- Tooling design and manufacturing.
- Composite parts manufacturing test.
- Composite parts validation.

Thermoplastic compounds

Experts in thermoplastics compounds development with high added value through extrusion-compounding.

- Development of thermoplastic compounds and masterbatch by extrusion-compounding.
- US technology for additives and nanoadditives dispersion.

Our Equipments

- Composites pilot plant: RTM, pultrusion, autoclave, infusion, press forming, thermoforming table.
- Compounding pilot plant: Extrusion-compounding, monofilament extrusion, injection.
- Characterization lab: Mechanical, thermal and rheological tests & NDI.monofilament extrusion, injection.
- Characterization lab: Mechanical, thermal and rheological tests & NDI.



Success cases



In-mould monitoring for out- autoclave manufacturing processes for composite aerostructures.

Full-scale composite frames fuselage manufacturing by RTM (resin transfer moulding) technology.

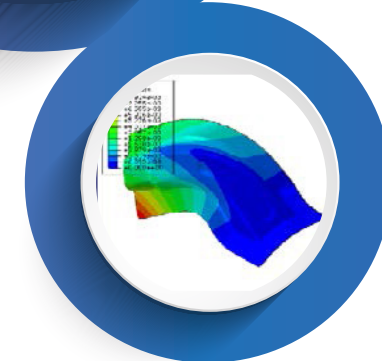
In order to optimize the RTM process, in addition to applying finite element analysis (FEA) for mould design and process analysis, different sensors have been introduced to control and monitor the mould temperatures and resin viscosity throughout the curing time.

Thanks to in-mould monitoring, it has been possible to achieve an optimal impregnation throughout the CF preform as well as the curing control to achieve the best properties of the composite in addition to optimize the cycle time and energy savings.

Project: Cofrare 2020 (CleanSky2)

Topic Manager: Leonardo

Partners: DEMA y ABETE



Advanced manufacturing systems

3D printing

- Development of new machinery for additive manufacturing and 3D-Forming metal sheet
- Optimization of 3D Printing processes according to application
- Printing with advanced materials (Silicon, additive filaments, additive resins, materials with Fibres)
- Custom made polymeric materials development

Eurecat 3D New Technologies:

1. Fibre-Reinforced Additive Manufacturing

New technology for manufacturing continuous fibre reinforced parts using 3D printing.

Success case

Carbon fibre reinforced brake pedal CFIP is a patented technology by Eurecat which enables to manufacture continuous fibre reinforced structures by 3D printing. A multi-material and multi-process approach has been applied in the pedal, defining the most suitable material and process in each zone of the structure according to the mechanical requirements but also taking into account costs and production targets. The continuous carbon fibres are aligned to the most efficient direction following complex trajectories, improving the mechanical and lightweighting performance. In addition, the Smart combination of translucent and metallic parts leaving in plain sight the inner fibres brings a unique aesthetic design.

2. Silicone Multi Material 3D printing technology

Eurecat has developed a 3D printing machine with two printing heads, one dedicated to print with silicone and the other one dedicated to any filament thermoplastic. This technology is capable to print highly complex silicone parts using soluble support or print functional silicone parts with electrical conductive, magnetic or other types of special filaments.

3. UDM

Ultrasonic Deposition Modelling for the direct production of plastic parts (EP2456570).

4. LM-RM

Solid Metallic Structure Formation by Localized Microwaves (EP2689635).

5. SLM

System consisted on a vertical milling centre equipped with a Ytterbium-fibre laser

We are leaders in Catalonia in additive and advanced manufacturing, with more than 30 years serving the industry.

Ultrasounds

- Ultrasonic moulding (USM) for the microinjection of plastic pieces
- Ad hoc design and simulation of sonotrodes
- Application of ultrasound to industrial processes
- USM

UltraSonic Moulding (USM) technology is a new high precision moulding process, developed by Eurecat. Is powered by ultrasonic energy, specifically designed for the production of mini and micro plastic parts. The main advantages are: increasing of polymer fluidity, lower injection pressure, very low material wastes and huge energy savings.

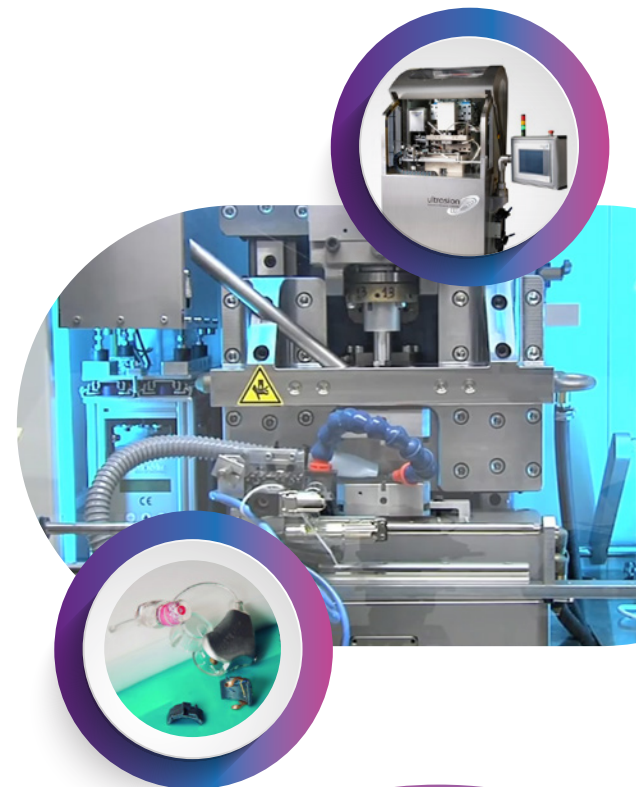
Ultrason is a spin-off company that commercialize the USM injection machine: Sonorus.

