

Pre-Feasibility Study

FIBER GLASS PRODUCTS MANUFACTURING UNIT



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1. DISCLAIMER

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2. EXECUTIVE SUMMARY

Fiber Glass is also called Glass Reinforced Plastic (GRP), is a type of fiber-reinforced plastic. It is made from thermoset polymer usually a resin and a chopped strand mat, 6% cobalt naphthenate¹ (a chemical used as a catalyst to accelerate the reaction) is also used with resin. Mainly it is formed by spreading the mixture of resin and cobalt on the mat, which dries in 1.5-2.5 hours. It is cheaper, movable, replaceable, more flexible than carbon fiber, and good looking as compared to concrete roofs (for parking sheds). It is stronger than many metals as in nonmagnetic and nonconductive quality. Fiber glass as an insulator is preferred as compared to metals in situation where conductivity is prohibited. Fiber glass can be easily molded in complex shapes as compared to metals.

Fiber glass is used to manufacture many products, such as sheds, doors, water tanks, boats, wall covering, swimming pools, bath tubs, septic tanks, roofing and pipes. Among these, fiber glass sheds and fiber glass roofing are highly demanded in market, since it requires less time for installation and looks attractive.

The proposed business targets to manufacture three types of fiber glass products related to construction sector. These are simple fiber glass sheets, designed fiber glass sheets and fiber glass roofing sheets. Fiber glass sheets (simple and designed) are usually used as a protection from sun in parking areas, lawns etc. Fiber glass roofing sheets are used in roofs from the protection of sun, rain, and in hilly areas it used as a protection from snow fall. Simple fiber glass sheet is the plain sheet of green color, without any design. Designed fiber glass sheet have different colors and ornamental designs on it. These designs may be in the form of plants, birds and flowers etc. Roofing sheets are used for its better impact and weather resistance and for its lower cost as compared to cement blocks (which are used for roofing). Business will also provide service of installation into sheds or roofs. For installation of sheds and fiber glass roofs the business has teams, consists of one skilled labor and 2 unskilled labors.

In urban areas, people prefer to use fiber glass sheets in their houses, offices and other areas, because these sheets are less costly, have a longer life with minimal maintenance, are easy to install and provide a nice look to the building. The proposed manufacturing unit would ideally be located in larger cities of Pakistan like Karachi, Lahore, Faisalabad, Islamabad, Peshawar, Quetta, Multan, Rawalpindi, Bahawalpur, Sargodha, Sialkot, Gujranwala, Gujrat, Hyderabad, Mardan, Sahiwal and other cities of Pakistan. These cities have also been proposed due to presence of large urban population, availability of required resources, availability of good infrastructure and qualified manpower.

The proposed manufacturing unit will operate in a single shift of 9 hours a day in a day for 300 days in a year. Further, it is assumed that the operational capacity for the manufacturing unit is 50% during the first year of its operations. The capacity will

¹ Cobalt Naphthenate is widely used in polyester resins and paint driers as a curing accelerator, cross linker catalyst for unsaturated polyester resins.

increase at the rate of 5% per annum attaining a capacity of maximum of 95% of its total manufacturing capacity during the projected period of 10 years. The manufacturing unit will manufacture three different fiber glass sheets which includes 705,600 sq ft simple fiber glass sheets at maximum capacity (which includes 302,400 sq ft fiber glass sheets of 1mm per year, 201,600 sq ft fiber glass sheets of 1.5mm per year and 201,600 sq ft fiber glass sheets of 2mm per year), 655,200 sq ft design fiber glass sheets at maximum capacity (which includes 252,000 sq ft fiber glass sheets of 1mm per year, 201,600 sq ft fiber glass sheets of 1.5mm per year and 201,600 sq ft fiber glass sheets of 2mm per year) and 504,000 sq ft roofing fiber glass sheets at maximum capacity (which includes 302,400 sq ft fiber glass sheets of 1mm per year and 201,600 sq ft fiber glass sheets of 1.5mm per year).

