WHO WE ARE

WHAT SECTORS WE WORK WITH

WHAT WE WORK IN

HOW WE COOPERATE WITH BUSINESS
WHO WE ARE

Supporting industrial development since 1969
Technology Institute member of the REDIT network

Head Office
University Campus

Alicer-ITC Office
Area for Design and Architecture
Scientific equipment
9 million euros invested in resources and equipment devoted to research, innovation, characterisation, and optimisation.
WHO WE ARE

Human resources
More than 100 professionals with a multidisciplinary profile, true innovation engine.
WHAT SECTORS WE WORK WITH

CONSTRUCTION SYSTEMS
ENVIRONMENT AUTOMOTIVE ENERGY WOOD
CHEMICAL PETROLEUM DERIVATIVES TUBS ADHESIVES
PLASTICS GLASS CERAMIC MACHINERY
VARNISHES AND PAINTS REFRACTORIES DIGITAL PRINTING
SANITARY WARE AND BATH SOAPS AND DETERGENTS
HABITAT AND URBAN DEVELOPMENT
WHAT WE WORK IN

Characterisation

What we are qualified to do

1. Determine the chemical, mineralogical, physical, and structural composition of raw materials and a great variety of products

Control finished product quality

Determine pollutants and analyse defects in materials and products
WHAT WE WORK IN

Characterisation

CHEMICAL

PHYSICAL AND STRUCTURAL

SCANNING ELECTRON AND OPTICAL MICROSCOPY

CERAMIC

FINISHED PRODUCT
Characterisation

Analysis of solid and liquid, inorganic as well as organic samples

Determination of major, minor, and trace elements in samples of any size

Development of new characterisation methods

Start-up of quality control and chemical analysis laboratories
Characterisation

PHYSICAL AND STRUCTURAL
Inner structure and behaviour of materials

Surface wear (Tribology)
- Scratch resistance
- Roughness measurement
- Mechanical tests
- Microindentation

Quantification of crystalline structures
- Product synthesis
- Environmental health
- REACH Regulation

Materials and/or process engineering
- Thermal behaviour
- Physical tests
- Determination of structures
- Study of emissions
- Characterisation of nanomaterials
SCANNING ELECTRON AND OPTICAL MICROSCOPY
Surface microanalysis

Characterisation

Study of defects
Microstructures
Nanometric surface layers

X-ray photoelectron spectroscopy (XPS)
Scanning electron microscopy with microanalysis unit
Optical microscopy with image analysis system
CERAMIC
Evaluation of materials

Characterisation

Rheological behaviour of solids and fluids

Mechanical properties
- Mechanical strength
- Elasticity
- Adhesion

Thermal behaviour
- Sintering
- Crystallisation
- Expansion

Surface properties
- Colour
- Gloss
- Texture
FINISHED PRODUCT
An indispensable requirement for export

Verification of national and international finished product standards:
- Ceramic tiles
- Roofing tiles and bricks
- Sanitary ware and bath tubs
- Non-ceramic flooring

Laboratory with ENAC accreditation
WHAT WE WORK IN

Materials

2

What we are qualified to do

- Optimise raw materials and additives in ceramic formulations
- Develop new materials: synthesis, optimisation of properties…
- Predict how materials will behave during the production process
- Analyse their sustainable aspects (environmental, economic, and social)
- Adapt them to environmental health standards
- Valorise industrial waste
- Apply simulation techniques to the study of materials
WHAT WE WORK IN

2

Materials

CERAMIC RAW MATERIALS
CERAMIC MATERIALS
PILOT PLANT
SIMULATION

DECORATION
NANOMATERIALS
HYBRIDS
PHOTOCATALYTICS

GEOPOLYMERS
ACID EMISSIONS
SILICA TOXICITY
REDESIGNS
CERAMIC RAW MATERIALS
Selection and optimisation

Selection of raw materials for different ceramic products
Additive efficiency (binders, deflocculants, barium carbonate...)

