

# Ample opportunities in India's FRP Pipes & tanks market

Vivek Patel

The FRP pipes and tanks are the class of composites end products which is manufactured by Hand lay-up as well as Filament winding process. Chopped strand mats, Single end roving and Stitched mats are used as fibre reinforcement with polyester, vinyl ester and epoxy resin in different compositions.

The FRP pipes and tanks sector have the largest application of composites in India because of its excellent corrosion resistance properties and rightly forms the backbone of Indian composites industry. Applications in this sector include chemical storage tanks, ducts, pressure vessels, large-sized overhead water storage tanks, underground petroleum storage tanks, and petroleum transportation equipments. This sector constitutes 32% of total composite consumption amounting to 56869.2 MT (Metric ton) in 2008. The FRP pipe industry in India alone consumes about 18188.1 MT (Metric ton) whereas the tank industry has a big chunk of 38681.1 MT (Metric ton) of composite materials. FRP pipe in the last five years has made a sound footing in India though its penetration is only 2% in the overall Indian pipe industry. The new entrants besides the existing Graphite India Ltd., and Strategic Engineering (Hepworth technology), are Amiantit (Flowtite technology) and Austria based Angerlehner.

The oldest user of FRP pipes and tanks in India has been the chemical industry. Due to the highly corrosive environment, the entry of FRP was comparatively easy and the typical applications are vessels, tanks, pipes etc. It has a well accepted and



Picture: GRP pipes for Sulfurous Gas Cleaning, Source: Tankinetics

matured application with established molders, industry standards, and many engineering consultants as well as clients. Major players here include Chemical Process Equipment. The Petroleum sector is another important segment, which has a massive potential for FRP tanks. Underground tanks, piping systems and signage have been common application with the petroleum companies. The public sector petroleum refineries and marketing companies in India, however, largely use steel tanks for both underground storage and transportation. With the initial opening up of the petroleum retailing market to private players, the FRP/GRP tank industry received tremendous boost. Amiantit Fiberglass Industries India Pvt

Ltd (AFIL) alone received order for 5,000 Single Wall Glass Fibre Reinforced Polyester (GRP) underground fuel storage tanks from Reliance Industries and 2000 Double Wall GRP tanks for Shell India involving several million of dollars. The euphoria generated in this sector also attracted other global major like Beluga Tanks that opened its Indian subsidiary, Beluga Tanks India Pvt. Ltd in 2006 and was also given approval by the Petroleum and Explosives Safety Organization (PESO) of the Government of India to supply its fiberglass underground storage tanks for petroleum retail outlets.

In India, the FRP pipes and tanks have huge market potential. It is replacing



Picture: GRP Tanks, Source: Belding Tanks

plastics based pipes due to its chronic problem of repair and maintenance, arising due to corrosion. The repair and maintenance costs can be very high over the service life of the pipe. This problem can be solved by the use of FRP pipes. FRP pipes are cost effective when life cycle costs are considered. They also provide excellent corrosion resistance. FRP pipes are now widely gaining acceptance for usage in transportation of potable water, sewage, de-salination, offshore oil production, paper and pulp industry, power plant etc.

One promising application of FRP pipe is Sewerage treatment and disposal. The existing sewerage management infrastructure in India is extremely poor in many cities. First of all, the sewerage disposal network needs to be created in many upcoming cities and expansion projects. The existing networks are very old, some of them are more than 100 years old. The British time networks need rehabilitations and the best material for the same is FRP. The best way to get an idea is from an example, say, Bombay Municipal Corporation where the first pilot projects are initiated with FRP pipes. Mott MacDonalds was appointed as consultant to make an extensive study of the existing network and recommend the rehabilitation and creation of new networks taking into account the next 20 years. This study has resulted in the

recommendation that more than 186.4 miles (300 kms) of sewer lines in the city of Bombay would need rehabilitation.

All the cities are not as old or as big or as wealthy as Bombay. Hence a realistic assumption would be that over the next 10 years there would be 50 kms of sewer lines per targeted city, which would need rehabilitation. This would mean 5 kms of rehabilitation per year per city. We assume that the municipal corporations are willing to explore the FRP pipes technology in 12% cases for their sewer rehabilitation needs and hence a market size of 0.5 km per city for FRP pipes. Roughly 10 tons of glass would be required per km, which would amount to 5 tons per city. In India, there are more than 100 such sewerage networks and therefore a conservative estimate would be around 500 tons of glass per annum for the next 10 years. This is apart from the, requirement for new sewer lines.

