Transforming traditional industry into a leader: The tile industry in Castellon

Dr. José Luis Amorós and Dr. Carlos Feliu
The Spanish Ceramic Tile Cluster
Ceramic Tile Cluster

The Ceramic Tile Cluster comprises the group of activities related to ceramic tile manufacturing, from floor and wall tile fabrication, complementary activities such as frit and ceramic colour production, machinery building, and other commercial activities (raw materials supply, manufacture of trims, design studios, etc.) to business support activities (public and private institutions).
Ceramic tile consumption and production

Data for 2004 on the major ceramic tile manufacturing countries

Source: ASCER
Ceramic Tile Cluster. Geographic concentration

- **Spain**
- **Castellón cluster**

<table>
<thead>
<tr>
<th>Category</th>
<th>Spain</th>
<th>Castellón cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiles</td>
<td>294</td>
<td>223</td>
</tr>
<tr>
<td>Frits and pigments</td>
<td>28</td>
<td>26</td>
</tr>
</tbody>
</table>

Source: ITC, ASCER, ANFFECC
Ceramic Tile Cluster. Distribution of employment

Castellon distribution of employment 2003

- Number of employees: 226,300
- Unemployment rate: 5.94%

- Number of employees: 36,326

| Industry | 30.9% |
| Building | 11.8% |
| Services | 49.7% |
| Agriculture | 6.50% |
| Ceramic tile Industry | 12.7% |
| Frits and pigments | 9.00% |
| Machinery | 4.10% |
| Tiles | 86% |

Source: INE. Instituto Nacional de Estadística
Ceramic Cluster. Industrial Investments

<table>
<thead>
<tr>
<th>Industrial Investments</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic Tile Sector</td>
<td>53.54</td>
<td>78.18</td>
<td>126.33</td>
<td>122.31</td>
<td>180.48</td>
<td>91.14</td>
<td>46.48</td>
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<tr>
<td>Total</td>
<td>373.31</td>
<td>435.77</td>
<td>557.17</td>
<td>535.73</td>
<td>861.68</td>
<td>520.13</td>
<td>411.41</td>
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<tr>
<td>%</td>
<td>14.3</td>
<td>17.9</td>
<td>22.7</td>
<td>22.8</td>
<td>20.9</td>
<td>17.5</td>
<td>11.3</td>
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</table>

Although the investment in 2003 by the ceramic sector was the lowest in the last 7 years, it accounted for 64.5% of the total industrial investment in Castellón province and 11.3% of the entire Valencia Region.

Source: ASCER
Ceramic Cluster. Evolution of frit and pigment production

Source: ANFFECC
Ceramic Cluster. Evolution of tile production

Source: ASCER

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Ceramic Cluster. Evolution of tile production

Total production

Evolution of firing processing

Source: ASCER

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Main factors contributing to the success of the ceramic sector in Castellón:

- High sectoral cohesion
- Highly skilled human resources
- Optimal use of technological resources
- Existence of public and private institutions supporting sector innovation

Innovation System Model
Local Innovation System Model
Ceramic Tile Cluster. Innovation System Model

Innovation and technology development are the result of a complex set of relationships among actors in the system, which includes enterprises, universities, government and research institutes.
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Ceramic Cluster. Innovation System Model

Public bodies

- Town Councils
- Ministry of Commerce
- Ministry of Industry
- Regional Government Generalitat Valenciana
- University Jaume I of Castellón
- County Council

Depts

- ICEX
- Technological Policy
- CDTI / DGpyme
- Environment
- Industry
- Education
- AAOA
- FP II
- Chemical Engineering Dept
- IPC

Companies

- CEVISAMA
- ASCER
- ANFFECC
- ASEBEC
- ITC ALICER
- Chamber of Commerce
- Lab. CSC
- QUALICER
- Cer. Technicians’ Ass.
- Ind. Eng. Ass.

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The Instituto de Tecnología Cerámica
Structure

University Institute for Ceramic Technology “Agustín Escardino”

Ceramic Industry Research Association

Concert Agreement AICE - UJI 5th November 2001

Both institutions jointly use the premises, facilities, equipment, material, and staff that make up their research infrastructure.
ITC general overview

Main objective:

> “The Instituto de Tecnología Cerámica’s mission is to foster and develop whatever technical activities may contribute to enhancing the competitiveness of the ceramic sector, both in the domestic and international marketplace”

Over 30 years’ experience in research and technology development, always working closely with companies to meet industry needs

Providing more than 360 companies world-wide (90% of which are SMEs) with scientific and technological services
ITC historical overview

1969: Creation of the Instituto de Química Técnica. University of Valencia

1975: All activities are focused on ceramics


1993: The name changes and becomes Instituto de Tecnología Cerámica (ITC). Integration of ITC at University Jaume I (UJI) of Castellón.