Composition formulation:
- Tiles
- Construction products
- Tableware
CERAMIC MATERIALS
Behaviour during the manufacturing process

Materials

Plasticity

In forming
- Pressing
- Extrusion
- Casting

Dimensional changes during firing
- Vitrification diagrams
- Evolution of curvature
- Wedging and calibres
PILOT PLANT
In between the laboratory and production

Materials

600 m2 devoted to anticipating production results
- Firing in a gas roller kiln
- Dry and wet milling
- Drying and spray drying
- Granulation
- Mixing
- Suspension application
- Forming
- Decorating systems
SIMULATION
Design of new materials and prediction of performance

Materials

Design of new materials
- Thermal optimisation
- Mechanical optimisation

Materials analysis
- Drying
- Chemical reactions
- Diffusion processes

Microstructure analysis
- Effect on macro properties

Simulation tools
- Finite elements
- Finite volumes
- MPM (Material point method)
WHAT WE WORK IN

2

Materials

DECORATION
Inkjet printing

Pigmented and functional inks
Hybrid inks
Optimisation of ink stability
Optimisation and management of ink consumption
Non-ceramic applications
Consulting on managing and preparing images for printing
Development of graphic applications and colour management adapted to the ceramic sector
SCRATCH AND IMPACT PROTECTORS
Nanomaterials applied to paints and varnishes

Addition of nano-additives to varnishes and paints used in furniture and products for the habitat to improve their mechanical properties:
- Scratch resistance
- Abrasion resistance
- Impact resistance
- Adhesion strength
- Elasticity
- Gloss and colour

Application of these additives to coatings that can be used for ceramics
HYBRIDS
New characteristics for construction materials

Materials

Use of non-fired coatings on construction materials (stone, wood, ceramics, glass)

Greater wear and scratch resistance than traditional varnishes

Application to the development of wide-gamut hybrid inks
PHOTOCATALYTICS
With bactericidal and self-cleaning properties

Development of surfaces that can be activated by solar UV radiation

Breakdown of bacteria and fungi in contact with the surface by total degradation of the organic matter present

Capable of being scaled up for industrial exploitation
- Ceramic tiles
- Reactors for wastewater treatment
- Food industry process components
GEOPOLYMERS
Non-fired tiles

Suppression of the firing process
15–20% saving on manufacturing costs
Reuse of industrial waste

Applications in other materials
- Cement
- Composites
- Construction materials
- Materials for art and decoration
ACID EMISSIONS
Alternative to gas cleaning

Tile rear coating that retains acid compounds released during tile firing

35–45% reduction in fluorine compound emissions

Compliance with the regulatory limits set for 2013
TOXICITY OF RESPIRABLE CRYSTALLINE SILICA (RCS)
Occupational safety and health

Materials

Assurance of occupational safety and health protection

Blocking RCS particle toxicity by incorporating substances into the production process that coat the RCS particles

Minimising the risk of silicosis
REDESIGNING MATERIALS AND PRODUCTION PROCESSES
Rethinking the ceramic industry to cut costs

Materials

Valorising industrial waste
Reducing production costs
Obtaining new urban paving at a very competitive price
WHAT WE WORK IN

Production processes

What we are qualified to do

3

- Analyse process variables
- Automate and control manufacturing stages
- Optimise energy consumption
- Minimise environmental impact
- Design, build, and simulate innovative solutions
Production processes

- VARIABLES ANALYSIS
- SPRAY-DRYER CONTROL
- PRESS CONTROL
- ENERGY SAVING
- DENSEXPLORER
- VISCOFREE
- ENVIRONMENTAL IMPACT
- PROCESS SIMULATION
WHAT WE WORK IN

VARIABLES ANALYSIS
During the production process

Production processes

Suspension density in continuous mills

Thermal cycle in dryers

Temperature gradients in kilns

Surface temperature distribution in thermal machines: THERMOGRAPHS
SPRAY-DRYER CONTROL
Keeping spray-dried powder moisture content constant

Production processes

Continuous measurement of spray-dried powder moisture content at the spray-dryer outlet

Infrared sensor on the production line

Accurate and continuous method
Production processes

**PRESS CONTROL**
Pressing uniformity

Estimation of unfired tile bulk density based on continuous measurement of tile moisture content

Adjustment of pressing pressure to keep bulk density constant

Continuous automatic control

Single calibre: 95% of nominal calibre in vitrified products
Production processes

**ENERGY SAVING**
Waste heat reuse

- Energy study of the available waste heat in kiln stacks
- Selection of the best available technique
- Heat reuse in the same kiln or in other process facilities
- Reduction of energy consumption and CO2 emission abatement
- Simulation of heat transfer
DENSEXPLORER
X-raying of tiles

