CERAMICS IN SPAIN

REGUEIRO, M., SÁNCHEZ, E., SANZ, V. and CRIADO, E. Instituto Tecnológico Geominero de España. Rios Rosas 23 .28003 Madrid. Spain. (m.regueiro@itge.mma.es). Instituto de Tecnología Cerámica. Campus Universitario Carretera de Borriol. 12004. Castellón. Spain. ([illegible]). Instituto de Cerámica y Vidrio. CSIC. Carretera de Valencia km 24,300. 28500 Arganda del Rey. Madrid. Spain. (e.criado@icv.csic.es)

Summary
The Spanish ceramic industry has experienced a amazing growth in the last four years. Such expansion has affected all sector, but has been particularly noteworthy in those directly related to construction: tiles. glazes, bricks and roof tiles. A combination of an extraordinary exporting effort, together with a record figure in new housing projects (415 000 houses in 1999), are responsible for such outburst. Other sectors, such as refractories have undergone significant growths due to the high rate of steel production increase, also in historical record figures (15m t in 1999). All this sectors doubled altogether the growing rate of their main European competitors. Raw material production has had an even more effervescent trend, almost doubling 1995 production. Such dynamic growth has been associated to a remarkable quality increase and to an unparalleled technological innovation process.

Key words:
Ceramics, Spain, tiles, glazes, refractories, raw materials, production, trends.

Introduction
Spanish ceramic industry has had a spectacular evolution in the past few years. The most optimistic forecasts have been greatly surpassed in most ceramic sub-sectors, in particular in those directly related with construction as a record figure in new housing projects was reached last year with 415 000 new houses. The huge internal demand has resulted in shortage of bricks in many areas of the country. In fact Spain has a great tradition in ceramic product consumption, and its the third world consumer in absolute figures (after China and Brazil, with higher population). Outstanding growths in car and food containers production have also been responsible for production increases in other ceramic sub-sectors such as refractories. The raw materials sub-sector has seen a ten-fold increase in research and development on new mining projects, in particular in feldspars and ball clays. Many new manufacturing plants of porcelain tiles and bricks are now under construction. Finally a Spanish company has become, after purchasing the actives of another multinational, the second world sanitary ware producer.
The sector's turnover has rocketed from 663 000 Mpta (US$ 4 250m) in 1996 to almost 1 billion pta (US$ 6 410m) representing today 1,18 % of the GDP. The tile industry, which has experienced a 40% growth in 3 years, from 400m sqm in 1995 to 564m sqm in 1998 and a turnover of 555 000 Mpta pa (US$ 3 557m) is the most important sector, followed by brick and roof tile production (20,9 Mt per year). Spain produces every year almost 9 million pieces sanitary ware, around 600,000 t of glazes and frits and 388 000 t of refractory materials. Tableware (60 million pieces), giftware, traditional ceramics and sectors of recent development such as technical and advanced technical ceramics, complete the panorama of Spanish ceramic areas.

Figure 1, included below shows an estimation of Spanish ceramic production value by sectors

Ceramic raw materials
Raw materials used by the ceramic industry are very varied as is the wide span of ceramic products available in the market. Wall and floor tiles are manufactured using either common clays (red clays yielding red coloured products after firing) or ball clays (white after firing). Red clays can be subdivided in terms of their carbonate content, from nil to low ,medium or high. Red clays with low carbonate content are usually employed in floor tiles, whereas red clays with a medium to high carbonate content are typically used in porous wall tiles. Ball clays are mainly used in white ceramic bodies. White porous wall tiles bodies also need the addition of kaolin, calcium carbonate, dolomite, silica sand and feldspar. Besides ball clays, single-fired white floor tile bodies usually include feldspar, silica, kaolin and talc, a very similar mixture to that of porcelain tiles, except for the feldspar content (up to 50% in the latter). Brick and roof tiles are produced with a wide range of red clays both with and without carbonates. Sanitary ware and tableware bodies use mainly ball clays, feldspar, kaolin and silica. The range of raw materials used in ceramic glazes is enormous and exceeds the objectives of this review, but it is also noteworthy the ever-increasing use of synthetic chemical products. The glaze industry evolution has been the supporting base for the spectacular development of the floor and wall tiles industry. The span of refractory raw materials is also ample, although national production only covers dolomite, magnesite, kyanite and flint clays, as chromite, bauxite, alumina, zircon, graphite, kyanite and andalusite are all imported commodities. In summary the review will refer only to domestic commodities of significance in terms of volume or overall cost.