The initial year manufacturing capacity of the proposed fiber glass products manufacturing unit is assumed to be 50% at which the proposed unit will manufacture three different fiber glass sheets which includes 352,800 sq ft simple fiber glass sheets (which includes 151,200 sq ft fiber glass sheets of 1mm per year, 100,800 sq ft fiber glass sheets of 1.5mm per year and 100,800 sq ft fiber glass sheets of 2mm per year), 327,600 sq ft design fiber glass sheets (which includes 126,000 sq ft fiber glass sheets of 1mm per year, 100,800 sq ft fiber glass sheets of 1.5mm per year and 100,800 sq ft fiber glass sheets of 2mm per year) and 252,000 sq ft roofing fiber glass sheets (which includes 151,200 sq ft fiber glass sheets of 1mm per year and 100,800 sq ft fiber glass sheets of 1.5mm per year).

This manufacturing unit will be set up in a rented building with an area of 5,125 square feet (23 Marla). The proposed business requires a total investment of PKR 23.43 million. This includes capital investment of PKR 9.12 million and working capital of PKR 14.32 million. The project will be established using 100% equity financing. The Net Present Value (NPV) of project is PKR 126.69 million with an Internal Rate of Return (IRR) of 78% and a Payback period of 2.11 years. Further, this project is expected to generate Gross Annual Revenues of PKR 356.94 million during 1st year, Gross Profit (GP) ratio ranging from 6% to 16% and Net Profit (NP) ratio ranging from 1% to 12% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 30% (551,596 sheets) with annual breakeven revenue of PKR 211.160 million.

The proposed project may also be established using leveraged financing. At 50% financing at a cost of KIBOR+3%, the proposed business provides Net Present Value (NPV) of PKR 153.38 million, Internal Rate of Return (IRR) of 76% and Payback period of 2.17 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 1% to 12% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 33% (620,446 sheets) with breakeven revenue of PKR 237.52 million.

The proposed project will provide employment opportunities to 78 people. High return on investment and steady growth of business is expected to the entrepreneur having

some prior experience or education in the related field of business. The legal business status of this project is proposed as “Sole Proprietorship” or “Partnership” concern.

3. INTRODUCTION TO SMEDA

The Small and Medium Enterprises Development Authority (SMEDA) was established in October 1998 with the objective to provide fresh impetus to the economy through development of Small and Medium Enterprises (SMEs).

With a mission "to assist in employment generation and value addition to the national income, through development of the SME sector, by helping increase the number, scale and competitiveness of SMEs", SMEDA has carried out ‘sectorial research’ to identify policy, access to finance, business development services, strategic initiatives and institutional collaboration and networking initiatives.

Preparation and dissemination of prefeasibility studies in key areas of investment has been a successful hallmark of SME facilitation by SMEDA.

Concurrent to the prefeasibility studies, a broad spectrum of business development services is also offered to the SMEs by SMEDA. These services include identification of experts and consultants and delivery of need-based capacity building programs of different types in addition to business guidance through help desk services.

National Business Development Program for SMEs (NBDP) is a project of SMEDA, funded through Public Sector Development Program of Government of Pakistan.

The NBDP envisages provision of handholding support / business development services to SMEs to promote business startup, improvement of efficiencies in existing SME value chains to make them globally competitive and provide conducive business environment through evidence-based policy-assistance to the Government of Pakistan. The Project is objectively designed to support SMEDA's capacity of providing an effective handholding to SMEs. The proposed program aimed at facilitating around 314,000 SME beneficiaries over a period of five years.

4. PURPOSE OF THE DOCUMENT

The objective of the pre-feasibility study is primarily to facilitate potential entrepreneurs in project identification for investment. The project pre-feasibility may form the basis of an important investment decision and in order to serve this objective, the document/study covers various aspects of project concept development, start-up, and production, marketing, finance and business management.

The purpose of this document is to facilitate potential investors in setting up a “Fiber Glass Products Manufacturing Unit” by providing a general understanding of the business with the intention of supporting them in investment decisions.

The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attains greater imminence as the research that precedes such reports reveal certain thumb rules; best practices developed by existing enterprises by

trial and error, and certain industrial norms that become a guiding source regarding various aspects of business setup and its successful management.