Production processes

Development and construction of an automated bulk density measurement device

Non-destructive measurements

Obtainment of 3D maps of tile thickness and bulk density distribution

Reduction of finished tile defects: flatness, size, mechanical strength

Enhanced worker safety: suppression of the use of mercury
**VISCOFREE**
Constant applied quantity of glaze

**Production processes**

- Very cheap, small device
- *In situ* coupling to the bell
- Applied quantity is independent of variations in viscosity
- Suppression of manual viscosity control
- Minimisation of the number of defective tiles
MINIMISATION OF ENVIRONMENTAL IMPACT
For sustainable production

Production processes

**Comprehensive water management**
- Removal of organic compounds from industrial wastewater by advanced filtration techniques (ultra-nanofiltration)

**Air**
- Selection and optimisation of BATs (best available techniques)
- Development of alternatives to conventional treatment systems

**Waste**
- Valorisation of materials
- Resource optimisation
PROCESS SIMULATION
The importance of knowing what’s going to happen

Production processes

Optimisation of existing processes
- Drying: vertical/horizontal dryers
- Firing: rotary kilns, roller kilns, and heat transfer in the tile
- Polishing: operating homogeneity
- Pressing
- Inkjet printing

Applicable when experiments are unfeasible and/or variables are difficult to measure
Design, develop, and model new products:
- With defined technical properties
- With preset aesthetic qualities
- That enable production costs to be reduced
- Matching service performance requirements

Analyse their sustainable aspects (environmental, economic, and social)

Study pathologies
WHAT WE WORK IN

Productos

SLIP RESISTANT
WITHOUT BIOLOGICAL POLLUTION
CERAMIC MEMBRANES
PRODUCTS WITH ENHANCED PERFORMANCE

ECO PROTECTOR FOR PAINT
SIMULATION OF PROPERTIES
2D INDUSTRIAL DESIGN
3D INDUSTRIAL DESIGN

URBAN FURNITURE
RAPID PROTOTYPING
PRODUCT DEVELOPMENT
PATHOLOGIES
SLIP RESISTANT
Assessment, consulting, and optimisation of performance

Characterisation in an ENAC-accredited laboratory according to the standards of different countries

Simulation of the changes produced in the non-slip performance of floors owing to wear by pedestrian traffic

Optimisation of non-slip performance by surface and coating design

Development of surfaces with combined stain resistance and non-slip performance
WHAT WE WORK IN

4

Products

WITHOUT BIOLOGICAL POLLUTION
Controlling biocide release

Longer useful life of construction materials
Sterilisation of surfaces colonised by micro-organisms
Reduction of biocide consumption
Compliance with new international standards on durability
CERAMIC MEMBRANES
Usable in aggressive environments

Products

Development of inorganic membranes for electrodialysis under aggressive conditions

Use in treating water containing heavy metals
PRODUCTS WITH ENHANCED PERFORMANCE

Nanostructures on metal substrates

Application of coatings on metal substrates by air plasma spraying

Products with thermal, mechanical, and tribological properties unobtainable by traditional methods

- Wear-resistant components
- Thermal barriers
- Bioceramics
ECO PROTECTOR FOR PAINT
Eco-design that improves current protections

New biodegradable protector
Prevents damage to paint during transport
Cheaper, more competitive and efficient
Increased productivity
WHAT WE WORK IN

SIMULATION OF PROPERTIES
Knowing how a product will perform before it is installed

Products

Design of new products
- New ceramic applications
  Floors subjected to high loads
  Solar collectors
- Non-ceramic products
  Metal anchors

Product behaviour
- Mechanical stresses
- Impact
- Thermal behaviour
2D INDUSTRIAL DESIGN
Filtering light inside the dwelling

Products

Joining glass and ceramics with EVA (ethyl-vinyl acetate) and subsequent curing in an autoclave

Water jet drilling of the ceramic sheet

Application as internal dividers or solar filters on façades
3D INDUSTRIAL DESIGN
Updating the range of ceramic craftware

Design and development of new product lines to update the range

Use of synthetic images to evaluate concepts

Use of rapid prototyping to produce moulds.
URBAN FURNITURE
Recycling discontinued material

Products

Development of a new system of urban furniture using obsolete products or products with a low market value

Eco-design defined by a series of previously cut horizontal layers, stacked and fitted in a metal structure