In the last few years an increasing trend has been observed in analytical quality and size reduction requirements of the raw materials, with a continuos increase in the under 30 micron particles production and control . In order to fulfil such requirements the Spanish companies have made important investments in R&D in mineral preparation and quality control. Raw materials outsourcing has also experienced an important growth with considerable turnover increase of the main supplying companies.

Ceramic Tiles

World production of ceramic tiles currently stands at 3 711m sqm pa (1998). Italy (16 %), Spain (15 %), China (10%) and Brazil (11 %) share the world production leadership, although China's production data are based in production capacity and are rather unreliable. Those four countries together with Germany are also leaders in tile consumption, but in Italy and Spain production doubles domestic consumption showing their formidable exporting capacity.

Today the Spanish floor and wall tile industry has deservedly earned international recognition based not only in price, but also in aesthetic quality and design and excellent technical properties of the end-product. Spain represent 25% of the total world international tile market. the production of floor and wall tiles in Spain.

Production in 1998 was 564m sqm and sales reached 555 000, pta (US$ 3557m). 1999 forecast indicate that Spanish production might have overcome 600m sqm, surpassing Italy for the first time. Exports shown in the same figure have also climbed steadily in the last few years reaching in 1998 almost 45 % of the production, and worth US$ 1600 m.

Brick and Roof Tiles

Current production levels have recovered to heights reached in the last decade, after the building crisis at the outset of the 90's. There has been a negligible increase in average product price, which means that only cost-competitive companies have been able to survive, evidenced by a severe reduction in the number of companies and work force, although production has clearly recovered. The sector's re-structuring in the last few years has resulted in a considerable reduction in number of companies and employees, although production capacity has recovered to the early decade levels.

In 1998 and 1999 demand has experienced such a growth that in some areas in Spain (Andalusia, Madrid and Barcelona) delivery times reach six months. Resulting from unbalanced offer and demand considerable price increases have been observed, which in fact only compensate previous long periods of stable or drop in prices. 25 new production plants are in due course with a total investment of 75 000m pta (US$ 481m).

Frits and glazes

At the beginning of this century, frits and glazes were prepared in Spain by the end user. In the 40's the situation changed substantially. In 1946 specialised companies were already producing 35% of a total production of 3700 tpa. This trend increased and resulted in the birth of a powerful industrial sector that in 1969 produced more than 45,000 t of glaze, although some porous tile factories still produced their own frits and glazes. Today all frits are manufactured in specialised companies, and only a few factories produce their own glazes, using previously prepared frits and pigments. Turnover in 1998 reached 103 319m pta (US$ 662m) and production to around 600,000 t. In 1998 exports amounted 48 994m pta (US$ 314m). Italy was the main client for Spanish glaze exports.

Sanitary ware

Spain is one of the most important European producers of sanitary ware. Although this branch, just as the tile industry, depends to a great extent on building trends, and also suffered considerable setbacks in the 1993 recession, it is now getting back to a stable level. There are 8 sanitary ware factories in Spain consuming around 44,000 t of clay pa and producing 8.9 Million pieces pa. Total turnover of this sub-sector reaches 45 500m pta (US$ 292m).

Tableware

Tableware is also a ceramic sector with a long tradition in Spain. Eleven companies with around 3,000 employees produce annually around 60 Million pieces worth some 14 000m pta (US$ 90m).

Giftware

Within the sub-sector we include all those producers of decorative figures, jars, lamps, decorative dishes etc. Spain is the third European producer in turnover after Germany and France. Sales in 1998 were above 26 000m pta (US$ 166m).

Traditional ceramics

Spain has a long and deep rooted traditional ceramic industry with a strong Arabic influence, that has suffered some setbacks, but is now recovering thanks to a renewed interest in handcrafts and tourism. More than 20,000 workers in some 3,000 pottery workshops carry on the country's impressive traditional ceramic heritage.

