Glass and Ceramics
MARKET & OPPORTUNITIES
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Glass and Ceramics Industry in India

**Glass**

Glass is an inorganic product that is typically produced by melting a mixture of silica (sand, 75 per cent), soda (around 15 per cent) and calcium compound (lime, 10 per cent) with the desired metallic oxides that serve as colouring agents. The glass industry covers products such as flat glass (including sheet glass, float glass, figured and wired glass, safety glass and mirror), glass hollow wares and containers, vacuum flasks, laboratory glassware and fibre glass. Glass products are used widely in households, construction, laboratories and consumer items such as bangles, beads, pearls, etc.

**The Glass Industry Consists of Four Segments**

**Container Glass**

This is the largest segment in the glass sector and comprises of glass packaging for drinks, food, perfumes and pharmaceuticals.

**Specialty Glass**

This is the second largest segment and contributes to one-third of the total global production. Specialty glass is mainly used for technical applications such as optics, electronics, lighting, engineering, ophthalmic lenses, etc. Borosilicate glasses are also included in this category.

**Flat Glass**

The flat glass industry accounts for 16 per cent of the total global glass production. This segment comprises of float glass, rolled glass, cast glass and other flat glasses which are used mainly for architectural and automotive applications.

The global market for flat glass was estimated at 41 million tonnes in 2005, with a value of US$ 19 billion at the primary manufacturers’ level. Out of the total production, 70 per cent was consumed in windows for buildings, 10 per cent in glazing products for automotive applications and 20 per cent was used in furniture and other interior applications.

**Fibre Glass**

Fibre glass consists of thin filaments of glass fibre that are used primarily as reinforcement material in polymer products. The resultant composite is called Fibre Reinforced Polymer (FRP) or Glass Reinforced Plastic (GRP), commonly referred to as fibre glass.
GLOBAL GLASS INDUSTRY

The major glass producing countries in the world are Germany, USA, UK, China and Japan. The major importing countries are USA, Germany, Japan, France, Italy and Australia. The main consuming regions are Europe, China and North America, that together account for 74 per cent of global demand for glass. Europe is the most mature glass market and has the highest proportion of value-added products.

The global glass industry is quite concentrated, with four companies – NSG/Pilkington, Saint-Gobain, Asahi and Guardian, producing 67 per cent of the total high quality float glass in the world. Lower quality float and sheet glass production is gradually being replaced by high quality float glass across the globe.

In 2005, the glass industry was running at around 90 per cent capacity utilisation globally and was heavily influenced by a strong demand in China.

Indian Glass Industry

The glass industry in India is quite old and well established. The first glass plant in India was set up in 1908. The glass makers employed methods such as moulding, folding, twisting, double-stripping and wire-winding to manufacture glass. It remained largely a cottage industry for a long time. In recent years, the industry has transformed and developed. From rudimentary mouth blown and hand working processes, the industry has evolved to adopt modern processes and automation in a large way. However, mouth blown processes and handcrafted glassware continue to play a role in developing innovative designs in decorative and table glassware products that are exported in large quantities.

The Indian glass industry has been growing across all segments. Sheet and float glass have recorded the fastest growth, at nearly 67 per cent CAGR between 2001 and 2005. This growth has been driven primarily by India’s booming

Joint Ventures / Strategic Alliances Among Global Players

There is an increasing trend of glass manufacturers to share the risk of new float investments, either with other manufacturers, secondary processors who wish to backward integrate to secure long term float supply, or other local or financial partners. Examples over the past 3 years include:

- Pilkington with Saint-Gobain in 2004 for Brazil region
- HanGlas with Saint-Gobain in 2004 for China region
- Pilkington with MEP in 2005 for Russia region
- Pilkington with SYP in 2005 for China region
- Asahi with Maruti/Labroo in India in 2006

In addition to the risk-sharing JVs, a number of strategic alliances have been formed in the automotive glass industry. These include:

- Pilkington and Nippon Sheet Glass (NSG) of Japan (now NSG Group): for a joint Research, Development and Engineering (RD&E) agreement for automotive products and processes. This also consists of a joint marketing approach for Japanese vehicle manufacturers
- Saint-Gobain and Central Glass of Japan have a joint marketing agreement, including cooperation on product and technology developments

For automotive glazing, there are only three major players – NSG/Pilkington, Asahi and Saint-Gobain – who, along with their respective associates, meet nearly 75 per cent of the world’s Original Equipment (OE) glazing requirements.
automotive and construction sectors which have been key drivers of the economy in the past five years. Other glassware such as bottles and fibre glass has recorded more modest growth rates of about 5-6 per cent CAGR, over the same period.