The key advantages of FRP pipes and tanks are:

- Light weight
- High strength to weight Ratio
- Excellent flow characteristics
- Low thermal Conductivity and low thermal expansion
- Corrosion resistance
- Size variety

- Ease of installation and repair
- Long service life
- Hydraulic efficiency and
- Non-toxic.

The Indian composites market is fragmented in the terms of demand and supply scenario, consisting of few heavyweight players and bunch of medium and small sized manufacturers who are spread all over India. The numbers of multi-national companies in Indian composites market has almost tripled from 10 in 2004 to 30 in 2008 and are in various stages of operation. (Beluga Tanks, Amiantit, Hepworth, Angerlehner, Pentair, Reichhold, Vestas, DuPont, GE, Saertex, Enercon, LM, Owens Corning, Fibergate, DSM, SABIC,

% distribution of Pipe & tank by composites applications

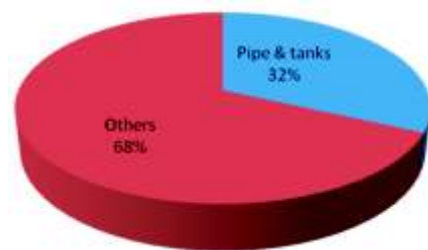


Fig 1: % distribution of pipe & tank by composites applications

Composites Shipment in Pipe & tanks applications

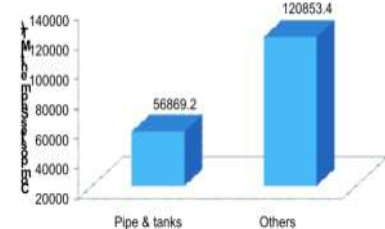


Fig 2: Composites Shipment (MT) in pipe & tanks

Composites Shipment in Pipe & tanks applications

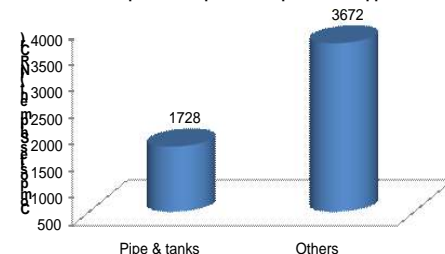


Fig 3: Composites Shipment (INR Cr) in pipe & tanks



Ashland, Georgia Pacific, DIAB, Solvay, Axson, Saint- Gobain, Fiberfil, Quickstep Holdings, Baysystems, Vetrotex, Mitsui Prime, Loparex).

It is estimated that total composites production in India was at around 177722.6 MT (Metric ton), by the end of 2008. The industry caters mostly to the domestic market and only 10-12 % of total production is exported. The composites industry in India is growing robustly with 19 % growth during the past 5 years complementing the healthy growth of Indian economy at more than 8%. Still, it is many times smaller than the Indian plastic industry. India's composite market at the end of 2008 was estimated at INR 5400 crores. In India, the pipe and tank industry share 32% of the total composites consumption and, the shipment is 56869.2 MT in volume and INR 1728 crores in value.

Some of the driving factors for the growth of Indian FRP pipe and tanks market are as follows:

- Foreign investment in composites industry in India is likely to cross Rs. 1000 cr. from the present value of Rs. 700 crores (approx.) in the next 4-5 years.
- GDP growth in FY 2008-09 was 7.1% and would shoot up in the next 4-5 years.
- Burgeoning growth in oil and gas sector as well as in the chemical industry.
- Growing urban infrastructure need for FRP pipes for sewage and water transportation.

- Heavy investment in infrastructure.
- With the slowdown of North American and European market, global players are increasingly investing in the Indian composites market.
- Increases in per-capita and generic consumption of composite products.
- India today is the fourth largest economy in the world and the second fastest growing market in Asia.
- India offers large potential for global collaboration both in trade and technology in composites applications.
- The production costs for making composite products can be 35-45% cheaper in India than in advanced countries in the area of hand lay-up, and at least 25% cheaper in the mechanized production processes (Filament winding).

