Production of Glass Fiber.

Investment Opportunities in Composites Industry
**Introduction**

Glass fiber also called fiberglass. It is material made from extremely fine fibers of glass. Fiberglass is a lightweight, extremely strong, and robust material. Although strength properties are somewhat lower than carbon fiber and it is less stiff, the material is typically far less brittle, and the raw materials are much less expensive. Its bulk strength and weight properties are also very favorable when compared to metals, and it can be easily formed using molding processes.
Glass fiber is manufactured from various raw materials, namely, silica sand, alumina, limestone, clay, and boric acid. There are different types of glass fiber, like E-glass and S-glass, depending on the mechanical properties. E-glass has high mechanical properties and it is used in armor applications.
Types of Glass Fiber

As to the raw material glass used to make glass fibres, the following types of glass fiber:

1. A-glass: With regard to its composition, it is close to window glass. It is mainly used in the manufacture of process equipment.

2. C-glass: This kind of glass shows better resistance to chemical impact.

3. E-glass: This kind of glass combines the characteristics of C-glass with very good insulation to electricity.

4. AE-glass: Alkali resistant glass.
Generally, glass consists of quartz sand, soda, sodium sulphate, potash, feldspar and a number of refining and dying additives. The characteristics, with them the classification of the glass fibres to be made, are defined by the combination of raw materials and their proportions. Textile glass fibres mostly show a circular.

Glass fibres can be used as a reinforcing agent for different types of vegetable oil-based polymer composites because of their availability, low cost, high strength and chemical resistance. Different types of silicate glass fibres are used in the preparation of polymer composites, but lime-alumina-borosilicate (E-glass) glass fibre is the most widely used. It can be used as chopped strand mat, ribbon and woven fabrics. Although it exhibits high strength (tensile strength 3.45 kN mm$^{-2}$), creep and chemical resistance, its specific gravity (2.5) is relatively high, which limits its uses in many advanced applications where light weight is important.
Glass fibers are useful because of their high ratio of surface area to weight. However, the increased surface area makes them much more susceptible to chemical attack. By trapping air within them, blocks of glass fiber make good thermal insulation, with a thermal conductivity of the order of 0.05 W/ (mK).

Indian glass fiber market is set to grow substantially in the next five years. The glass fiber industry in India is mainly driven by its domestic consumption by government, NGOs, and civic bodies. The Indian government use glass fiber in their defense segment and some projects may have more than 50% glass fiber materials used in them.
Though the glass fiber industry slowed down during recession, it has gained momentum after 2011. According to market forecasts, India glass fiber market is expected to reach 754 million pounds ($752.7 M) by 2018.

The fiberglass market was estimated at USD 13.95 Billion in 2017 and is projected to reach USD 18.75 Billion by 2022, at a CAGR of 6.1% between 2017 and 2022. The fiberglass market is growing due to the extensive use of fiberglass in the construction industry, use of fiberglass composites by the automotive industry for enhanced performance, and an increasing number of wind turbine installations.
Global Glass Fiber Market Volume Share

By Application, 2015

- 32.1% Building & Construction
- XX.XX Transportation
- XX.XX Consumer goods
- XX.XX Wind turbine
- XX.XX Industrial
- XX.XX Others

2016-24 at a CAGR of 6.4%
The global glass fiber market is promising with opportunities in the end use industries such as transportation, construction, pipe and tank, electrical and electronics, wind energy, and consumer goods, tanks, printed circuit boards, wind blades, and automotive parts.

Emerging trends, which have a direct impact on the dynamics of the glass fiber industry, include cost optimization and performance enhancement of glass fibers.
Glass fiber is primarily used as a composite in construction industry. It is highly used in building materials owing to the properties, such as lightweight, fire resistant, anti-corrosive, and exhibits excellent strength. It has been widely used in the construction industry for non-structural elements, like facade panels, piping, and channels. This material is very good in making shapes on the front of any building and it is less dense than steel. Therefore, the usage of glass fiber is increasing in construction industry, which is fueling the demand during the forecast period.