Exports and Imports

The domestic glass industry is facing increasing competition in the global, as well as domestic markets. State-of-the-art technology in manufacturing is becoming increasingly important in the industry. Modern technology and operations are replacing traditional methodologies in fibre glass composites. Such upgradation is driven by healthy demand for fibre glass products, particularly due to growth in petrochemical sector and allied products.

Some segments, like vacuum flasks, have been adversely affected by stiff competition in the international market. India’s exports in this segment declined from US$ 111.2 million in 1998-99 to US$ 64.3 million in 2003-04.

However, some segments have faced up to the competition from global players well. For instance, the glass container production more than doubled, from approximately 0.8 million tonnes in 1997-98 to around 1.7 million tonnes in 2004-05. This is despite the stiff competition faced from alternative packaging materials.

Exports of glassware from India have been growing at a rate of 17 per cent CAGR over the period 2001-02 to 2006-07. From US$ 139 million in 2001, exports increased to US$ 307 million in 2007. The products exported have been primarily bottles, jars, fibre glass and glass beadwork, which together accounted for more than half of all glassware exports in 2006-07.

The global market for Indian glassware is fragmented and spread across several countries, with no dominant market. USA is the biggest market for Indian glass products and accounted for 14 per cent of exports in 2006-07. UAE with 8 per cent and Poland with 6 per cent, were the other key markets.

Country-wise Exports (2006-07)

<table>
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<tr>
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<tr>
<td>UAE</td>
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<tr>
<td>Poland</td>
<td>6%</td>
</tr>
<tr>
<td>Italy</td>
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</tr>
<tr>
<td>Belgium</td>
<td>5%</td>
</tr>
<tr>
<td>PRP China</td>
<td>5%</td>
</tr>
<tr>
<td>Brazil</td>
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</tr>
<tr>
<td>Turkey</td>
<td>3%</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>3%</td>
</tr>
<tr>
<td>Mexico</td>
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<td>Spain</td>
<td>3%</td>
</tr>
<tr>
<td>UK</td>
<td>3%</td>
</tr>
<tr>
<td>Others</td>
<td>38%</td>
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</table>
KEY SUCCESS FACTORS IN THE INDIAN GLASS INDUSTRY

Technological Capability

The growth in India’s glass industry is being driven by user segments such as manufacturing, construction and petrochemicals. These segments are highly competitive, demanding and well integrated with global trends. Supplying to key players in these segments will require the glass manufacturers to be capable of developing technically advanced products and customising specifications to user requirements. Hence, technological capability is a key success factor in the industry today.

Players like Saint-Gobain (please see case study on Saint-Gobain provided later in this document) have successfully leveraged their state-of-the-art technological capability to differentiate themselves and grow.

Energy Efficient Manufacturing

The glass industry is highly energy intensive and energy consumption is a major cost driver. Energy costs include power consumption and running costs of furnaces. Safety and environmental requirements are also key drivers of costs in this area. The average energy cost as a percentage of manufacturing cost is 30 per cent.

Amid these constraints, glass manufacturers need to find innovative ways for improving energy efficiency and also explore alternate sources of energy. Energy saving strategies such as higher temperature refractories could be adopted. Re-using waste heat to pre-heat new batches is another option that has been estimated to yield up to 18 per cent savings in energy. The recycling of glass also leads to an estimated savings of 15-35 per cent.

Supply Chain Management

User segments such as automotive OEMs and construction companies work on tight schedules and project plans and this requires just in time supplies. Glass suppliers need to have capabilities in managing the distribution chain to ensure on time delivery every time.

Given the increasing trend in glass exports, managing global supply chains is the new challenge for exporters. This will involve developing the right structure, processes and technology support for supply chain management.

Branding

Experience of companies like Saint-Gobain and Asahi in India indicate that having a strong brand is a major asset to ensure customer demand. Depending on the user segment, customers today look for quality, product range, technology and reliability. A brand that has been built to incorporate these values can be a major differentiator.