Photonics

- Development of light sources
- Optical sensors
- Development of microfluidic devices with photonic interrogation
- Optical solutions in an industrial environment
- Characterisation of materials through spectroscopy techniques

Incremental sheet forming

Eurecat has developed an Incremental Sheet Forming (ISF) and Dieless process, which allows the metal sheet forming by the generation of small strains, layer by layer, in 3D programmed paths. This is a very flexible technology, suited for small-medium production series that need a high degree of flexibility towards design changes.



Functional Surfaces

We offer R&D&I services and technological assessment for the development, selection and characterization of coatings and surface treatments as well as for their industrial implementation.

We have our own laboratories for the development, testing and characterization of coatings. We help companies find solutions for hard, wear, corrosion resistant, low-friction, biomedical, bactericidal, viricidal, and decorative coatings, among others.

Our services:

- Plasma-based surface treatments and coatings technologies (PVD, CVD and Ion Implantation)
- Surface analysis
- Superficial deterioration and corrosion: identification and solutions
- Non-destructive inspection techniques
- Damage and friction reduction

Micro & nanotexturization

Development of micro and nanotextures in plastic and metallic parts

Coatings

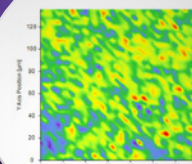
Development, characterization and industrial implementation of coatings with advanced surface functionalities

Treatments

Vacuum plasma-based surface treatments

In mold electronics

Development of new user interfaces.
Development of new integrated sensors



New advances with metallic materials

Support in cold/hot forming processes, and characterization of structural parts (mechanical characterization, wear behavior, corrosion, etc.)

Analysis of damage mechanisms and solutions to extend the life of forming tools (HPDC molds, stamping tools, extrusion dies, etc.)

Functional coatings for decorative components

We develop sustainable metallic coatings on metal and plastic parts by means of Physical Vapor Deposition (PVD) technology for replacing traditional electroplating processes.

More flexible. Apart from different aesthetic finishes, specific surface functionalities can be incorporated: wear resistance, antitarnishing, bactericidal activity, hydrophobicity, etc.



Success case

Creation of a European industrial innovation platform.

The platform aims to increase the productivity of sheet metal forming industries through the development of new experimental methodologies and modelling approaches to predict and optimize the performance of materials and parts and reduce marketing time for new developments in the field.

These new methodologies will increase the use of high strength metal sheets in the manufacture of pieces with a high added value, thus reducing production costs by up to 20% and the time it takes to introduce these products on the market by 25%.

www.formplanet.eu

**FORM
PLANET**



European
Commission

Horizon 2020
European Union funding
for Research & Innovation

Functional printing & Embedded devices in products

Functional printing and embedded electronics will enable industries such as automotive, white goods, packaging, textile or health, to create functional surfaces and smart objects by printing thin-layer devices, integrated sensors and electronic hybridization. It is expected that product surfaces will host increasingly more communication and user interface functions, as well as sensorization and interaction with the environment as a whole, so printed electronics is an important technology to take into account.

Functional printing

- Tailored functional inks to suit the printing technique or substrate required in each case.
- Surface treatments to modify the physical and chemical characteristics of substrates.
- Printed flexible thin-film devices adaptable to almost any type of surface for their form factor.
- Flexible electronic circuits.
- Embedding and printing radio frequency identification (RFID) and near field communication (NFC) antennas.
- Identifying and evaluating opportunities for enhancing existing products by introducing printed or flexible electronics.

In-Mould Electronics (IME)

- Designing functional parts with embedded electronic devices.
- Printing electronic circuits and hybridisation of discrete components.
- Thermoforming plastic parts with functional printing and decorative inks.
- Overmoulding plastic parts with functional inks and decorative inks.
- Overmoulding printed electronics with rigid plastic and flexible elastomers.

Printed sensors and actuators

- Printing sensors on flexible and rigid substrates with functional inks.
- Printing non-invasive biomarkers through printed and flexible electronics.
- Electrochemical and potentiometric sensors. Printed biosensors.
- Ion-selective electrodes (ISE), lateral-flow sensors and microfluidics.
- Printing printed devices, strain gauges, heated devices, piezoelectric devices, etc.
- Flexible electronic circuits through a wide range of printing techniques.
- Developing PoC (Point of Care) diagnostic devices.
- Tailored electronics and signal capture and analysis.

Smart Electronic Devices

- Innovation, design and development of new applications including embedding electronics in all kinds of smart devices.
- Tailored hardware and firmware.
- Wearables development from scratch.
- Wireless communication.
- Artificial intelligence in embedded systems.
- Signal analysis and processing.
- Development of tailored apps.



Success cases



A European acceleration program that aims to helping innovative companies and startups in the adoption and integration of **flexible and wearable electronics (FWE)** testing into their services and products, as well as experimentation and manufacturing support.

The **SmartEEs2** project, which is positioning as a follow-up initiative to SmartEEs DIH, is a **Digital Innovation Hub** formed by **14 technological centres from 9 European countries**, such as the **CEA** (France), **Eurecat** (Spain), the **Fraunhofer** (Germany), the **TNO** (The Netherlands) or the **VTT** (Finland), among others.

Within the framework of the project, the **“Open Call for Application Experiments”** will be organised with the objective of providing support to Innovative Companies to digitalise their businesses and access new markets by the integration of Flexible and Wearable Electronics technologies (FWE). The Open Call, which will be open from 2020 to 2021, will be addressed to companies, SMEs and startups from different fields as the automotive, logistics, energy or packaging, among others.

Open Calls deadlines:

- 31st August 2021

To help companies in the development of new projects, the project has a **Marketplace** with different typologies of innovative technological solutions in the field of printed electronics, organic photovoltaic, flexible displays and electroluminescent lighting for applications in multiple sectors.