Apart from carefully studying the whole document one must consider critical aspects provided later on, which form the basis of any investment decision.

5. BRIEF DESCRIPTION OF PROJECT & PRODUCTS

Glassmakers throughout history have experimented with glass fibers. Many ancient civilizations used to make glass and also converted glass into fibers, or in other words, made fiber glass. They used this fiber for decoration, unaware of the potential that lay within it. Mass manufacturing of glass fiber was only made possible with the invention of finer machine tooling in the 18th century.

Fiber Glass is also called Glass Reinforced Plastic (GRP), is a type of fiber-reinforced plastic. It is made from thermoset polymer usually a resin and a chopped strand mat, 6% Cobalt Naphthenate (a chemical used as a catalyst to accelerate the reaction) is also used with resin. Mainly it is formed by spreading the mixture of resin and cobalt on the mat, which dries in 1.5 to 2.5 hours. It is cheaper and more flexible than carbon fiber. It is cheaper, movable, replaceable and good looking as compared to concrete roofs (for parking sheds).

Fiber glass is used to manufacture many products. Its usage includes manufacturing of sheds, doors, water tanks, boats, wall coverings, swimming pools, bath tubs, septic tanks, roofing and pipes. From all these products, fiber glass sheds and fiber glass roofing have a higher demand in the local market. These are easy to install, require minimum time to manufacture, provide a good decorative look are cheap and light weight, compared to concrete roofs and sheds. All these properties make fiber glass sheds and roofing popular among the customers.

The proposed business unit manufactures three types of fiber glass products. These products are simple fiber glass sheets, designed fiber glass sheets and roofing fiber glass sheets. Both simple and designed fiber glass sheets are used as sheds for the buildings, such as parking sheds, to prevent from sun, rain etc.

Following are the properties due to which fiber glass is in high demand in the market.

5.1. Properties of Fiber Glass

Some of the important properties of fiber glass are as follows:

- **Mechanical Strength**

Mechanical strength of a material is its ability to withstand an applied load without failure or deformation. Fiber glass is a very strong and durable material that will last for many years. It can withstand extreme weather conditions without cracking, chipping, or breaking.

- **Electrical Characteristics**

Fiber glass is neither magnetic nor electrically conductive. It is transparent to radio waves, cellular frequencies and other forms of electromagnetic signals.

- **Incombustibility**

Fiber glass is a mineral material. It is naturally incombustible. It does not propagate or support a flame. It does not emit smoke or toxic products when exposed to heat.

- **Thermal Conductivity**

Fiber glass have a low coefficient of thermal expansion and relatively high thermal conductivity. Glass fabrics will dissipate heat more rapidly than organic fibers.

- **High Tensile Strength**

Fiber glass yarn has a high strength-to-weight ratio. Fiber glass yarn is twice as strong as steel wire.

- **Compatibility with Organic Matrices**

Fiber glass can have varying sizes and has the ability to combine with many synthetic resins and certain mineral matrices like cement.

- **Dimensional Stability**

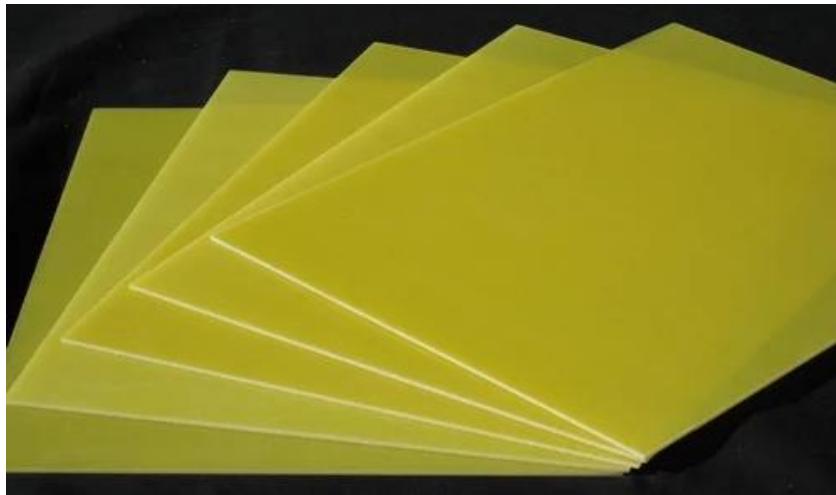
Fiber glass is not sensitive to variations in temperature. It has a low coefficient of linear expansion due to which it does not stretch or shrink.