This industry has some challenges which are as follows:

Cost of GRP pipes and tanks are still 42% higher than the steel ones in India. Low level of awareness among end user sector/government Agencies. Fabrication time is higher for composites tank. Lack of quality consciousness among small FRP/GRP manufacturers. (Can give a bad name to the industry). Little effort to develop new products and applications. In India, there are few players in FRP pipes and tanks. The fact is that this sector is totally fragmented and

unorganized. The major players' list is given below:

Pentair India manufactures structural branded fiber reinforced polymer (FRP) pressure vessels, which are used in industrial and domestic applications for water treatment, filtration, softening, purification etc. FRP pressure vessels made by Pentair India ranges from 18" to 63" in diameter and contain LLDPE lining. Filament winding is done on the LLDPE rotomolded vessels axially, biaxially and across the length.

Graphite India Limited is the pioneer in the field of manufacturing large diameter Glass fibre Reinforced Plastic (GRP ) pipes by continuous filament winding process in India. This technology was provided by Owens Corning, USA world leader in glass fibre and allied products, in lieu of royalty payment. However Amiantit has purchased this technology in 2000 and presently has patented it. Graphite manufactures "Everflow" G R P pipes in its plant at Gonde, Nashik. The composite laminate is a combination of glass fibre, unsaturated polyester resin and fillers. On an average, it produces around 10 12 kms per month, i.e., 120 140 kms length of pipe per annum of the size range of 600 mm dia 1200 mm dia. The FRP pipes and tanks are manufactured on a computer-controlled filament winding machine by continuously advancing the mandrel. The in-built curing device ensures that the FRP pipes thus manufactured provide consistently the high level of quality.

Leaders in Pipe Market	Leaders in Tank Market
<b>Graphite India Limited</b>	<b>Pentair Water India Pvt. Ltd.</b>
<b>Shriram EPC Ltd</b>	<b>Chemical Process Equipment</b>
<b>Amiantit</b>	<b>Fabtech Industries</b>
<b>Angerlehner Composites Pvt. Ltd.</b>	<b>Coromandel Prodorite</b>
<b>Kineco</b>	<b>Kineco</b>
<b>Others</b>	<b>Sunrise Polymers</b>
	<b>Gandhi &amp; Associates</b>

A joint venture between Saudi Arabian pipe manufacturer and Salgaocar Group in India, earlier known as Amitech, it was restructured as AFIL in 2003. Its Goa plant is one of the biggest manufacturer of GRP single- and double-wall storage tanks. It has successfully undertaken and delivered some big-ticket orders for GRP pipes and tanks in drinking water projects and petroleum storage and transportation. This includes a US\$6.5 million contract from Essar Oil and US\$ 10 million from Reliance (India's largest petrochemicals and refining company) for engineering, supply and installation, supervision of GRP pipes for the sea water intake and outfall system for their refineries in 2006. In the tank category, AFIL supplied 5000 single-wall GRP underground fuel storage tanks to Reliance Industries, the world's largest order ever. It also supplied double-wall GRP underground fuel storage tanks worth \$3.5 million to Dutch oil company Shell India, which has a license to open 2000 retail outlets. AFIL's another major project is for supplying Flowtite corrosion-resistant pipe systems for water transportation drinking water projects in rural India worth USD 18.7 million. The company recorded a turnover of around Rs. 200 cr. in 2007, that it expects to scale up to Rs.500 crore by 2012.

Strategic Engineering Limited is a pioneer in India in the manufacture of quality Filament Wound Composite Products. The company aspires to become a leader in composites technology. SEPL manufactures products following international standards and practices through motivated, trained and dedicated human resources by innovative manufacturing processes.

Strategy was created by a dedicated group of entrepreneurs from around the world with a shared vision of developing innovative applications at a very affordable cost using space-age composite technology. India was chosen as the manufacturing base since it offers a highly skilled technical workforce at very competitive rates.

Austrian major Angerlehner Composites is a medium sized civil engineering company with various subsidiaries in different fields. After successfully completing the renovation of the sewerage of Mumbai between 2001 and 2004, Angerlehner signed a contract with Kolkata Municipal Corporation in January 2008 for the first sewer rehabilitation project in Kolkata that envisages the rehabilitation of several kilometers of more than 100 year old main sewer lines in the next two years. With a total value of EUR 20 million a contract for a similar project was signed in Delhi. The value of contract amounts to around EUR 11 million. With another project currently being executed in Delhi, Angerlehner's total volume of projects in India would amount to EUR 40 million. The company is a specialist in the MCS-InLiner system, which offers the worldwide unique possibility to expand the existing pipes by using a milling machine to remove the inside surface and the use of glass fiber reinforced plastic pipes. The system provides both an increase of flow and the correction of sags in the alignment, as well as an extraordinary improvement of the static load bearing capacity.