SmartEEs2 is aligned with the **Smart Anything Everywhere (SAE)** initiative, that promotes the innovation of products and services through digital technologies.





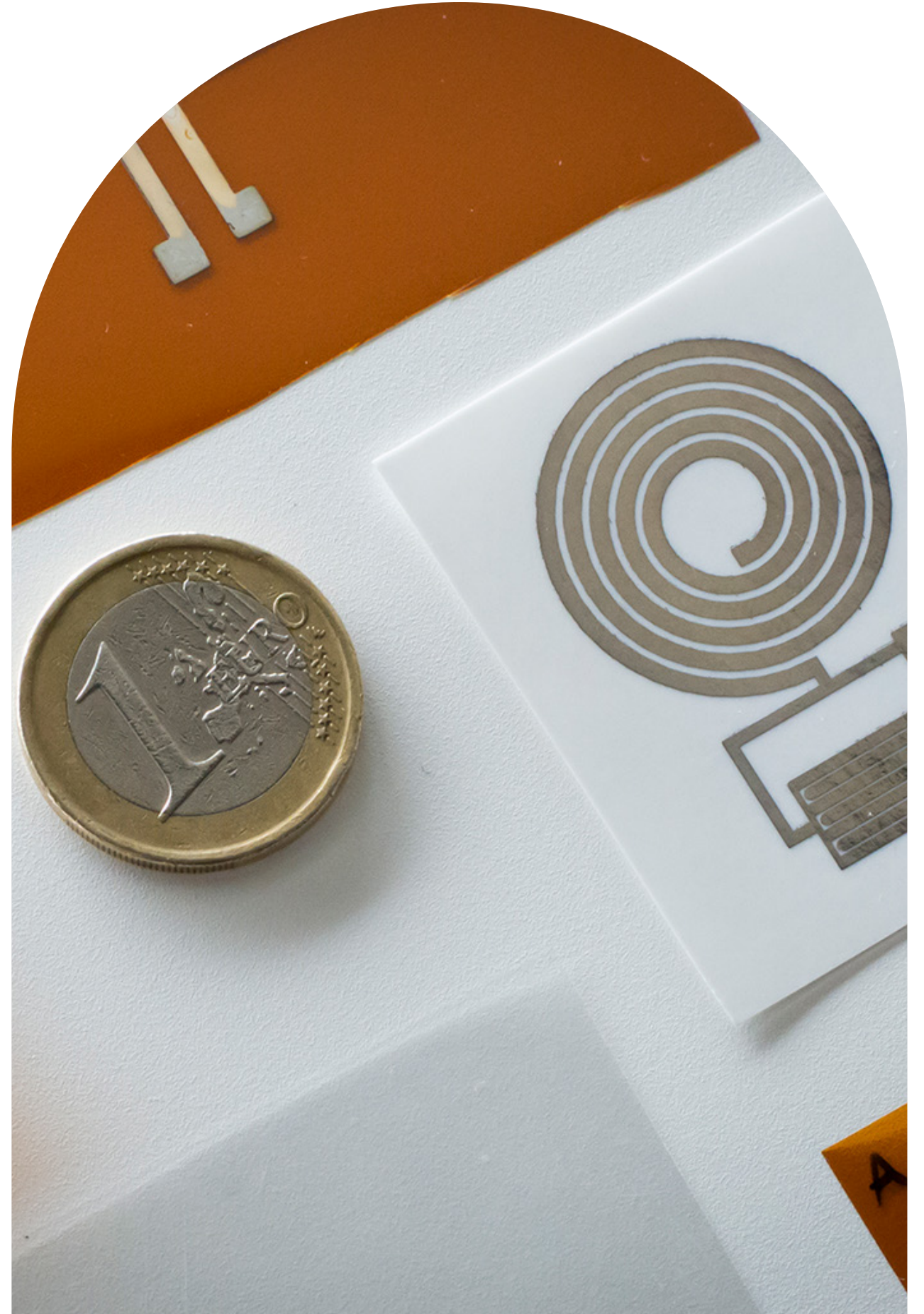
Success cases



SmartLabels

SmartLabels is an inter-cluster and trans-autonomous initiative that tries to develop smart labels using contactless technology, to offer other functionalities in packaging such as product traceability or counterfeit control systems.

A consortium made up of two national clusters, the Packaging Cluster and the Clúster Alimentario de Galicia; the Eurecat technology center; and 3 SMEs: IPE Industria Gráfica; Cooperativa Vitivinícola Arousana SCG (Paco&Lola) and Bodega Matarromera.



The first Plastronics pilot plant in Europe

Eurecat: adding intelligence and functions to plastic components. From product concept to industrial production.

Eurecat's Plastronics pilot plant is the first of its kind in Europe.

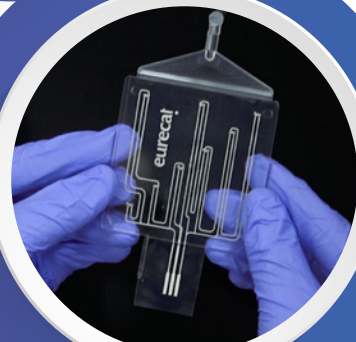
It is a pioneering platform that has been made available to companies for the purposes of creating and/or improving products, services and processes: from the initial idea to industrial production.

Located in Cerdanyola del Vallès (Barcelona), the plant boasts a series of truly unique facilities.

It consists of two cleanrooms that enable an orderly combination of different manufacturing processes. One is dedicated to printing and electronics, while the other is dedicated to processes involving plastics.

Plastronics, also known as In-Mold electronics (IME), is an emerging technology that combines electronics and plastics to create products that have high added value, advanced functions or features and are manufactured on a large scale.