5.2. Products of the Proposed Project

The proposed business manufactures three types of fiber glass products, simple fiber glass Sheet, designed fiber glass sheet and roofing fiber glass sheet. And will also provide the services of installation of these products into sheds and fiber glass roofing. Following is the explanation of these products.

- **Simple Fiber Glass Sheets**

It is the fiber glass sheets which does not include any design; it is a plain transparent sheet and also available in different colors. It is commonly used in plant nurseries, car parking, fishing and poultry farms. In proposed project, business will manufacture three different sizes of simple fiber glass sheet of thickness 1 mm, 1.5 mm and 2 mm (1 mm and 1.5 mm are commonly used in household while 2 mm is commonly used in industries that's why it is proposed in this project). One sheet of 24 ft length and 7 ft width will be manufacture and then it will be cut down to desired sizes of sheets. Later these sheets are cut in desired size. Figure 1 shows simple fiber glass.

Figure 1 Simple Fiber Glass

- **Design Fiber Glass Sheets**

These fiber sheets have colorful designs. Design addition is done by adding a design cloth while manufacturing the sheet along with the addition of mat. Due to its design look it is used as decorative choice in households. In proposed project, business will manufacture three different sizes of design fiber glass sheet of 1mm, 1.5 mm and 2 mm thickness. Among these 1mm and 1.5 mm are used in houses for parking, balcony and to make shades. 2mm sheet is used in industrial. Due to increase in population and construction demand and uses 1mm and 1.5 mm sheets. One sheet of 24 ft length and 7 ft width will be manufacture and then it will be cut down to desired sizes of sheets. Later these sheets are cut into desired sizes. Figure 2 shows design fiber glass sheet.

Figure 2 Design Fiber Glass

- **Roofing Fiber Glass Sheet**

Roofing fiber glass sheet is used for roofing purpose on the front of roofs. In many places like in hilly areas it also used on complete roofs for protection and heat purposes. These roof sheets have better impact and weather resistance. These sheets are of light weight and offer great resistance to water and atmosphere. In proposed project, business will manufacture two different sizes of roofing fiber glass sheet. Fiber glass sheet of thickness 1mm, and 1.5 mm. (1 mm and 1.5 mm are commonly used roofing sheet sizes that's why it is proposed in this project). One sheet of 24 ft length and 7 ft width will be manufacture and then it will be cut down to desired sizes of sheets. Later these sheets are cut into desired sizes. Figure 3 shows Roofing fiber glass sheet.

Figure 3 Roofing Fiber Glass Sheet



- **Fiber Glass Sheds**

After the manufacturing of these sheets, they will be used in the installation of sheds. The business unit has hired a number of teams for the installation of fiber glass sheds. Every team consists of one skilled labor and two unskilled labors (helpers) which will install the fiber glass sheds. The products and services of its installation both will be provided to the customers because it is difficult to install by the customers alone. Fiber glass shed will be fit on the iron frame. Iron frame is out sourced in this business study, it will manufacture on the demand of customers. These sheds are of different sizes according to the need of customers. Figure 4 shows the use of fiber glass sheds.

Figure 4 Fiber Glass Shed

- **Fiber Glass Roofing**

Roofing fiber glass are used as roofing in the roofs. It can be easily install as compared to fiber glass sheds. Because it only requires to be put over the roof with the help of screws and drill machine and does not need any iron frame for its installation. Figure 5 shows a fiber glass roofing.