CERAMICS INDUSTRY

Ceramics is a diverse industry that contains several categories of products, including sanitaryware, refractories, cement, advanced ceramics and ceramic tiles. Tiles could be further segmented into wall tiles, floor tiles, vitrified and porcelain tiles. Tiles and sanitaryware constitute the bulk of the ceramics industry in India and will be discussed in detail in this report.

Global Ceramics Industry

Ceramic Tiles Industry

The global ceramic tiles industry production was estimated at 6,560 million square metres in 2005. The ratio between consumption and production has been stable at around 94 per cent. Ceramic tile production has been increasing at a cumulative rate of close to 6 per cent.

Asia is the most significant region by production, as well as consumption, accounting for more than 50 per cent of both. China is the leading country in the production of ceramic tiles with a share of 33 per cent at a total production of 2,200 million square metres, followed by Spain and Italy.
Europe accounts for 30 per cent and USA accounts for 14 per cent of the total global production of ceramic tiles. In terms of consumption the pattern remains similar, with Asia accounting for 51 per cent, Europe for 26 per cent and USA accounting for 18 per cent of the total global ceramic tile consumption.

India ranked fifth globally in the production of ceramic tiles. The top ten ceramic tile producing countries produced around 79 per cent of the total global production in 2005.

**Global Sanitaryware Industry**

The global sanitaryware industry is estimated to be 187 million pieces and growing at about 7 per cent Y-o-Y. The main sanitaryware producing countries in the world are China, Italy, Mexico, Brazil and Spain, which together account for about 35 per cent of global production (See figure).

India, with a size of 6.7 million pieces, accounts for about 3.3 per cent of global production. Penetration of sanitaryware in India—about 30 per cent—is much lower than even neighbouring Asian countries, indicating significant growth potential for this sector in the Indian market.

The Indian sanitaryware market has been growing at about 10 per cent a year, as compared to the global average growth of about 7 per cent.

India's ceramic tile industry emerged in the 1950s. Tiles form the most significant part of the Indian ceramics industry and consist of floor tiles (46 per cent), vitrified and porcelain tiles (12 per cent) and wall tiles (42 per cent). The floor tiles segment is growing faster as compared to wall tiles.

Vitrified and porcelain tiles are recent entrants into the ceramic tile industry and have increased the size of the market considerably. It is expected that this segment will capture the bulk of the market gradually, replacing the conventional floor and wall tiles segment. These tiles are light and have the added advantage of being offered in designer looks as compared to mosaic tiles, which are...
heavier and more expensive to transport. Both, organised and unorganised sectors play a key role in the manufacturing of ceramic tiles in India.

The Indian ceramic tile industry is estimated at US$ 0.35 billion

The size of the Indian ceramic tile industry is estimated at US$ 0.35 billion. It comprises of wall tiles, floor tiles and vitrified tiles. The per capita consumption of ceramic tiles in India is just 0.15 square metres per annum, which is quite low as compared to developed countries.

The industry has been experiencing increased demand, which, in recent years, has matched the installed capacity. While capacity has also increased significantly, from 120 million tonnes in 2001, to 215 million tonnes in 2005, the demand has grown nearly two and a half times in the same period, from 97 million tonnes to 207 million tonnes.

Ceramic tiles are produced by organised, as well as unorganised players. The share of production of organised players is around 55 per cent. The organised sector is characterised by the existence of a few large players, such as H. & R. Johnson, Kajaria Ceramics, Bell Ceramics, SPL, Spartek and Murudeshwar Ceramics. H. & R. Johnson leads the market with a market share of 21 per cent, followed by Kajaria Ceramics, with a market share of 13 per cent.

Exports and imports of tiles are rising

Apart from domestic demand, exports of ceramic tiles from India have also been increasing. From a level of US$ 33.3 million in 2001-02, exports of ceramic tiles from India have gone up to US$ 58.5 million in 2006-07, at a CAGR of 12 per cent.

India exports tiles to other parts of Asia, Africa and West Europe. The other main exports of ceramic products consist of chemical porcelain and insulators, handicraft artware and stoneware crockery.

Imports of tiles have gone up rapidly in recent years, to almost match the level of exports. From around US$ 8.3 million in 2001-02, imports have gone up to nearly US$ 55 million in 2006-07, at a CAGR of 46 per cent. Rising imports indicate the rapid growth in domestic demand for tiles, due to boom in real estate construction.

