

# 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](http://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 €50M and a workforce of 650 professionals, it is involved in more than 200 R&D projects and has a customer portfolio of over 1,600 companies.

Eurecat R&D, innovation and training activities range from Industrial Technologies (metallic, plastic and composite materials, manufacturing processes, autonomous and professional robotics, functional printing and fabrics, chemical, simulations and sustainability) to Digital Technologies (Big Data analytics, IT security and smart management systems, e-health, data mining and multimedia technologies) and Biotech (omic science and nutrition & health).

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.



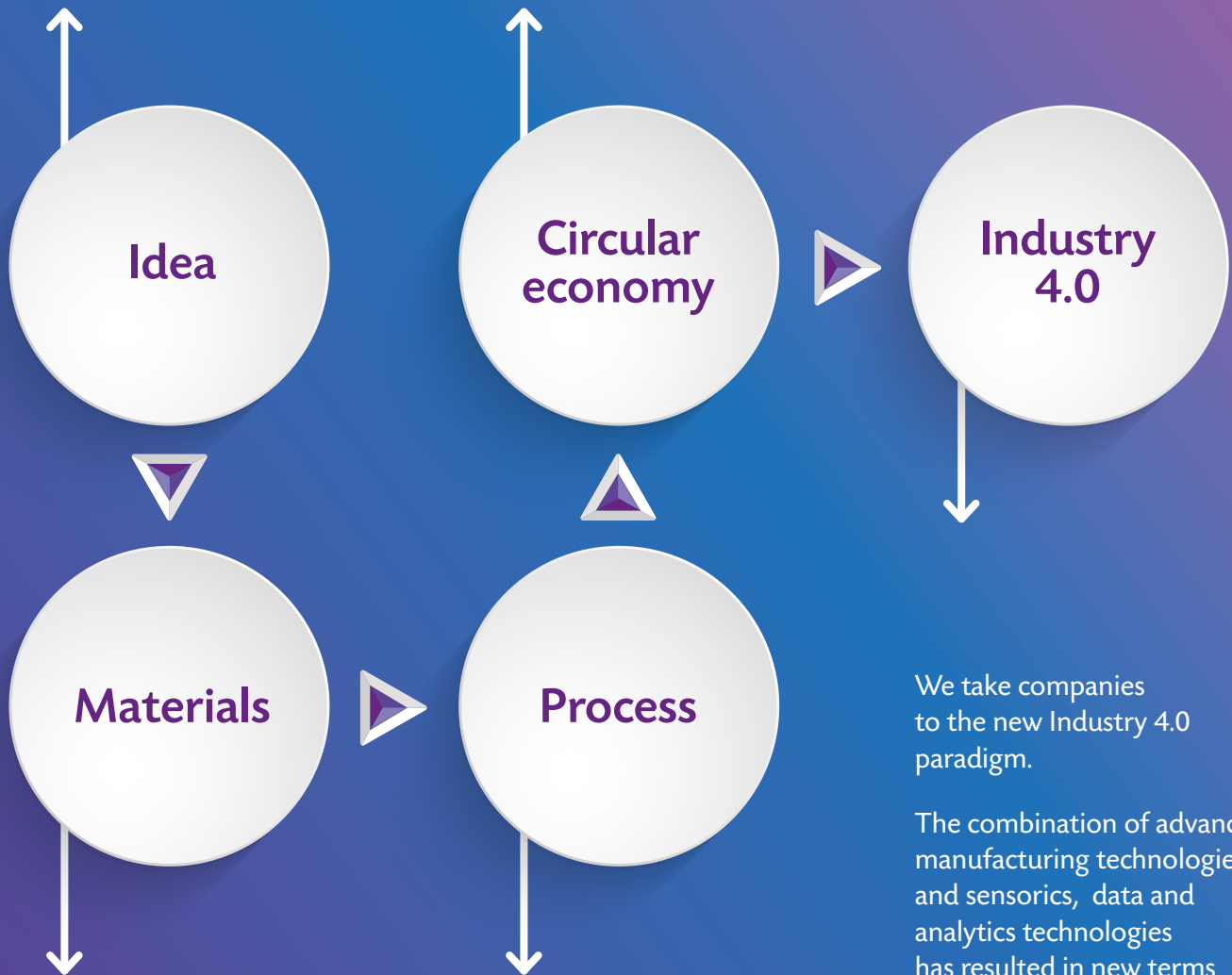
We develop and implement wearables, robotics, sensorics, functional materials, innovative machines, data analytics and smart management systems.