Figure 5 Fiber Glass Roofing

Following are the tools used for Manufacturing of fiber glass

Fiber glass products manufacturing does not need machinery. all the manufacturing processes are performed manually. Because of this, wastage also decreases to minimum level up to 1%-2%. But in the installation process wilding plant, drill and grinder machine will be used. Following are the tools used in manufacturing fiber glass.

- **Glass Table**

Glass table of 24 feet in length and 7 feet in width is required for the manufacturing of fiber glass. Fiber glass solution or mixture is coated on the table for the manufacturing of sheet because glass provides smooth surface for the manufacturing of fiber glass sheet. The proposed model requires eight glass tables for manufacturing sheets. One glass table will be used for manufacturing a single product of fiber glass sheet. Figure 6 shows glass table.

Figure 6 Glass Table



- **Brush**

Brush is used for coating or spreading the fiber glass solution on the glass table and then on the mat. After usages these brushes are washed with thinner. Figure 7 shows picture of a brush used for fiber glass solution coating.

Figure 7 Brush



- **Iron Roller**

For making high quality fiber glass, it is important to ensure smoothness of the surface. When fiber glass solution is added on the table or mat, they are made smooth with the help of iron roller. This rolling is done at same time of solution coating, otherwise fiber glass solution becomes dry and rolling becomes difficult. Figure 8 show the picture of iron roller used for to ensure a smooth coating of the solution.

Figure 8 Iron Roller



Metal Bowl

For preparing the fiber glass solution it is necessary to avoid contamination or chemical reactions which is ensured by using a right type of container for measuring and mixing. Metal bowl is normally used for this purpose. It is very important to avoid using glass or foam containers as they could result in a dangerous exothermic heat build-up. Plastic may also be used but it is better to use metal bowl. Figure 9 shows metal bowl.

Figure 9 Metal Bowl



Stir Sticks

To mix the solution of resin with cobalt, color, and MEKP (Methyl Ethyl Ketone Peroxide), stirring is required for which stir sticks are used.

Figure 10 shows stir sticks.

Figure 10 Stir Sticks**Molds**

Dyes will be used for manufacturing roofing fiber glass sheets. Molds give different shapes to the fiber glass sheets. These are put on table and fiber glass solution is coated on the dye, which gives the required shape to the sheet. Figure 11 shows roofing dye use for the manufacturing the.

Figure 11 Roofing Mold

- **Grinder**

As these sheets are of long size, it becomes difficult to use and move these sheets. For using sheets in sheds or on roofs these sheets are cuts into desire size by the help of grinder. Figure 12 shows grinder for cutting the sheets.

Figure 12 Grinder



- **Measuring Cups**

To manufacture fiber glass sheet of good quality, it is necessary to measure the raw material for fiber glass solution. Because increase or decrease than the specified amount will affect the quality of the fiber glass. Figure 13 shows measuring cups.

Figure 13 Measuring Cups



- **Drilling Machine**

While installing the sheds and fiber glass roofing, they are attached or fixed on the frame and roof respectively. By the help of drilling machine, labor make holes in the frame or roof and then these sheets are fix in it with the help of screws. Figure 14 shows picture of drill machine.

Figure 14 Drill Machine



Drill will consume drill cutters, which are also included in the cost of installation of the sheds. One drill machine will be required for each team. Figure 15 shows drill cutters of different sizes.

Figure 15 Drill Cutters



- **Scissors for Mat Cutting**

Scissors will also be required for fiber glass sheet manufacturing teams for the cutting of cloth and mat. Scissors will help the labor to cut the cloth and mat with perfection. Figure 16 scissor for cutting.

Figure 16 Scissor for Cutting



- **Measuring Tape**

Measuring tape will be required for both the manufacturing team of fiber glass sheet and also for the installment teams. Because to measure the site for the frame manufacturing. Sheets are also required to be cut in same size of the frame. Measuring tape will also be used for this purpose. Figure 17 shows picture of the measuring tape.