By combining the functional printing of electronics and the hybridisation of electronic components with traditional transformation processes, such as injection, it is possible to create lightweight devices with new functionalities and embed them in geometrically complex products.



Eurecat offers a complete cycle of plastronics' manufacturing processes



Printing



Hybridisation



Thermoforming



Injection Molding

Printing

Additive deposition of inks with electronic properties onto plastic substrates, with the aim of producing functional films containing thin layers of circuits and electronic devices.

Hybridisation

Placing electronic SMDs (surface-mount devices) components onto a functional film using pick and place equipment. A combination of printed electronics and SMD components is known as hybrid electronics.

Thermoforming

Controlled deformation using a mold of the printed sheets and hybridised rigid components to transform 2D films into 3D shapes.

Injection

3D films coating with plastic materials by pressure-injecting melted plastic into a closed mold and allowing it to solidify inside.

Plastronics' applications

Plastronics is a revolutionary technology for the automotive, aeronautics, packaging, consumer electronics, medical and sports industries.

- Manufacturing flexible screens and haptic controls that enable interactive responses or invisible buttons.
- Creating plastic products that contain embedded sensors (temperature, pressure, etc.).
- Creating buttons for vehicle interiors.
- Creating user interfaces for domestic appliances.
- Producing geometrically complex and 3D products.
- Producing lighter and smaller components and parts.
- Producing thinner and cheaper pieces.
- Creating products from conductive plastics.



Robotics

We develop Smart Robotics solutions enabling the innovation of our clients and partners in the use of intelligent and flexible industrial and mobile robots for different industrial challenges

Industrial robotics

15+ years of experience in simulations, advanced integrations and custom projects to bring **agility, efficiency and human-robot interaction to different manufacturing and quality inspection processes.**

Service robotics

Smart Autonomous Navigation and AI/ Cognition solutions to put mobile robots at the service of workers in various sectors such as Logistics, Infrastructure Inspection, Agriculture, Construction and others.

Our research lines

Advanced Industrial Applications:

- Advanced robotics cells for machining, cutting, deburring, polishing, assembly, palletising, etc.
- Adaptive planning solutions such as Vision Guided Robotics and model-free Scan and Plan
- Hybridization of processes: combination of robotics with manufacturing processes such as 3D printing, incremental sheet forming (ISF), US / laser cutting, smart assembly, recycling, etc.

Industrial Perception:

- Quality inspection: digitalization, verification, defect detection, etc.
- Object detection and scene understanding
- Experience with deep learning over thermal and hyperspectral imaging

Autonomous Robots, both ground and aerial:

- Multi-sensor 3D localization and mapping (SLAM)
- Collision free autonomous navigation in unstructured dynamic environments (factories, warehouses, etc)
- Specialized planners for complex maneuvers
- Automation of industrial applications of AGVs, UGVs and drones

Cognitive Robotics:

- Robot learning for an intuitive programming: learning from demonstration, reinforcement learning, etc
- Bringing semantics into the robot: understanding the environment in semantic mapping and navigation
- Affective human-robot cooperation: how to develop naturally behaved robots



Success cases



The EU project Horse had the objective to leap forward in the manufacturing industry proposing a new flexible model of smart factory involving collaboration of humans, robots, Autonomous Guided Vehicles and machinery to realise industrial tasks in an efficient manner.

Eurecat developed a new smart integrated Robotics system based on dynamic manufacturing processes and addressed to SMEs familiar with the concept of Internet of Things (IoT), exploiting novel approaches such as (physical) human-robot interaction, intuitive human-machine interfaces, and interaction between different robots and machines into an integrated environment with pre-existing machines and workflows. The project contributes to improve safety of the human worker as well as reduction of health risks through physical support by the robotized equipment and contributes to better overall manufacturing processes.



Sharework provides the intelligence, methods and tools required for the effective adoption of human-robot collaboration (HRC) in manufacturing processes lacking automation.

The project is developing a robotic system capable of understanding the environment and predicting human behaviour thanks to artificial intelligence and process data. The technology will have the capacity to create a robot that can work in an environment that guarantees human safety.

www.sharework-project.eu





The EU project Cobolleague has developed an innovative highly modular, collaborative and autonomous ground robot with the objective to assist workers in heavy parcels transportation as well as last-mile delivery.

Eurecat developed a BIM-based interface that processes 3D building information, appending structural data to the pose-graph of a simultaneous localization and mapping (SLAM) system used by a mobile robot. This enables the robot to access a 3D map of the reference model and to determine its own pose in the environment, saving time and being able to perform autonomous navigation to a destination without previously exploring the area.

COBOLLEAGUE project is a joint collaboration of Eurecat together with Robotnik Automation.

The EU project ARSI developed an autonomous Micro Air Vehicle (MAV) that allows brigades to carry out sewer inspections in a faster, safer and more efficient way.

MAVs have many advantages: they are light and compact; easy to transport and deploy without extra equipment; and they can navigate quickly in sewer tunnels, regardless of obstructions or obstacles on the ground —the area most likely to be damaged by the flow of sewage water. Crucially, a MAV allows brigades to carry out inspections efficiently from the surface, safe from the hazards of the sewers. All the information collected onboard the MAV is then post-processed using the ARSI software suite to generate high-resolution 3D models of the sewer tunnels, in order to establish whether the inspected sections are operative and to automatically flag possible obstructions or structural defects. The intuitive user interface references all data and possible structural defects against maps or GIS information provided by the clients, allowing inspection professionals to efficiently review all the information and generate accurate reports of the state of the sewers.



Sustainability

Eurecat carries out R&D and innovation activities and technological development to promote businesses' competitiveness and sustainability.

Our experience

Recovery

- **Water:** treatment, reuse, recovery of compounds and energy.
- **Waste:** use, stabilisation and disposal.
- **Ground, groundwater and sediments:** treatment and recovery.