Indian sanitaryware market

India’s sanitaryware market is estimated at US$ 42 million. Production of sanitaryware has been increasing rapidly over the past few years and stands at nearly 190,000 tonnes per year. Production has been growing at about 17 per cent CAGR over the past 5 years.

About 50 per cent of production is from the organised sector, which comprises of about 15 firms. The unorganised sector, comprising of nearly 150 units, accounts for the other 50 per cent. EID Parry and Hindustan Sanitaryware are the biggest organised players, together accounting for about two-third of the output of the organised sector.
Exports have risen marginally, Imports have grown much faster

Exports of ceramic sanitaryware from India have gone up marginally, from US$ 17.9 million to US$ 20.7 million in the period 2001-02 to 2006-07. Imports have risen rapidly from nearly zero in 2002-03, to US$ 8.8 million in 2005-06. Rapid rise in consumption (production + imports) indicates the strong demand in the domestic market, driven by housing construction boom over the past 5 years.

Growth in the domestic construction industry is driving demand for ceramics

Construction industry in India has been experiencing rapid growth over the past few years, driven primarily by real estate construction. This, in turn, is driven by demand for housing and retail construction.

It is estimated that real estate construction in India will grow from US$ 99 billion in 2005 to US$ 112 billion by 2008. This will drive sustained demand in ceramics – both tiles and sanitaryware, as these are essential inputs for any real estate construction. Hence both these sectors offer attractive growth opportunities for existing players, as well as potential entrants. The increase in imports and domestic capacity indicates that demand is likely to match or exceed domestic supply in the short to medium term.

Critical success factors for the ceramics industry

The key factors for success for the ceramics industry are similar to that for glass, as they operate in similar markets and address similar consumer segments. Both use energy intensive manufacturing processes. Hence the key success factors for the ceramics industry will include:

- Efficient manufacturing processes
- Technology – especially in growing areas like porcelain and vitrified tiles
- Supply chain management and distribution
- Branding

Having a strong brand is more critical for ceramic tiles and sanitaryware, as these sectors address individual consumers. Players like H. & R. Johnson, EID Parry and Hindustan Sanitaryware invest substantially in advertising and brand building. Their efforts have been successful in creating a felt need for high-end ceramic products in houses, especially in urban areas. Going forward, the acceptance of technically superior, high-end products in these segments is expected to be better than in the past. However, as the market is getting increasingly competitive, players will still need to focus on creating a differentiated position in the market.
Conclusion

The glass and ceramics industry in India is poised for sustained growth, powered by long term demand for construction. In India, the construction sector is expected to do well mainly due to the fiscal incentives given to infrastructure development. Increase in income levels and availability of a range of financing options for housing is enabling rapid growth in housing construction.

At the same time, industry players are gearing up for growth through building capacity and focusing on technology and process improvements. Improving capability of Indian players is getting reflected in increasing exports across both ceramics and glass.

The industry offers a bright picture for existing players, as well as potential investors.
Appendix

CASE STUDY OF A SUCCESSFUL GLOBAL PLAYER IN INDIA: SAINT-GOBAIN

At present, there are several big global glass and ceramics players who have entered or are planning to foray into the Indian glass and ceramics industry. Saint-Gobain was one of the foremost players to enter India and the success story is exemplary for other potential entrants.

The Saint-Gobain group entered India in 1996 by acquiring a majority stake in Grindwell Norton. Since then, it has consolidated and strengthened its presence and today has four of its divisions operating in India, through six companies. Saint-Gobain Glass India Ltd. is Saint-Gobain’s largest greenfield venture in India.

Located at Sriperumbudur near Chennai, with an initial investment of US$ 125 million, this plant manufactures float glass for mirrors, architectural, automotive segments and other applications (solar panels, photo framing, etc). The group’s net turnover has seen a steady increase over the years. Glass accounted for the majority of sales, followed by abrasives, ceramics & plastics and reinforcements.

Saint-Gobain Glass manufactures a wide range of products, such as:

• Glass panels ranging in size from 4 sq ft weighing 1.5 kg to 240 sq ft weighing 1,000 kg
• Thickness ranging from 2 mm, all the way to 19 mm
• Widest range of tinted glass - green, bronze and dark grey (first for Saint-Gobain in the world)
• Online, pyrolytic coated reflective glass (first time in India)

Saint-Gobain India’s glass plant has the third lowest cost across its worldwide plants. Saint-Gobain Glass has grown rapidly in India, to become a dominant player in flat glass within a short time.