Figure 17 Measuring Tape



- **Frame (Iron)**

Fiber glass shed is installed over the iron frame. The iron frame provide support to shed just like roof. The iron frame is out sourced in this business unit, because of markets norm and to focus on the core business if fiber glass. Frame is composed of

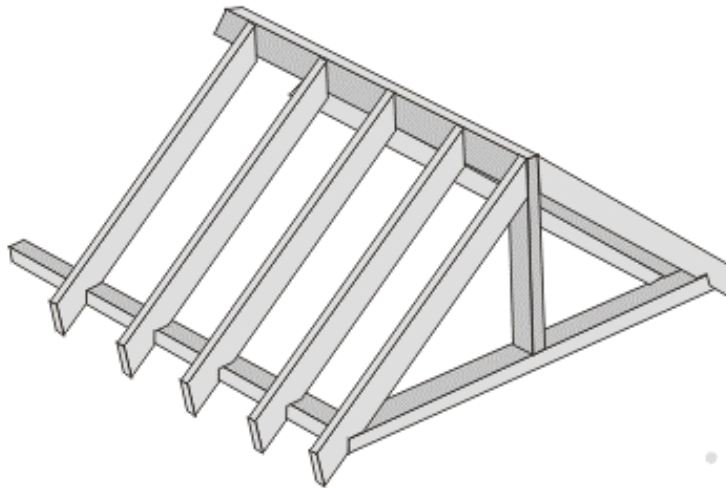
pillars and iron rods or pipes of 1 inch length and 1 inch width. Pillars are also used required length, in parking 15 to 20 feet long pillars are used, in roof top shed can 10 feet to 15 feet etc. Pillars are used of 3 inches to 5 inches of width. In frame manufacturing 14 gauge to 18 gauge of iron is used. But for better quality iron of 18 gauge is preferred in the market. glass shed. For large sheds quality, length and width of the iron use in frames may vary. These iron pipes and pillars are then welded before the labor during shed installation by the help of welding plat or machine. Figure 18 shows iron frame.

Figure 18 Frame



Same is the case with roofing fiber glass sheets to install on the frame, but the frame of roofing fiber glass does not include pillars. Frame of roofing fiber glass sheets is installed a few inches above the roof. This frame is also manufactured from iron, using 14-gauge to 16-gauge quality of iron. Roofing fiber glass sheets are then fixed on the frame. Figure 19 shows picture the frame used in roofing fiber glass.

Figure 19 Frame for Roofing Fiber Glass



- **Welding Plant**

Welding Plant is necessary in the formation of frame on the site. Wilding plant is used to fix the iron pipes together and, on the pillars, to make complete structure of the frame. Welding plant is only used in fiber glass sheds because of the need of iron frame. Roofing fiber glass does not require welding machine. One wilding plant is given to each team for installing fiber glass shed. Figure 20 shows welding plant.

Figure 20 Welding Plant



During Welding, welding machine will consume welding rod. Cost of welding rod is included in the cost fiber glass sheds. After the completion of frame fiber glass sheets will be fix on the frame with the help of screws. Figure 21 shows picture of welding rods.

Figure 21 Welding Rods



- **Screws**

After the completion of frame fiber glass will be fix on the frame by the help of screws. Roofing fiber glass sheets will also be fix on the roof by the help of screws. Screws may be varied in inches and diameter according to frame and roof. Figure 22 shows screws to be used in fixing the fiber glass sheets.

Figure 22 Screws



- **Hand Screw Machine**

Hand screw machine will be used for screwing the screws into the sheets and roofs. This helps the labor to save time, it makes it easy to use the screws. This machine is chargeable, which make it easy to use the machine while working or above the roofs. Figure 23 shows hand screw machine.

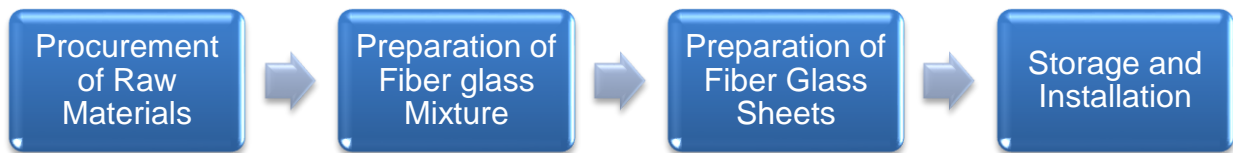
Figure 23 Hand Screw Machine



5.3. Process Flow for Fiber Glass Manufacturing Unit

A general process flow of a fiber glass product manufacturing unit is shown in Figure 24.