1993: Establishment of Industrial Ceramic Design Association (ALICER) from ITC Design Department


2006: Integration of ALICER
ITC main facts

Highly qualified team – 23 university lecturers, 53 graduates, 27 technicians, and 27 support staff

8000 m² of laboratories, pilot plant, meeting rooms, offices, lecture rooms, and stores

6 million euro in scientific instruments and equipment

450 analyses and tests relating to ceramic materials or the manufacturing process

600 R&D Projects ~ Revenue of 12.5 million euro

17 European R&D Projects
Organisation

Production 79.2%

22 PhD holders
54 4 or 5 yr degree holders/Engineers
4 3 yr degree holders/Tech. Engin.
23 Vocational training and Arts & Crafts graduates

Support 20.8%

2 4 or 5 yr degree holders
8 3 yr degree holders/Tech. Engin.
17 Medium-level qualifications

Total Staff: 130 (Equivalent 108 full-time staff)
Organisation

Total Staff: 130
(Equivalent 108 full-time staff)

28 Persons engaged in the University 20.7%

3 Full Professors
10 Associate Professors
1 PhD-holding Assist. Prof.
9 Assistant Professors
1 PhD-holding administrative and service staff
4 Administrative and service staff
ITC Number of associated companies

Average in the last 10 years: 284 companies
ITC contribution to Industrial Innovation

Industrial Innovation

Novel technology + Qualified human resources + Financial resources (capital)

Instituto de Tecnología Cerámica
Novel technology resources
ITC activities

> R&D+i and technological consultancy
> Technology Transfer
> Training and educating
> Technological service
> Design and Architecture
> Competitive Intelligence service
Ceramic subsector activity

Revenue from ceramic subsectors

<table>
<thead>
<tr>
<th>Year</th>
<th>Ceramic tiles</th>
<th>Frits and glazes</th>
<th>Raw materials</th>
<th>Brick &amp; Roof tiles</th>
<th>Sanitary ware/Artware</th>
<th>Machinery and Consultancy</th>
<th>Other</th>
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<td>2005</td>
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R&D activity

Revenue from R&D projects

Spanish Administration-related R&D

European Union-related R&D

Company-related R&D

Euros

Year


0 200.000 400.000 600.000 800.000 1.000.000 1.200.000 1.400.000 1.600.000 1.800.000 2.000.000

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Areas of work

Number of papers in scientific journals

- Raw materials
- Frits and Glazes
- Manufacturing process
- Energy and Environment
- Measurement and control techniques
- Technical ceramics
R&D+i and technological consultancy

R&D+i and Technological Consultancy activities are carried out to meet the demands of the ceramic sector.
Technology transfer

The work involved is aimed at directly applying or, when required, adapting technologies from other industrial branches to the ceramic sector to satisfy specific industrial needs.
Technological service
Analyses and Tests

accredited laboratories
Design & Architectural applications

From this area actions are undertaken to generate new applications of ceramics in architecture, aimed at recovering ceramics as functional and decorative, yet also innovative elements for architects and designers.
Competitive Intelligence System

Center for Information and documentation generating and coordinating studies, reports, and events concerning the market; industry; consumer; trends in product design in related sectors; technology watch and product development
Qualified Human Resources
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Offer in Castellón of specialised training in ceramics (regulated)

<table>
<thead>
<tr>
<th>Vocational training</th>
<th>Industrial ceramics</th>
<th>84/85 (Castellón) 00/01 (Onda)</th>
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<tbody>
<tr>
<td>School of art and design</td>
<td>Ceramic tile design</td>
<td>88/89</td>
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<tr>
<td>Schools of ceramics</td>
<td>Diploma in Ceramics</td>
<td>00/01 (Manises) 05/06 (l’Alcora)</td>
</tr>
</tbody>
</table>

Chem. Degree, specialty in Industrial Chemistry

Chemical Engineering Degree

From 88/89 to 98/99

Since 93/94
University graduates

University graduates from UJI with a specialty in ceramic materials technology

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ITC contribution to the training of qualified technical personnel

Attendance by industrial technicians to ongoing training courses

2604 technicians in 174 courses since 1990
ITC contribution to the training of qualified technical personnel

137 technicians with higher education or medium-level qualifications hired by companies, after postgraduate training at ITC
The INSTITUTO DE TECNOLOGIA CERAMICA