Kineco has set up a joint venture with US FRP pipe manufacturer Conley Corporation of Tulsa, Oklahoma, in 2006 for the manufacture of glass reinforced epoxy (GRE) piping systems at an investment of USD1 million. The joint venture is called Conley Kineco Pipe System Private Limited in Goa. It is the first GRE pipe manufacturing plant in India. The plant will manufacture filament wound pipes, fittings and accessories using Conley's proprietary technology and will have an annual

production capacity in the range of 75-150 km depending on the pipe diameter. The joint venture's target markets include the petroleum onshore and offshore sectors, shipping, chemical and pharmaceutical plants, and water and waste water installations.

*(Note: - The % market share of Shriram EPC Limited is due to acquisition and merger of Strategic Engineering (P) Ltd)*

### Growth opportunity in India.

This sector presently constitutes the largest component in composites application sector because of better corrosion-resistance, high strength-to-weight ratio, low maintenance and life-cycle cost of composite materials compared to competing materials such as steel, plastics and concrete. Composites consumption in this sector will grow at 20 % (CAGR) during 2008-13. Chemical industry in India has received investment proposals worth Rs. 31.58 lakh crore of which Rs. 2.60 lakh crore has been actually invested. Government of India in 2007 launched policy for Integrated Petroleum, Chemical and Petrochemical Investment Regions( IPCPIR), a delineated investment region having an area of about 250 sq. km that would accommodate manufacturing facilities for domestic and export led production in petroleum, chemicals and petrochemicals along with associated services and infrastructure and 4 such IPCPIR are being planned and each one is likely to get an investment of Rs 35,000 crore to Rs 40,000 crore. FRP/GRP chemical equipments, pipes and tanks would receive tremendous boost as a result of these investments. Another growth factor would be increased investment in urban and rural infrastructure for water transportation and rehabilitation of sewage lines. The piping industry is benefiting from all these activities. Demand for filament wound composite pipe is strong, and many Indian companies are setting up production plants.

Market % Share of Pipe's Industry Player by Composites Demand

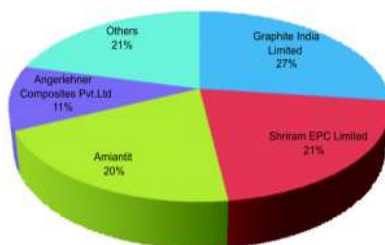


Fig 4: Market share by Molders

India has very low pipe penetration levels at 32% compared to global average of 79% in oil and gas transport. The pipeline network of India for oil and gas transport stood at 13,517 kms as on April 06. There are a vast number of potential applications for composites in the oil and gas sector in India over the coming years in high-pressure pipes and pipe fittings. Both domestic units like ONGC, Reliance and multi-national companies like Shell, Cairn Energy are running several onshore and offshore exploration projects in India. Because of their low weight, corrosion resistance, improved life-cycle costs and enhanced safety, it is predicted that composite materials can capture 50% of this market in the oil and gas sector in the next 5-6 years.

Also the fast growing urban infrastructure needs and fulfillment of Millennium Development Goals (MDG) involving supply of safe drinking water and ensuring sanitation measures have made the Indian pipe industry grow by leaps and bounds. Government agencies

in the states of Rajasthan, Andhra Pradesh and Kerala undertook massive water supply schemes with Amiantit receiving order for USD 18.7 million for its Flowtite corrosion-resistant pipe systems for water transportation. Graphite India, another major player also witnessed a record high of 102% growth in its Glass Reinforced Plastic Pipes (GRP) Division.

### India's comparative advantage

- Low comparative skilled labor rates
- Low per capita consumption of composites

Per capita composite consumption

Countries	Overhead composite consumption
India	0.09 kg
China	0.8 kg
US	7 kg

Some of the emerging and growth markets for composites pipes and tanks are listed below: Water supply and sewerage. Transportation of crude oil, oil products and natural gas. Industrial piping for oil refineries, petrochemical complexes, engineering and steel industries. Casting pipe for offshore and on-shore drilling and tubular for oil and gas offshore platforms and decks. Pipeline for transport of metallic ores/minerals in slurry form in pelletisation plants and coal ash in thermal power plants.



Vivek Patel

(Contact : [vivepatel@gmail.com](mailto:vivepatel@gmail.com))