Chemistry

- **Chemical risk analysis:** human health and ecosystems.
- **Environmental chemistry and microbiology:** analysis and mobility of contaminants.

Energy

- **Energy:** energy efficiency, thermal and electrical systems, integration of renewable energies and microgrids.
- **Batteries and electric vehicles:** new energy storage and sustainable mobility systems.

Building

- **Sustainable construction:** energy rehabilitation and nZEB.
- **Sustainable production:** industrial symbiosis, instrumentation and process measurement.
- **Evaluation of environmental and economic benefits:** life cycle analysis, cost cycle analysis and water footprint.

Services

- **Tailor-made environmental experimentation:** laboratory scale and pilot plant.
- **Treatability** of waste, ground and water.
- Support for **energy rehabilitation** of buildings and insulation characterization.
- **Electrical characterization** of equipment and batteries.



Success cases

Design, manufacturing and validation of the next generation of battery packs for the automotive mass-market.

The MARBEL project develops an innovative and competitive lightweight battery with increased energy density and shorter recharging times with the objective to accelerate the mass market take-up of electric vehicles.

Eurecat coordinates and participates in the project through its Waste, Energy and Environmental Impact (WEEI) Unit, which is the technical coordinator of the project and supervises the battery pack requirements and guidelines in terms of safety, functionality 2nd life, circular economy, recycling and eco-design.



Transformational circular economy solutions and systems around resource use in the water sector. NextGen project challenges embedded thinking and practices by bringing financially sustainable innovations to life.

To achieve this, NextGen will deliver technological, business and governance solutions for water in ten high profile demonstration cases across Europe and three associate partners worldwide.



The SEA4VALUE project, coordinated by Eurecat, has the objective to develop a Multi-mineral Modular Brine Mining Process (MMBMP) for the recovery of valuable metals and minerals from brines produced in sea-water desalination plants (SWDP).

The innovation promoted by the project improves the economic feasibility of well-established concentration and crystallisation processes (capacitive deionisation, membrane crystallisation, bipolar electrodialysis, multi-effect distillation) while performing research on innovative materials to develop the next generation separation processes enabling the production of raw materials from seawater brines.



We work together with companies from the conceptualization of innovation to the pre-commercial scale.

We apply smooth methodologies to monitor projects. Targeted towards ROI, quick wins, PoC.

Predictive Analytics using Big Data

Machine Learning

Collaborative / Industrial Robotics

Cybersecurity

AR and VR Assisted Systems

DIAGNOSIS

Analysis of technologies and trends in the sector.
Interviews with company management.

STRATEGY

Definition of the digital vision of the company.
Setting strategic objectives.

BUILDING INITIATIVES

Building initiatives for each of the digital dimensions.

PLANNING

Prioritization, scheduling and analysis of initiatives.

PROOF OF CONCEPT

Technical validation of the project in a non-operational environment to analyze its impact

MARKET TEST

Realization of a pilot with pre-selected clients to validate the real acceptance of the concept

DEVELOPMENT

Design and development of the concept to implement it in an operational or real market environment

INDUSTRIAL SCALING

Marketing or implementation of the solution

SUPPORT IN THE MANAGEMENT OF CHANGE

Accompanying the company during the process through work sessions, workshops and team dynamics to promote technological transformation

Digital twins

Predictive Maintenance

Optimized Production Planning

Personalized Manufacturing and Zero Defects

System Integration

Artificial intelligence applied to industrial management

Integrated, adaptive multi-tool/machine monitoring, remote diagnostic and control features.

- IoT and Artificial Intelligence
- Web-based decision support systems
- Cyber security
- Collaborative, mobile and unmanned industrial robotic systems

Connected Industry

Eurecat innovates together with companies and aligns them with the new Industry 4.0 paradigm.

The combination of advanced manufacturing technologies and sensorics, data and analytics technologies has resulted in new terms that are already applied in different industrial sectors.

IoT Cyber security Industrial Lab

Cyber security is a critical factor in IoT, with billions of interconnected devices interacting, each with their corresponding communication channels.

Eurecat's IoT Cyber security Industrial Lab investigates how cyber security is implemented in IoT systems, focusing on embedded equipment and infrastructure. The Lab reveals vulnerabilities in the IoT systems and devises state-of-the art prevention and mitigation measures. The Lab is a sound technology partner in cyber security issues for IoT device manufacturers, IT companies, and critical infrastructures.

Intelligent resource management

Eurecat applies sensorization, IOT, cyber-physical systems, simulation and advanced data analytics for the development of platforms designed to control and manage resources (materials, energy, etc.) in the industry.

Highlighted initiatives

CIDAI, Centre of Innovation for Data tech and Artificial Intelligence. A key for the AI strategy in Catalonia

The CIDAI promotes the transfer of knowledge and the implementation of joint projects between knowledge-generating entities (universities, research and innovation centers), technology and service providers, and user companies and institutions demanding innovative solutions in applied artificial intelligence.

The CIDAI is modelled on the Digital Innovation Hubs set up by the European Commission and is structured as a networked service centre working for businesses and institutions.