Glass fiber is the most widely used reinforcing material in composites across the globe and accounts for a more than 90% share of reinforcement materials used in fiber reinforced plastics.
Glass fiber offers qualities such as low weight, high strength, and impact resistance when compared to its substitutes. Demand for glass fiber is high in end-use applications such as building and construction, transportation, consumer goods, industrial, and wind turbine.

Glass fiber comprises many extremely fine fibers of glass and is amorphous in nature. Glass fiber can also be used as a reinforcement material in plastic. Silicon dioxide, calcium dioxide, aluminum dioxide, and boron oxide are the key raw materials used in the production of glass fibers.
Glass fiber is used in mats and fabrics as it offers corrosion resistance and thermal and electrical insulation. It is used in construction, aerospace tooling, automotive, electronics, and wind energy industries because of its excellent mechanical properties such as high tensile strength, stiffness, dimensional stability, thermal conductivity, and chemical resistance. Glass fiber reinforced concrete (GFRC) is a high-performance building material that is used in the construction industry. Owing to its low weight, high strength-to-weight ratio, and excellent durability, it is used in the automotive and wind energy industries.
Glass Fiber Market: Revenue Share (%), Global, 2017
Marine and automotive industries are among the key consumers of glass fibers owing to the need for impact resistance and lightweight materials. As glass fibers are lightweight and impact resistance in nature, they are being incessantly employed in the automotive and marine industries. They are the primary reinforcement materials in the marine composited. Glass fibers such as e-glass fibers are employed in the manufacturing of glass fiber reinforced plastics (GFRPs). Glass fiber reinforced plastics have features such as durability, high strength to weight ratio, and weather resistance, which are necessary for materials being used in the manufacturing of marine and automobile components.
Glass fibers account for over 90% of the reinforcements that are used in the manufacturing of composites across the globe. There is an increased demand for glass fiber composites in the aerospace, automotive, wind energy, and construction & infrastructure applications, owing to their lightweight, high inherent strength, weather-resistant finish, and variety in surface textures offered by them. As the demand for glass fiber composites is increasing across the globe, several companies are investing in setting up their glass fiber composites manufacturing plants in the emerging economies such as China, India, etc. One of the major composite manufacturing companies, Owens Corning (U.S.), signed a strategic alliance with two China-based glass fiber manufacturing companies, namely, Xingtai Jinniu and Taishan Fiberglass in 2013 to enhance its supply of customized glass fiber reinforcements in the Asia-Pacific region.

In 2017, the glass fiber market reached 2.5 billion pounds in terms of volume of composites materials produced.
Machinery Photographs

Automatic Batching System
Automatic Control System

Wire Drawing & Auxiliary Equipment
## Project at a Glance

### Cost of Project

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Existing</th>
<th>Proposed</th>
<th>Total</th>
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</thead>
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### Means of Finance

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# Project at a Glance

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<th>Debt Divide and Retained Earnings</th>
<th>Payout Probability Market Price</th>
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<th>Yield Price/Book Value</th>
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# Project at a Glance

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<th>Profitability Ratio</th>
<th>Asset Turnover Ratio</th>
<th>Current Ratio</th>
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<td></td>
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<td>(Number of times)</td>
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<td>%</td>
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### Project at a Glance

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<tr>
<td>Fixed Assets Coverage Ratio ( No. of times )</td>
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Major Queries/Questions Answered in the Report?

1. What is Glass Fiber Manufacturing industry?

2. How has the Glass Fiber Manufacturing industry performed so far and how will it perform in the coming years?

3. What is the Project Feasibility of Glass Fiber Manufacturing Plant?

4. What are the requirements of Working Capital for setting up Glass Fiber Manufacturing plant?
5. What is the structure of the Glass Fiber Manufacturing Business and who are the key/major players?