Technical ceramics

Even though Spain is a world leader in the technology, production and trade of traditional ceramics, and although generally good to very good quality technical ceramics (TC) are also being produced, the advanced technical ceramics industry (ATC) is still in swaddling clothes. Some TC or ATC companies also produce traditional ceramics and/or market ceramics in sub-assemblies. This combined with the absence of a specific manufacturers' association, and the unavailability of company data-banks, makes it extremely difficult to estimate the economic importance of the sector. However the Spanish TC turnover (including ATC) is assessed at less than 2 % of the total Spanish ceramic industry's turnover.

Refractories

The total Spanish refractory production reached in 1998 the record figure of 388 000t, a significant growth from the stagnant 325 000tpa during early 90's. Production value jumped in the last 10 years from 20 000m pta (US$ 80m) to 30 000m pta (US$ 200m).

Conclusions

Excellent raw materials, research and development, a world-wide strong marketing policy and the drive of the internal demand, has turned Spain in one of the most technologically advanced countries in ceramic production of the world.

- **References**

- ASCER. 1998. El Sector Español de Fabricantes de Baldosas Cerámicas. Castellón
- Asociación Nacional de Fabricantes de Refractarios. ANFRE, Estadísticas de la Producción Anual 1990-1999
- EuropeanTechnical Ceramics Directory 1996/1997. Watford: Materials Technology, U.K
- European Refratories Production . P.R.E. Paris. Copia mimeo 1999 La producción española de azulejos. Azulejo, 89, 234-238, (1996).
- http://www.ardan.es. Servicio de Información empresarial Ardan: [1999].
- Informe cerámica roja 1994. Técnica Cerámica, 229, 805-854
- Instituto Tecnológico Geominero de España ITGE. 1997. Panorama Minero 1995-96. Madrid.
- I Jornadas sobre Materias Primas de la Industria Cerámica. Asociación Española de Técnicos Cerámicos. Castellón. Febrero 1996.
- International Iron and Steel Institute. Annual Repport 1998. Bruselas
- Mir, P. 1995. Los 50 líderes por beneficios ganaron más de 50.000 millones. Economía 3, (46) 44-54.
- Mosser, J., Baumgarten, H., Karhut, G. 1998. Global perspectives for the Refractory Industries. Procc, XXVII Congreso ALAFAR Lima Perú nov. 5-24
- Padrós, D. 1999. Capacidad Productiva del Sector de Cerámica Roja con Inclusión de la Teja prensada y los pavimentos de gres extrusionado. Assesoria Técnica Cerámica.
- Pezzi, G. 1999. Porcelain tile outputs continues to rise. Ceram. World. Rev. (32) 66-73.
- Regueiro,M., Sánchez, E. Criado,E.,Sanz, V. 1997. An overview. Spanish refractories. Industrial Minerals 353 (2) 53-55.
- Regueiro,M., Sanchez, E. Criado,E., Sanz, V. 1996. Ceramics in Spain. High winds for earth and fire. Industrial Minerals 348 (9) 75-89.
- Regueiro,M. Sánchez, E. Criado, E., Sánz,V. 1996. La industria cerámica española. Bol. Soc. Esp. Ceram. Vidr. 35 (6) 439-421
- Regueiro, M., Dámaso,P., Sánchez, E. 1997. Red ceramics in Spain. Export markets the key". Industrial Minerals 361(10).
- Regueiro,M. Sánchez, E. Sánz,V, Criado, E. 2000. Cerámica industrial en España. Bol. Soc. Esp. Ceram. Vidr. 39 (1) 5-30
- Semler, C.E. 1999. Trends and Issues in Refractories. CN-Refractories 6. (3) 78-80.
- Sezzi, G. 1995. The leading spanish firms. Cer. World Rew., 16, 42-46.
- Zhong, X.C. 1998. China's refractories heading for the new century. Am. Cer. Soc. Bulletin (3) 50-55.

FIGURE 1. SPANISH CERAMICS PRODUCTION VALUE (% mpta)