CIT UPC

TECHNOLOGY CENTER

UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

# ADVANCED MANUFACTURING TECHNOLOGIES

# RESEARCH, DEVELOPMENT AND INNOVATION AT THE **UNIVERSITAT POLITÈCNICA DE CATALUNYA** · BARCELONA**TECH** (UPC)

The **Universitat Politècnica de Catalunya · BarcelonaTech (UPC)** specializes in the areas of architecture, science and engineering, including advanced manufacturing technologies. In this field, the main focus are:

- Sustainable manufacturing.
- Product design and development.
- Advanced manufacturing processes.
- Adaptive and smart manufacturing systems.

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

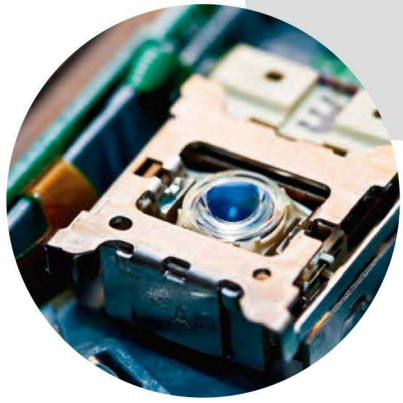
# TECHNOLOGY EXPERTISE

## PRODUCT DESIGN AND DEVELOPMENT

- Conceptual and structural design of products and equipment.
- Management of prototyping and short series.
- Technologies for the reduction in product development time: concurrent engineering, rapid manufacturing of prototypes, DFMA, PLM, CAD/CAE/CAM, CFD, CSM, FEM.
- Design of optical systems and sensors.

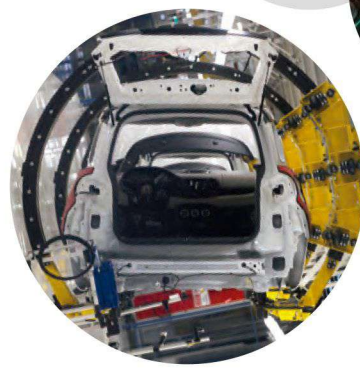
## SUSTAINABLE MANUFACTURING

- Management, monitoring and optimization of energy consumption (models for predicting and optimizing consumption and decision support systems).
- Assessment of environmental impact and energy strategy for a product or process.
- Acoustic emissions, location and characterization of sources of noise, environmental management and active noise control. Design of equipment with low noise emission or a low vibration level.