6. What is the total project cost for setting up Glass Fiber Manufacturing Business?

7. What are the operating costs for setting up Glass Fiber Manufacturing plant?

8. What are the machinery and equipment requirements for setting up Glass Fiber Manufacturing plant?
9. Who are the Suppliers and Manufacturers of Plant & Machinery for setting up Glass Fiber Manufacturing plant?

10. What are the requirements of raw material for setting up Glass Fiber Manufacturing plant?

11. Who are the Suppliers and Manufacturers of Raw materials for setting up Glass Fiber Manufacturing Business?

12. What is the Manufacturing Process of Glass Fiber?
13. What is the total size of land required for setting up Glass Fiber Manufacturing plant?

14. What will be the income and expenditures for Glass Fiber Manufacturing Business?

15. What are the Projected Balance Sheets of Glass Fiber Manufacturing plant?

16. What are the requirement of utilities and overheads for setting up Glass Fiber Manufacturing plant?

17. What is the Built up Area Requirement and cost for setting up Glass Fiber Manufacturing Business?
18. What are the Personnel (Manpower) Requirements for setting up Glass Fiber Manufacturing Business?

19. What are Statistics of Import & Export for Glass Fiber?

20. What is the time required to break-even of Glass Fiber Manufacturing Business?

21. What is the Break-Even Analysis of Glass Fiber Manufacturing plant?

22. What are the Project financials of Glass Fiber Manufacturing Business?
23. What are the Profitability Ratios of Glass Fiber Manufacturing Project?

24. What is the Sensitivity Analysis-Price/Volume of Glass Fiber Manufacturing plant?

25. What are the Projected Pay-Back Period and IRR of Glass Fiber Manufacturing plant?

26. What is the Process Flow Sheet Diagram of Glass Fiber Manufacturing project?
27. What are the Market Opportunities for setting up Glass Fiber Manufacturing plant?

28. What is the Market Study and Assessment for setting up Glass Fiber Manufacturing Business?

29. What is the Plant Layout for setting up Glass Fiber Manufacturing Business?
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   1.1.1. General
   1.1.2. Location & Geographical Area
   1.1.3. Climate
   1.1.4. Map
   1.1.5. Topography
   1.1.6. Availability of Minerals
   1.1.7. Forest
   1.1.8. Large/Heavy & Medium Scale Industries
   1.1.9. Transport

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4. PROPERTIES

5. COMPOSITION OF CFGF

6. PRODUCT DESCRIPTION
   6.1. FEATURES

7. B.I.S. SPECIFICATION
   7.1. IS: 6181 – 1971 VARNISH BONDED GLASS-FIBRE BRAIDED RECTANGULAR COPPER CONDUCTORS
   7.2. IS: 6411 – 1985 SPECIFICATION FOR GEL-COATED GLASS FIBRE REINFORCED POLYESTER RESIN BATH TUBS
7.3. IS: 10192 – 1982 SPECIFICATION FOR SYNTHETIC RESIN BONDED GLASS FIBRE (SRBGF) FOR ELECTRICAL PURPOSES
7.4. IS: 10661 – 1983 SPECIFICATION FOR GLASS FIBRE REINFORCED POLYESTER CHEMICAL RESISTANT TANKS
7.5. IS: 11273 – 1992 WOVEN ROVING FABRICS OF ‘E' GLASS FIBRE – SPECIFICATION (FIRST REVISION)
7.6. IS: 11551 – 1996 GLASS FIBRE CHOPPED STRAND MAT FOR THE REINFORCEMENT OF EPOXY, PHENOLIC AND POLYESTER RESIN SYSTEMS – SPECIFICATION (FIRST REVISION)

8. MARKET SURVEY
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8.2. INDIAN COMPOSITES INDUSTRY OUTLOOK
8.3. RAW MATERIALS CONSUMPTION
8.4. SECTORS/APPLICATIONS
8.5. GROWTH AREAS
8.6. KEY VENDORS
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9. EXPORT & IMPORT: ALL COUNTRIES
9.1. EXPORT: ALL COUNTRIES
9.2. IMPORT: ALL COUNTRIES