Some of the factors that have contributed to Saint-Gobain’s success in India include:

• Strong local management, commitment of resources
• Investing in people development to overcome lack of skills
• Vertical integration and development of quality supplier base
• State-of-the-art technology, strong brand building and wide distribution network
• Leveraging Indian operations for exports

CERAMIC PRODUCTS

• Technical Ceramics consist of adhesives, alumina products, bearings, beryllia products, bioceramics, dental bioceramics, medical implants, boride products, carbide products, catalysts, cermet coatings, boron nitride, carbon-carbon composites, ceramic-ceramic composites, ceramic-metal composites, ceramic-polymer composites, intermetallic cutters & knives, cutting tools, dies, engine components, filters, fuel cells, glass-ceramics, heat exchangers.

• Artistic ceramic products consist of ceramic artware, sculptures, glass artware, lighting, ornamental artware, pottery. These are typically mass consumption items and have large market shares. New designs and styles command consumer attraction and sale

• Electricals & Electronic applications include antennas, dielectric capacitors, conductors, crystals, diodes, electrical porcelain insulators, ferrites & ferromagnets, filters, forsterite ceramics, high voltage insulators, hybrid circuits, IC packings, R.C.L. low voltage magnets,
hard and soft magnets, oscillators, SAW piezoelectric, pyroelecticals, rectifiers, resistors, thick-film, resonators, semiconductors, sensors, spark plugs, substrates, aluminum nitride substrates, glass substrates, silicon carbide, superconductors, microwaves, wire tapes, thermistors, transducers, transformers, ultrasonic ceramics varistors.

Raw Material used in Ceramics

Raw materials used in the ceramic industry include amblygonite, andalusite, aplite, bauxite, bentonite, borax, calcite, chromite, clay, ball clay, China clay, enamel clay, engobe clay, fire or refractory clay, glaze clay, stoneware, cordierite, corundum, diatomaceous earth, dolomite, feldspar, flint, fluor spar forsterite, garnet, gypsum, hectorite, illite, kaolin, kyanite lime & limestone, lithium minerals, magnesite, mica, montmorillonite mullite, nepheline syenite, olivine, perlite, petalite, pumice pyrite, pyrophyllite, quartz, rutile, sapphire, silica, sillimanite and soda ash spinels.

INDUSTRY ASSOCIATIONS

<table>
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<th>Address</th>
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<tr>
<td>Indian Council of Ceramic Tiles and Sanitaryware</td>
<td>The Secretary General Indian Council of Ceramic Tiles and Sanitaryware, 4th Floor, PHD House, Opp. Asian Games Village, New Delhi - 110016. Tel: +91-11-26964238 Fax: +91-11-26511365 <a href="http://www.icctas.com">www.icctas.com</a></td>
</tr>
<tr>
<td>Ceramic Tile Institute of America</td>
<td>12061 W. Jefferson Blvd. Culver City, CA 90230-6219 Tel: +1(310) 574-7800 Fax: +1 (310) 821-4655 <a href="http://www.ctioa.org">www.ctioa.org</a></td>
</tr>
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<td>Ceramic Tile Distributors Association</td>
<td>800 Roosevelt Road, Building C, Suite 312 , Glen Ellyn, IL 60137, U.S.A. Tel: +1(800) 938-2832 Fax: +1(630) 790-3095 <a href="http://www.ctdahome.org">www.ctdahome.org</a></td>
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<tr>
<td>All India Glass Manufacturers' Federation</td>
<td>812, New Delhi House, 27, Barakhamba Road, New Delhi- 110001. Tel: +91-11-23316507 Fax: +91-11-23350357 <a href="http://www.aigmf.com">www.aigmf.com</a></td>
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Exchange Rate Used

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India Brand Equity Foundation
c/o Confederation of Indian Industry
249-F Sector 18, Udyog Vihar Phase IV
Gurgaon 122015, Haryana, INDIA

Tel: +91 124 401 4087, 4060 - 67
Fax: +91 124 401 3873, 401 4057
Email: j.bhuyan@ciionline.org
Web: www.ibef.org
Website in the Russian language: www.ibef.org/russia