Figure 24: Process Flow for Fiber Glass Manufacturing Unit



Brief description of process flow is as follows:

Procurement of Raw Materials

In fiber glass products manufacturing, different types of raw materials are used which are available from local suppliers. The quality of product is mainly dependent on the quality of raw material applied at different stages of manufacturing process. Main raw materials include the following:

- **GP Resin**

Resin is a semi solid or highly viscous solution organic substance that is usually of transparent and yellowish to brown in color. It is soluble in organic solvent but not in water. It is also non-conductor of electricity. It is mostly found in three types, Epoxy resin, Vinyl ester resin and GP resin (general polyester resin). For fiber glass manufacturing, GP resin is used, because it is cheap and more economical to use, has quick cure surface take which helps multiple layers to adhere well to each other. It also provides hard surfacing area. GP resin is of transparent color.

- **Fiber Mat**

Most commonly mat used in fiber glass is Chopped Strand Mat (CSM). This is nonwoven mat made from 3B E-CR (electrical-corrosion resistant) glass filaments, consisting of chopped fibers randomly and yet evenly orientated. Mat is used for providing equal strength throughout the sheet. It also provides long durability and corrosion resistant quality. This is available in roll form, which can be easily spread on the table. Its width is up to 3.5 ft and are combined during manufacturing of fiber glass sheet. It is sold on weight basis and not on area basis. Figure 25 shows the picture of fiber mat.

Figure 25 Fiber Mat



- **Gel for Polishing**

Gel is used on the glass tables or molds as a mold release, which prevent the fiber glass solution from sticking to the table or mold. After gel, it become easy to put the fiber glass. It is also called paste wax or run in wax made from hydrocarbon and microcrystalline waxes. Figure 26 shows gel for polishing.

Figure 26 Gel for Polishing



- **MEKP**

MEKP stands for Methyl Ethyl Ketone Peroxide, it is an organic compound of yellow color. It is used as a hardening agent. It in combination with cobalt works as a cold curing of resins. After combining with a cobalt accelerator, it also works as a catalyst to increase the speed of the reaction or mixing. Figure 27 shows MEKP in bottles.

Figure 27 MEKP



- **Cobalt**

The cobalt containing products, cobalt 6% naphthenate is often used as catalysts or accelerators. It is of violet color and activated by MEKP (which is also added in the fiber glass solution). It also works as a dryer of the fiber glass solution. It speeds up the reaction of resin with other mixture materials and also helps the fiber glass solution to dry faster. Figure 28 shows picture cobalt.

Figure 28 Cobalt



- **Color**

As the color of fiber glass is transparent, so to make a colorful fiber glass sheet, different colors are added according to the need of desire color fiber glass sheet. In the market, shades of green and sky-blue colors are in high demand. Because green color prevents sun light and blue color shed give similar appearance like sky. Figure 29 shows different colors.

Figure 29 Different Colors



- **Thinner**

Acetone and methanol are used as a thinner. Thinner is of transparent color. This is basically used in paints to thin the paint and for washing the color paint brushes. Here it will also be used to wash the brush after the coating of the fiber glass solution. Figure 30 shows the brush is cleaning in the thinner.

Figure 30 Thinner (Washing of Brush)



In addition to the above, there are some specific materials required for making special products. These include the following:

- **Design cloth sheet**

For the addition of design in the fiber glass sheets, design cloth is used for it. Any design fabric can be used for this purpose. Due to the transparent color of resin or fiber glass solution, it will take the design of fabric and will like the design fabric color and design. Figure 31 shows different designs fabric pictures which can be used for manufacturing design fabric glass sheets.

Figure 31 Design Cloth



- **Design Molds**

Roofing fiber glass is usually in shapes just like the shape of bricks on the roofs. For the shape of roofing fiber glass molds are required for their manufacturing. They are coated on these molds, which give the required shape to the fiber glass sheet. Figure 32 shows picture of molds use for roofing fiber glass sheets.