It is coordinated by Eurecat.

www.cidai.eu

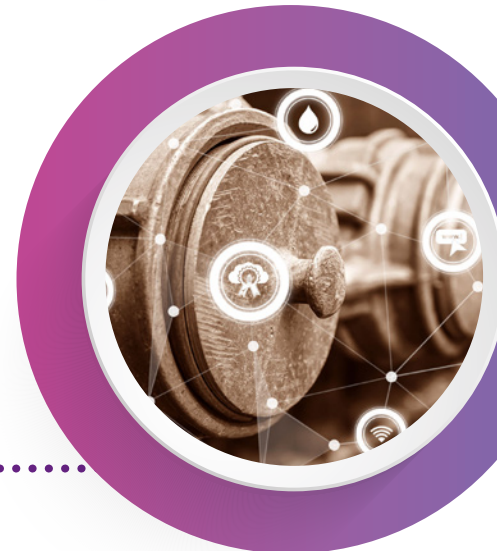
Improving the daily operation and management of water networks in the water-energy nexus

WatEner is a Eurecat spin-off based on a web platform that improves the (daily) operation and management of water networks through real-time performance monitoring and smart decision tools, integrating data, models, and expert knowledge.

www.watener.com

Bim4Safety

This project aims to develop a Control Center for the Prevention of Occupational Risks (PRL), computerized, of the building construction, which facilitates and manages the safety of the work, through a network of sensors related to a system for monitoring activities, of people, machines and preventive elements, distributed by the building construction and is able to interact with the BIM planning of the building. Eurecat is in charge of the architecture design and software development of the PRL tool.





Success cases

Sesame

Automation of the manufacturing process and operations of aerospace launchers to increase the number of units produced and reduce production time and cost.

Currently, the production of aerospace launchers implies a complex process and multiple manual validation processes in order to guarantee the integrity and proper functioning of the launcher which causes a low volume of units manufactured per year.

SESAME project develops Industry 4.0 solutions to digitalise the manufacturing of the new European launcher Ariane 6, with the aim to exploit the data of the process to ensure and guarantee the traceability and quality of the manufactured launchers. The Smart Management Systems Unit of Eurecat participates in the project researching on predictive quality methods through solutions based on artificial intelligence machine learning. SESAME is coordinated by Ariane Group and counts with a consortium formed by 7 European partners.



Innovative **neuroscience and Artificial Intelligence** technologies applied to the design of new food products.

The **CIEN CONOCE** project applies **disruptive technologies** in the field of neuroscience and Artificial Intelligence, with the aim of deepening the consumer's knowledge and perception of multisensory stimuli, **developing innovative food products adapted to their needs and preferences.**

The solution promoted by the project allows to better understand the consumer, their needs and their responses to a new product in different consumption contexts and, on the other hand, to analyse how these responses can be parameterised to include them systematically in a new comprehensive methodology of product conceptualisation and innovation within the company.

CIEN CONOCE counts with the participation of Eurecat through the Big Data & Data Science Unit, the Applied Artificial Intelligence Unit and the Audiovisual Technologies Unit. More specifically, the role of Eurecat is **based on the application to the design and production process of the latest innovations in neuroscience techniques that allow obtaining measurements of behavioural and physiological responses** (eye tracking, peripheral physiology, electroencephalogram, etc.).

On the other hand, Eurecat also has the objective to address **the improvement in the efficiency of food processing and investigates the use of technologies based on Artificial Intelligence**, to provide new tools that allow flexible production, so that the creation and adaptation of new products are more agile and less expensive, allowing you to respond quickly to market demand.

CIEN CONOCE consortium is led by Angulas Aguinaga and has the participation of Carinsa, Aldelís, Codorníu, Cerealto Siro Foods, Loop and Seidor.



Success cases

Precatex

Design and development of a **new generation of circular knitting machines with total and predictive quality control.**

The **PRECATEX** project implements an **innovative total and predictive quality control system with the objective to allow the productivity of quality textiles and minimises defective production.** This new system is achieved by using new techniques not currently implemented in the sector, such as new generation sensors and the integration of Predictive Quality Models.

Eurecat, which participates in the project through its Applied Artificial Intelligence Unit, the New Manufacturing Processes Unit and the Functional Textiles Unit, is responsible for the design and development activities of the sensorisation and quality control stages.

The consortium of the project also counts with the participation of **CANMARTEX**, a manufacturer of textile machinery with extensive knowledge of circular knitting systems and **Hallotex**, an end user of circular knitting machines for its high-volume textile production.



Development and application of **novel retrofitting technologies and equipment for efficient use of Variable feedstock in metal making processes.**

The **REVaMP** has the objective to cope with the increasing variability and to ensure an efficient use of the feedstock in terms of materials and energy. These new technologies developed will be exemplarily demonstrated within three different use cases selected due to the industrial relevance: **electric and oxygen steelmaking, aluminium refining and lead recycling.**

Eurecat, through the Metal and Ceramics Materials Unit and the Smart Management Systems Unit, is mainly involved in the research of the effect of impurities and metal treatment in aluminium alloys and the development of a tool to optimize the selection of recycled aluminium with variable composition and quality.

The consortium of REVAMP project, led by the **German Technology Centre BFI**, is composed by **16 members of 3 different European countries.**

An extensive range of Technology Solutions to face future Industry Challenges.

Operation optimization

- Control and optimization of processes.
- Cost reduction by detecting inefficiencies in processes/systems
- Flexible and productive environments
- Human-machine interaction technologies
- Autonomous mobile robotics



Success story

Industrial and collaborative mobile handler
Multinational from the automotive industry

Predictive maintenance

- Diagnosis of machinery breakdown and useful life prediction
- Route optimization
- Augmented reality

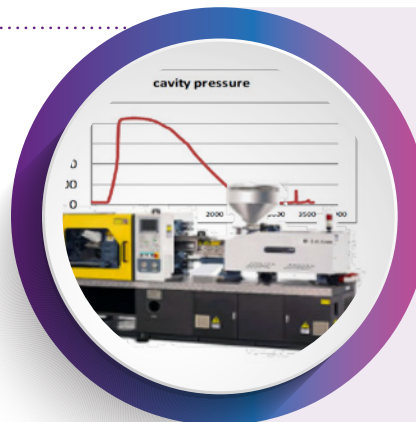


Success story

AR and VR to assist operators. Algorithms to calculate optimum routes and indoor positioning for guidance.
Manufacturer of metalworking transformation equipment