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



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

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.

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

## 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 vto 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



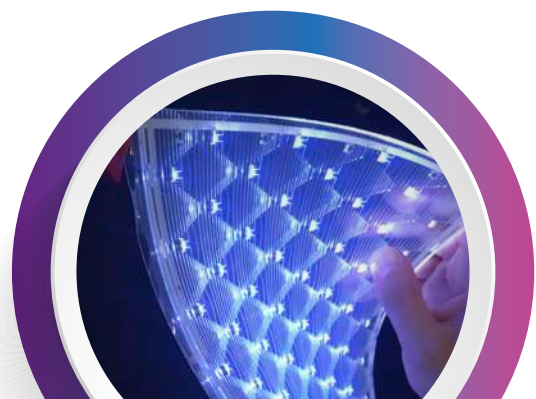
Predictive System to Recommend Injection Mould Setup with Process Optimization in Wireless Sensor Networks. This project incorporates 4 innovations into Industry 4.0:

- 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.
- Standard conformability 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 behavior in service (impact, fatigue, fatigue-corrosion, etc.).
- Characterisation of components subject to mechanical forces in the laboratory and 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 mechanism study through potentiometric techniques.

## Surface Technology

- Development of coatings by PVD and CVD on metals, plastics and ceramics.
- Hard and low-friction coatings for tribomechanical applications.
- Coatings to protect against corrosion and fouling.

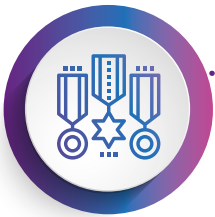
## Light alloy forming

- 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. Dispersion of ceramic particles and nanoparticles in metal.
- Sensorisation of processing tools and development of mechanisms adapted to process variations.

## Tribology

- Wear and friction. In-situ inspection of superficial damage to components.
- Wear mechanisms in forming tools: characterisation and assessment of alternatives with improved performance.
- Definition of laboratory tests to estimate wear resistance.
- Advanced surface characterisation.
- Contact fatigue and micromechanics.





## 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. Other industrial sectors using high performance sheet material can also use fracture toughness to select and design the most appropriate sheet material.

The method to evaluate the fracture toughness of metal sheets is especially interesting for high strength metal sheets, both as a quality control tool and to predict cracking related issues such as edge cracking or crack formation during impact loading.



## 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.

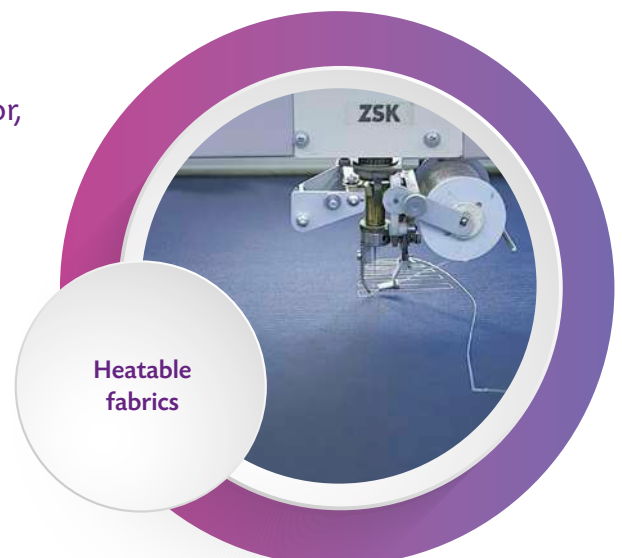


### Conceptualization and design

- 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.