Creation of products with different functions

Protected and licensed model
RAPID PROTOTYPING
Three-dimensional models

Models that exhibit a conceptual design in a physical, three-dimensional form

Prototypes with acceptable dimensional tolerances and sufficient strength

No need for moulds
PRODUCT DEVELOPMENT
Short runs

Development of innovative ceramic products in limited series by digital printing

Creation of custom murals using different ceramic printing techniques
PATHOLOGIES IN CERAMIC PRODUCTS
Avoidance of claims by identification of the causes

Study of pathologies originating during the installation, use, and maintenance of ceramic products

- *In situ* verification visits
- Performance of tests to determine the causes
- Proposals for preventing repetition of the problem
- Issue of expert reports
WHAT WE WORK IN

Construction systems

What we are qualified to do

Design and develop construction systems

Optimise energy efficiency in building construction

Carry out architectural and urban development projects
Construction systems

RAISED FLOOR
SCALABLE MODULAR SYSTEM
ENERGY EFFICIENCY IN BUILDING CONSTRUCTION

ARCHITECTURE AND URBAN DEVELOPMENT
RAISED FLOOR
With drainage capacity and slip resistance

Construction systems

Easy-to-fabricate, low-cost construction system for areas exposed to water: terrace roofs, swimming pools, spas, health resorts

Extruded pieces on a structure of variable height and inclined deck

Concealment of slopes under a flat floor

Avoidance of water-logging
SCALABLE MODULAR SYSTEM
Use of solar energy

Construction systems

Modular semi-cylindrical structure comprising three stainless steel arcs on which porcelain tile and laminated glass can be fastened

Electro-mechanical mechanisms to regulate the slat angle of inclination as the weather changes
ENERGY EFFICIENCY IN BUILDING CONSTRUCTION
Buildings with minimum energy consumption

Construction systems

Thermal optimisation of materials and products

Fabrication of scale prototypes and assessment of the construction system in actual operating conditions

Monitoring construction systems on a real scale

Architectural integration of new construction elements

Energy performance simulation of construction elements integrated into buildings
Architectural and Urban Development

Adaptation of building work to the ceramic language

Construction systems

Mosaic, 50m in diameter, made with non-slip porcelain tile

Metaphor of a hand gesture, representing the pure spirit of a fresh graduate, and reflection of white hands lifted skyward in a clear sign of peace

Definition of the requirements of the ceramic material

Specifications of the installation project

Photo: Universitat Jaume I Agora
Order and analyse the information needed to take business decisions

Optimise the product range

Support design management

Organise the company towards innovation management

Define eco-sustainable marketing strategies
WHAT WE WORK IN

Business strategy

COMPETITIVE INTELLIGENCE
RANGE AUDIT
DESIGN MANAGEMENT

INNOVATION MANAGEMENT
ECO-SUSTAINABLE MARKETING
Business strategy

System of collecting privileged information in order to facilitate strategic and operational decision taking for business

Ceramic Observatory articulated in three specialised platforms:

- **Technology and environment**: reports on emerging technologies, diversification, and ideas for R&D&I
- **Market**: compilation of ceramics end-consumer needs
- **Habitat Trends**: keys for implementing trends information in the ceramic company
RANGE AUDIT
Optimisation of the portfolio

Analysis of the product portfolio from a formal and market point of view
Matching the product portfolio to customer markets
Start-up of new product lines
Complete overview of the company’s product offer in the mid and long term
Design Management
Business strategy tool

Business strategy

Analysis of design implementation in the company on a corporate identity, environment, communication, and product level

Strategy aimed at improving detected shortcomings

Actions required to address these strategies

Monitoring, follow-up, and correction of deviations
INNOVATION MANAGEMENT
Custom Innovation Plan

6

Business strategy

Identifying and developing innovation projects aligned with the company’s strategic guidelines

Establishing the company’s principal strategic axes, generating innovation projects, analysing the feasibility of the most interesting projects, and starting up the selected projects

Incorporating innovation into daily work, creating an innovation culture in the company
ECO-SUSTAINABLE MARKETING
Learning how to sell eco-actions conducted in the company

Business strategy

Decision taking from an eco-sustainable point of view that conditions strategic decision success

- Eco-design
- Eco-labels
- Environmental analysis
- Life cycle
HOW WE COOPERATE WITH BUSINESS

1. Research
2. Consulting
3. Analyses and tests
4. Training