Near-zero-defects

- Artificial intelligence applied to defective parts
- Expert systems
- Self-adjustment of machine parameters to achieve total quality
- Artificial vision systems
- Acquisition of production data and data analytics for product traceability



Success story

Development of a Cyber Physical System to monitor, control and optimize the process.
Tier 1 plastic components

Worker of the future

- Work Force Management
- Health monitoring
- Operator positioning systems
- Staff training



Success story

AR and VR for learning. Simulation and assessment of incidents in industrial environments.
Content management and assessment test.
German multinational in the personal care industry

Smart resource management

Smart modules and data analysis for:

- Multi-objective optimization (water, electricity, cold, heat, etc.)
- Incorporation of external data
- Detection and reduction of inefficiencies
- Bad management detection

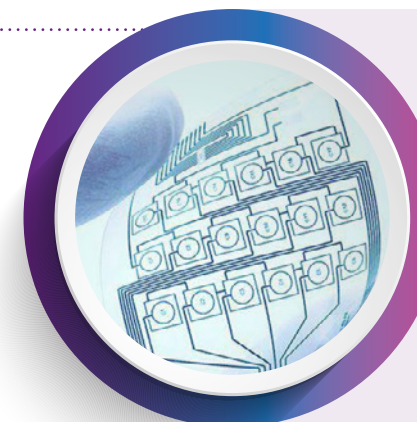


Success story

Smart energy management system based on the supervision, diagnosis and prognosis of consumption.
Multinational from the automotive industry

Smart products

- 'Always on' sensorized products
- Real-time data for decision-making
- Product traceability



Success story

Development of an encoder equipped with a USB communications port and a new SW embedded with a control panel to enable the component to be controlled and reconfigured in real time.
Encoder manufacturer

An extensive range of Technology Solutions to face future Industry Challenges.

Success cases



Smartcat and Eurecat have created a Guide to provide direction to companies on the transition to Industry 4.0

The Guide, "Maturity Model for the Adoption of Industry 4.0 in the Company", provides companies with guidance on the actions to be undertaken to enable the implementation of a 4.0 strategy in the organisation. It also presents the main innovative tools, processes and technologies.



smartCATALONIA



European
Commission

Horizon 2020
European Union funding
for Research & Innovation

Creation of technological tools for the analysis and prevention of risks in water supply infrastructures to counteract cyberattacks and natural risks.

Among the technologies used and/or developed by the project is the combination and integration of market technologies such as citizen alert systems and intelligent blockers. The project will also include more innovative technology, such as blockchain schemes to protect sensitive data and water contamination detection algorithms.

www.stop-it-project.eu



The IoECrops project is part of the COPTA RIS3CAT Community.

It is coordinated by Eurecat and boasts a total of 11 members.

Improves the productivity, efficiency and resilience of large-scale crop production by supporting agricultural management through the use of technologies based on the Internet of Things (IoT).

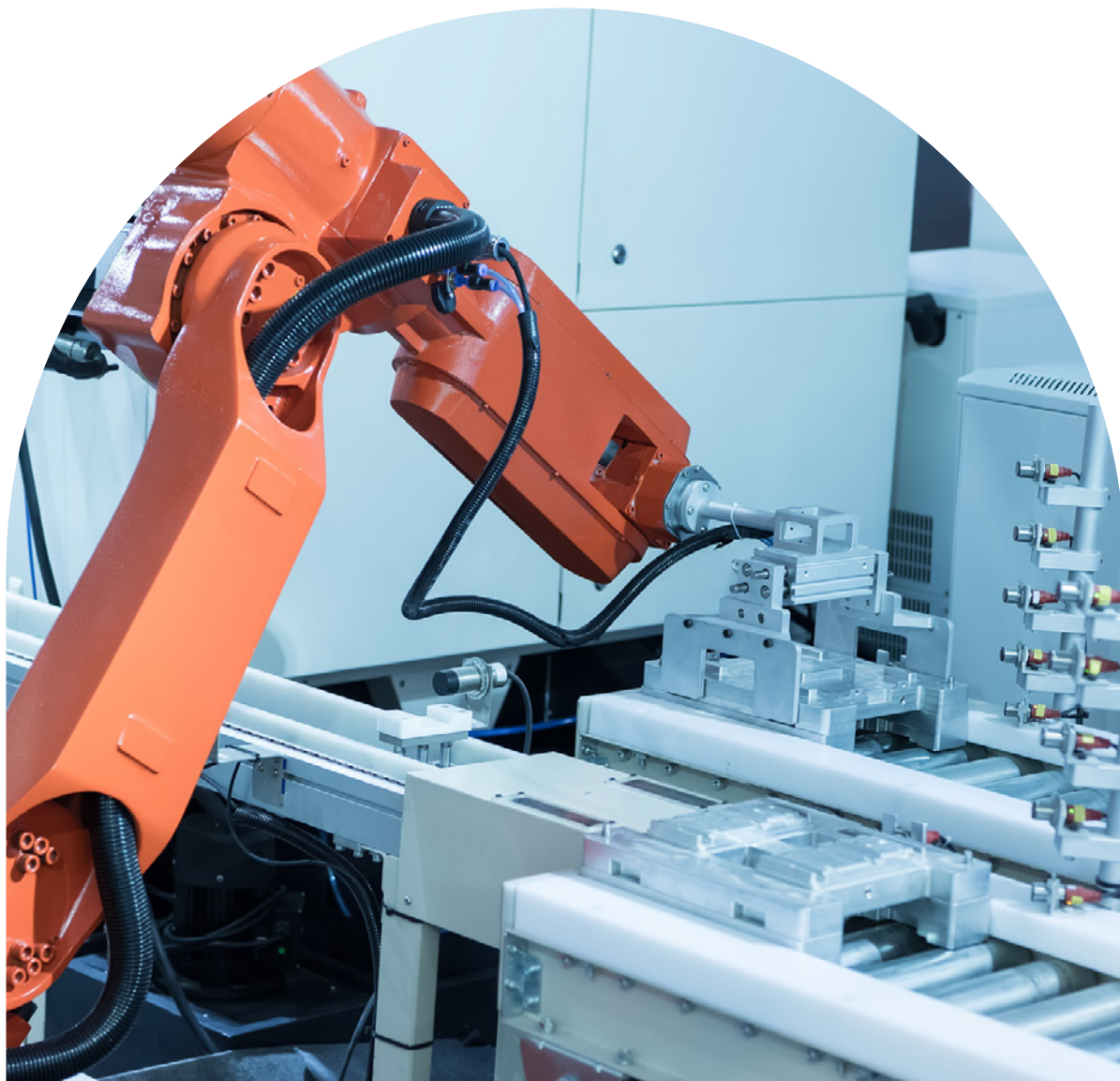
IoECrops is able to facilitate the decision-making process for the planning of major agricultural operations, such as preparing the land, sowing seeds, fertilizing and irrigating the crops, and harvesting. It is able to provide online support while the majority of these operations – including sowing seeds, harvesting, irrigation and fertilization – are in progress.