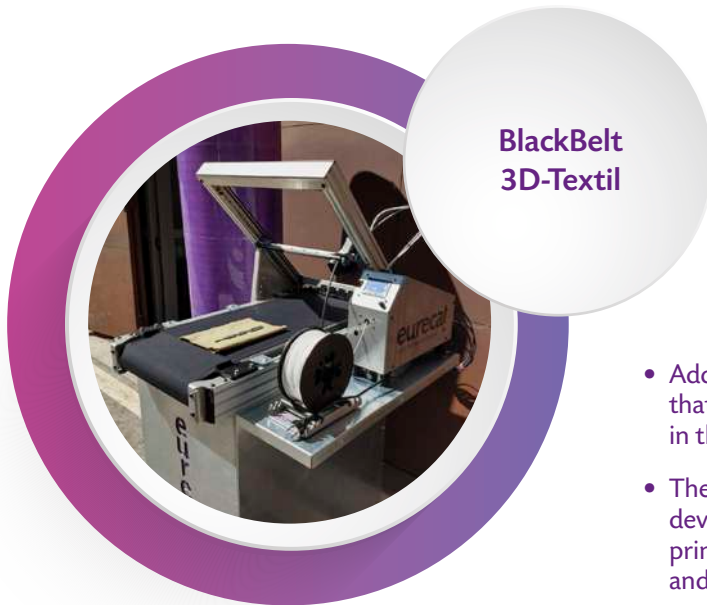
In collaboration with companies in the textile sector, we create new products with functionalities that contribute to consumer satisfaction.

- 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.





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, CO<sub>2</sub> 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.



# Composites

## Specialists in chemical technologies

### Extrusion – Compounding

Thermoplastic compounds with high added value through extrusion-compounding.

- Development of thermoplastic compounds adapted to the application.
- Manufacturing tests and trials.
- Characterisation of developed materials.
- Validation of compounds through various transformation processes: injection, profile extrusion, etc.
- Monofilament extrusion with different diameters according to requirements.

### Advanced Composite Manufacturing

Lightweight structural parts in thermoplastic & Thermoset composites

- Design and structural simulation of the composite piece for structural components.
- Tailor-made structural textiles and preforms: development of hybrid fibres and textiles, design and manufacturing of textile structures in accordance with geometry and application requirements.
- Design and manufacturing of forming tools, taking into account process technology.
- Manufacturing tests and trials with various technologies.
- Mechanical Characterization



### Our equipments:

- Composites pilot plant: RTM, pultrusion, autoclave, infusion, press-forming, vacuum bag
- Compounding pilot plant: Extrusion-compounding, monofilament extrusion, characterization lab.

# 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.



## Surface coating and new processes with metallic materials

We offer R&D&I services and technological assessment for the selection of Surface coating and treatments as well as for their industrial implementation.

We have our own laboratories for material characterization and testing. We help companies find solutions for bio-compatible, bactericidal, anti-fouling, and hydrophilic coatings, both for the medical sector and for the textile, food, and pharmaceutical industries, among others.

### Our services:

- Material characterization tests and modelling
- Superficial deterioration and corrosion: identification and solutions
- Non-destructive inspection techniques
- Surface analysis
- Damage and friction reduction
- Technology for surface coating and treatments

#### Micro & nanotexturization

Development of micro and nanotextures in plastic parts

Development of micro and nanotextures in metal parts

#### Coatings

Development and industrial implementation of coatings with advanced surface functionalities

#### Treatments

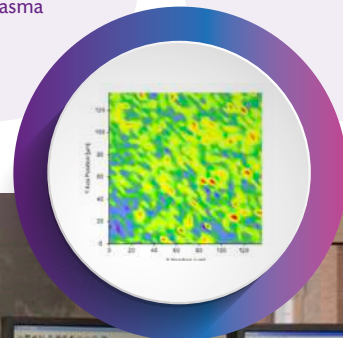
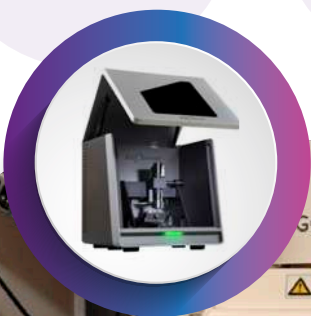
Ionic implantation treatments for the biomedical sector, etc.