10. FINANCIALS & COMPARISON OF MAJOR PLAYERS/COMPANIES
10.1. ABOUT FINANCIAL STATEMENTS OF CMIE DATABASE
10.2. PROFITS & APPROPRIATIONS
10.3. TOTAL LIABILITIES
10.4. TOTAL ASSETS
10.5. NET CASH FLOW FROM OPERATING ACTIVITIES

10.6. SECTION – I
10.6.1. Name of Company with Contact Details
10.6.2. Name of Director(S)
10.6.3. Plant Capacity
10.6.4. Credit Ratings
10.6.5. Location of Plant
10.6.6. Name of Raw Material(S) Consumed With Quantity & Cost

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10.7.1. Assets
10.7.2. Cash Flow
10.7.3. Cost as % Ge of Sales
10.7.4. Forex Transaction
10.7.5. Growth in Assets & Liabilities
10.7.6. Growth in Income & Expenditure
10.7.7. Income & Expenditure
10.7.8. Liabilities
10.7.9. Liquidity Ratios
10.7.10. Profitability Ratio
10.7.11. Profits
10.7.12. Return Ratios
10.7.13. Structure of Assets & Liabilities (%)
10.7.14. Working Capital & Turnover Ratios

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12. EXPORT & IMPORT STATISTICS DATA OF INDIA
12.1. EXPORT STATISTICS DATA FOR FIBER GLASS
12.2. IMPORT STATISTICS DATA FOR FIBER GLASS

13. PRESENT MANUFACTURERS

14. INDIAN COMPANIES

15. RAW MATERIAL

16. MANUFACTURING PROCESS
   16.1. E-GLASS PRODUCTION
   16.2. GLASS FIBER PROCESS

17. PROCESS FLOW DIAGRAM

18. BUYER’S LIST
   18.1. CONTACT DETAILS OF BUYER’S
   18.2. NAME OF DIRECTOR(S)
   18.3. PLANT CAPACITY
   18.4. LOCATION OF PLANT
   18.5. COMPANY WISE CONSUMPTION DETAIL OF THE RAW MATERIALS

19. PLANT & MACHINERY REQUIREMENTS

20. HEALTH & SAFETY ASPECTS OF CFGF
20.1. INHALATION
20.2. EFFECTS ON SKIN AND MUCOUS MEMBRANES
20.3. HUMAN EPIDEMIOLOGY
20.4. CLASSIFICATION AND REGULATORY ASPECTS
20.5. INDUSTRY RECOMMENDED WORK PRACTICES

21. SUPPLIERS OF PLANT & MACHINERY

22. SUPPLIERS OF RAW MATERIAL

23. PHOTOGRAPHS/IMAGES FOR REFERENCE
23.1. PRODUCT PHOTOGRAPHHS
23.2. MACHINERY PHOTOGRAPHHS
23.3. RAW MATERIAL PHOTOGRAPHHS

24. PLANT LAYOUT

25. QUOTATION OF PLANT, MACHINERY AND EQUIPMENTS FROM SUPPLIER
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- Production Schedule
- Land & Building
- Factory Land & Building
- Site Development Expenses

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  - Other Machineries (Miscellaneous, Laboratory etc.)

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  - Furniture & Fixtures
  - Pre-operative and Preliminary Expenses
  - Technical Knowhow
  - Provision of Contingencies

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  - Raw Material
  - Packing Material
  - Lab & ETP Chemical Cost
  - Consumable Store
• Overheads Required Per Month and Per Annum………………………….8
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- Gross Profit
- Financial Charges
- Total Cost of Sales
- Net Profit After Taxes
- Net Cash Accruals
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- Current Assets
- Gross Working Capital
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