Success cases



ROADMAP 4.0 to guide and accelerate the digital transformation process based on the identification and prioritization of projects.



EMBOT-ITs

Artificial intelligence applied to industrial management

Eurecat worked together with Splendid Foods on the EMBOT-ITs project. Through the application of sensors, advanced data analytics and the creation of an intelligent decision support system, the company managed to reduce drying time of products, increase dryers' capacity up to 20% and consequently increase productivity while maintaining the quality of final product. EMBOT-ITs project joins company's initiatives for continuous improvement on its way to Industry 4.0 to foster its competitiveness.

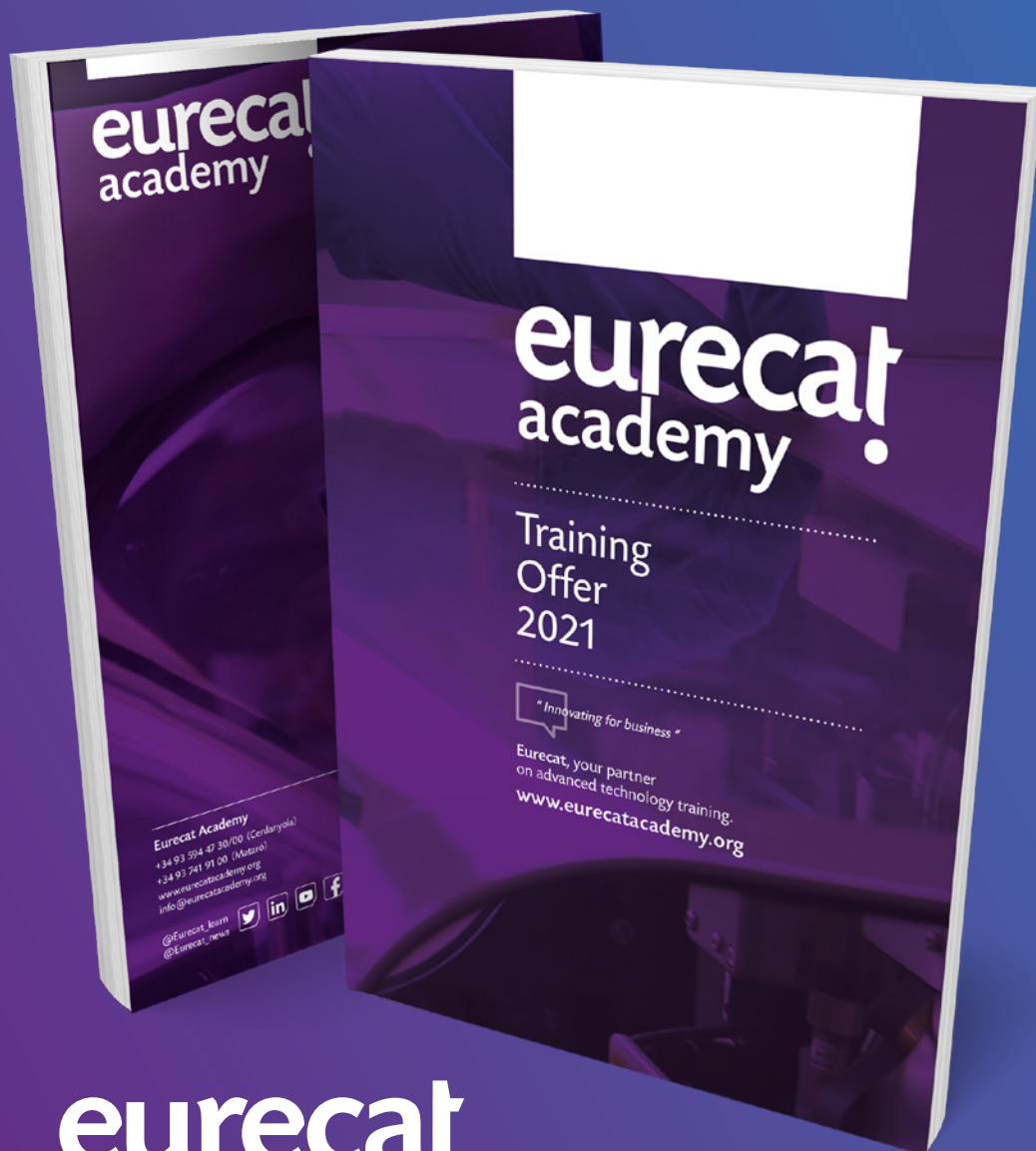
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