Surface treatments with plasma

#### In mold electronics

Development of new user interfaces

Development of new integrated sensors



## New advances with metallic materials

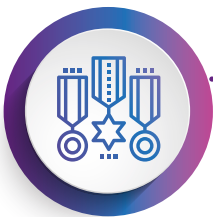
Support in cold/hot forming processes, and characterization of structural parts (mechanical characterization, wear behavior, corrosion, etc.)

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

## Wear resistant coatings for decorative components

We develop Green and sustainable metallized coatings on plastic parts and provide industrialization assessment and Surface characterization.

Physical Vapor Deposition (PV) technology for replacing traditional electroplating. More flexible. Not only generation of different colors but also the addition of specific superficial functionalities (antifingerprint, antitarnishing, bactericidal effect, 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](http://www.formplanet.eu)



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 packaging, textile, pharma or biomedicine, to create functional surfaces and objects by printing thin-layer devices, electronic hybridization in printed circuits, and integratin sensors and specific control electronics. Product surfaces will host increasingly more communication and user interface functions, as well as sensorization and interaction with the environment as a whole.

## Become flexible with Printed electronics

Research lines and developments:

Printed photonics: designing and prototyping

- HYLEDs
- OPV
- Electroluminescent Lamps

Printed electronics: designing and prototyping

- Printed sensors, circuits & components
- Inmold & stretchable electronics
- Hybrid electronics

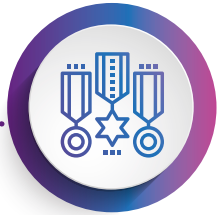
Smart engineering: designing, prototyping and industrializing

- Deployment of Wireless sensor networks and relays
- Signal and data processing, as well as the communication using Wireless technologies
- Redesign and improvement of existing electronic devices





## Success cases



**SmartEEs** is the first European Digital Innovation Hub (DIH) specialized in Flexible Electronics. This DIH aims to help companies to access new markets by way of integrating printed electronics technologies and has Budget for supporting up to 20 projects. One of them is FLEx-UTAG developed by Uwinloc in collaboration with Eurecat

**UWINLOC** has developed the world's first IoT BATTERY-LESS tag for industrial indoor positioning. Its competitive cost makes it affordable for companies to track a high volume of goods at 30cm precision in order to optimize stock and production flows while avoiding manual inventories.



## In-mould electronics innovation

We are developing a new technology that reduces manufacturing costs up 30 percent thanks to in-mould electronics (IME), which makes the device easy to integrate and customize.



# Robotics

We develop advanced solutions for the automation of various tasks in different types of environment.

## Autonomous robotics

- Air and land vehicles, navigation and control, sensors and actuators.

## Industrial robotics

- Robotic cells, tooling design, collaborative robotics, modelling and advanced simulation and multi-modal, intuitive programming.

## Automation and mechatronics

- Process control, sensors and actuators, embedded systems, artificial vision, automated quality control.