## ADVANCED MANUFACTURING PROCESSES

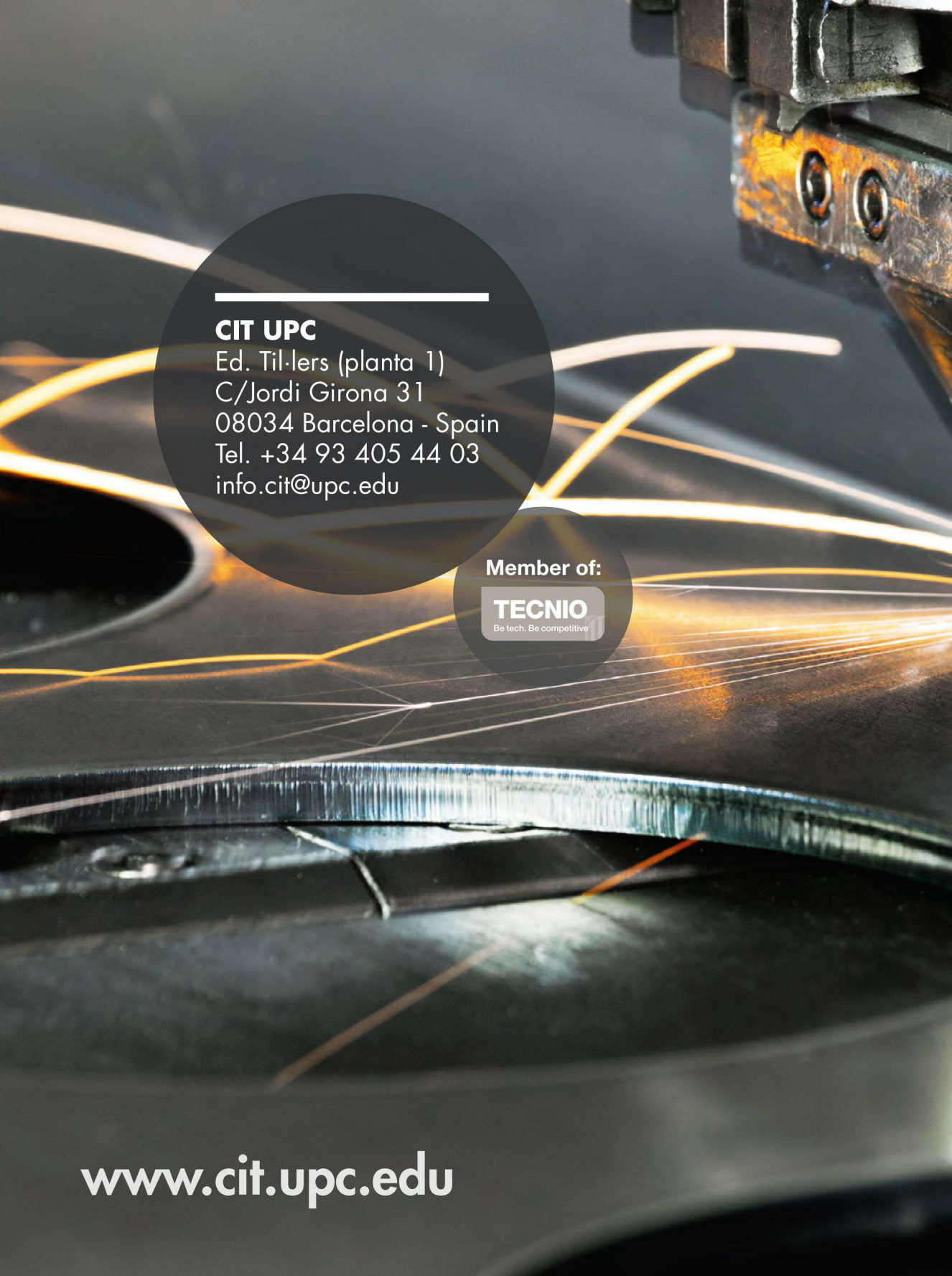
- Development of new processes for high-performance materials.
- High-precision manufacturing for miniaturization of products (micro and nano).
- Development of new manufacturing processes through high-speed mechanization.
- Advanced techniques for controlling and monitoring process/product quality:
  - Spectral technologies applied to online control: non contact monitoring and inspection (surface metrology at micro and nanoscale, detection of surface and internal defects, high-resolution real-time colorimetry, and specific parameters...).
  - Artificial vision in production processes.
  - Non-destructive optical assays.
  - Fault detection systems at high operation speed mechanisms and production lines.
- Engineering applied to laser processes (design of optical heads, specification of complete systems, safety).



- Automation of processes:
  - Automation of standard production processes.
  - Personalized applications based on DSP microprocessors, microcontrollers and reconfigurable integrated circuits (FPGA).
  - Sensors and data extraction systems.
- Robotics:
  - Design, prototyping and control of robots.
  - Collaborative robotics: robots with improved capacities for programming and for interaction with people and processes.
- Additive manufacturing technologies: rapid prototyping, 3D printing, stereolithography (SLA) and selective laser sintering (SLS).
- Development of fluid mechanical, oleohydraulic, pneumatic and thermofluid systems, components and installations.

## ADAPTIVE AND SMART MANUFACTURING SYSTEMS

- Smart systems for taking decisions about complex tasks and processes:
  - Diagnosis and predictive maintenance of rotating equipment and machinery.
    - Early detection of faults and prognosis.
    - Low-cost sensors and actuators for data collection, monitoring, decision-making and optimization.
  - Advanced decision-making tools for zero defects manufacturing:
    - Strategies for predicting production and quality based on continuous, real-time monitoring.
    - Electronic systems for early detection of machinery problems.
- Analysis of flexible manufacturing processes and the management of production and logistics systems:
  - Modelling, simulation and optimization of manufacturing processes and internal transport systems.
  - Simulation applied to the improvement of automated warehouses and stock management.
  - Simulation applied to logistics and distribution systems.
- Human-machine collaboration:
  - Human-machine communication interfaces (dialog systems).
  - Advanced information models for knowledge generation and learning.
  - Smart applications for mobile access from remote devices.
- ICT security and infrastructure:
  - Monitoring, centralization and correlation of security checks for active detection of security incidents.
  - Local network management and centralized management of work stations.



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