## Success case

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](http://www.sharework-project.eu)



# 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.



Circular economy

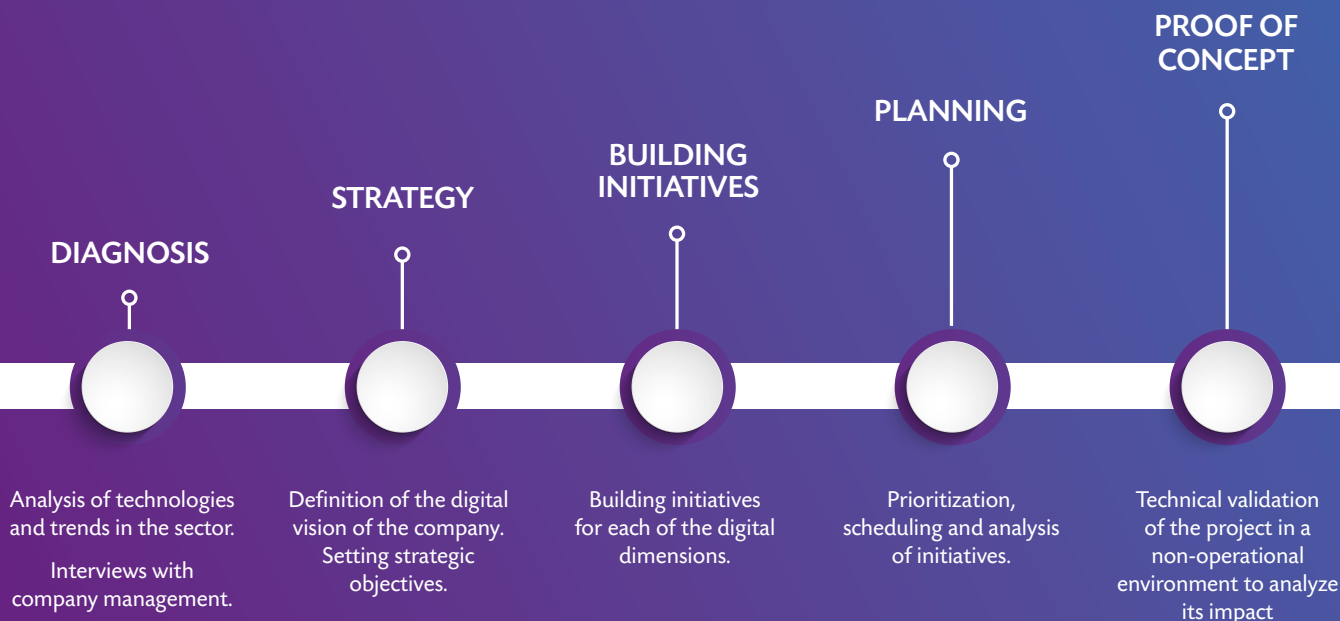
Industry 4.0



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

Predictive Analytics using Big Data

Machine Learning



Digital twins

Predictive Maintenance

Optimized Production Planning

Circular economy

Industry 4.0

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

Collaborative / Industrial Robotics

Cybersecurity

AR and VR Assisted Systems

MARKET  
TEST

DEVELOPMENT

INDUSTRIAL  
SCALING

SUPPORT IN THE  
MANAGEMENT  
OF CHANGE

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

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

Marketing or  
implementation of the  
solution

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

Personalized Manufacturing and Zero Defects

System Integration

## 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

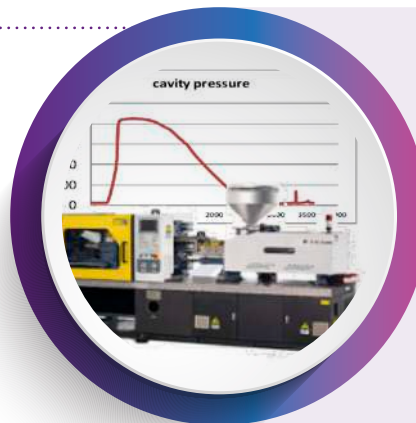


#### Success story

Industrial and collaborative mobile handler  
Multinational from the automotive industry

### 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

### 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



## 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

## Worker of the future

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



### Success story

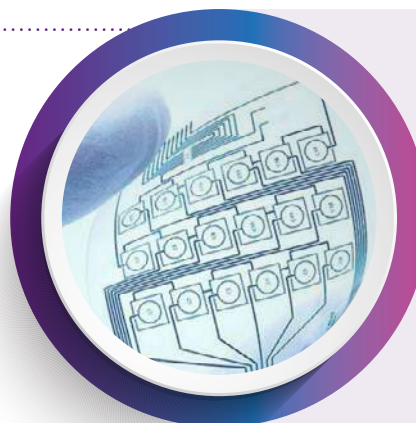
AR and VR for learning. Simulation and assessment of incidents in industrial environments.

Content management and assessment test.

German multinational in the personal care industry

## Smart products

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



### Success story

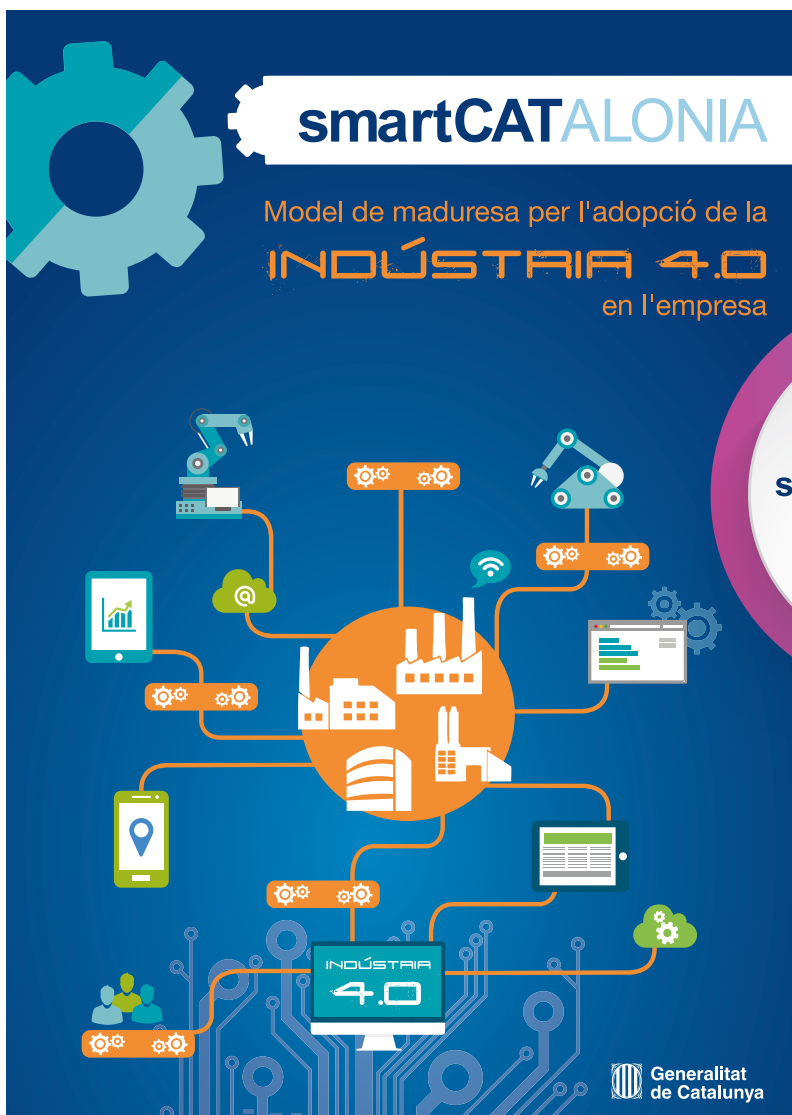
Development of an encoder equipped with a USB communications port and a new SW embedded with a control panel to enable the component to be controlled and reconfigured in real time.

Encoder manufacturer

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

## 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.



## Success cases

European  
CommissionHorizon 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](http://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.



# eurecat academy

Offers specialised technical training in the field of Industry 4.0, key for professionals and organisations to grow up.

[www.eurecatacademy.org](http://www.eurecatacademy.org)

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