Figure 32 Molds



Accurate mixing raw materials, as per the right composition is extremely important which determines the quality of the final products.

Manufacturing process of fiber glass is completely a manual process and does not require any machinery. This is a complex process in terms of preparing mixture and then coating that. Coating has to be done very carefully otherwise it can become hard without getting any proper shape. Wastage in manual manufacturing decreases, but still 1-2% is wasted during the process. Its detail process is explained below:

Preparation of Mixture for Fiber Glass

First stage of fiber glass product manufacturing is preparation of mixture of resin, Cobalt (cobalt 6% naphtholate) (used as a catalyst for speeding up the reaction), MEKP (Methyl Ethyl Ketone Peroxide) for hardness and the desired color. All these ingredients are mixed in a metal bowl. The size of one batch ranges from 1 to 2 liters, to reduce any possible wastage, . since this mixture becomes hard quickly and then cannot be used for coating. Following combination will be used in 100% or 1000-ml solution. In this Cobalt ratio is 0.5 % to 3%, 1.25% to 1.75% MEKP, 0.5% to 1% of desire color will be add in 100% solution of resin, cobalt and MEKP. Table 1 shows the combination of fiber glass solution.

Table 1 Combination of Raw Materials

Raw Material	Fiber Glass solution (100%)
Resin	94% to 96%
Cobalt	0.5% to 3%
MEKP	1.25% to 1.75%
Color	0.5% to 1%

Figure 33 shows the mixing process for preparation of fiber glass.

Figure 33 Mixing of Fiber glass Mixture



Preparation of Fiber Glass Sheets

After preparation of the mixture, the next step is to coat this on the glass table surface because the mat is sandwich between two fiber glass coats and on the mat to prepare fiber glass sheet. This process is carried out on a glass table, which helps in achieving the required smoothness and accurate shape. Initially, the glass surface is polished by using wax/gel, for the prevention of sticking of fiber glass to it. The process of coating is then performed to manufacture fiber glass sheet. The processes to manufacture all the included products, simple fiber glass, sheet, designed fiber glass

sheet and roofing glass sheet are almost similar, with small differences in designs and thicknesses. All are explained as follows:

- **Simple Fiber Glass Sheet:**

Simple fiber glass sheet is a colored, transparent fiber glass sheet. After the polishing of table, first layer of fiber glass solution is coated on the table using brush. This layer partially dries within 10-15 minutes to become fit for putting second layer of fiber glass solution, along with mat.

For the manufacturing of 1mm fiber glass sheet, when the first coat which is applied on table becomes dry then mat (type 450 gram/square meter) will be placed on it. For making fiber glass sheet of 1 mm thickness, only one layer of mat type 450 gram/square meter will be used. Then the mat will then receive a second layer of the fiber glass solution, sandwiching it in between the first and second coats. The solution will be spread on the mat and is rolled through iron roller for achieving smoothness and equal distribution of solution to the all parts of sheet. Figure 34 shows coating of fiber glass solution.

Figure 34 Coating of Fiber Glass Solution



After coating, the sheet is left on the glass table for drying. This whole process takes 1 to 2 hours, including the drying time.

For making 1.5 mm fiber glass sheet, all the process is similar but it requires two layers of mat. In one layer mat type of 450 gram/square meter is used while and in the second layer, mat of type 350 gram/ square meter is used. After completion of one layer, the second layer of mat is spread on it and coated again.

2 mm sheet is also manufactured by the same way as 1.5 mm sheet. For this, both mat layers are of type 450 gram/square meter. After completion of the first layer, second layer of mat is spread above the first one and again coated with fiber glass solution. It is rolled by iron roller for achieving smoothness and equal distribution of the surface of the final fiber glass sheet. After drying, sheet is ready It is removed from the glass table and stored in roll form.

- **Design Fiber Glass Sheet**

The process of the design fiber glass sheet is like that of simple fiber glass sheet, with the only difference of addition of design cloth during the addition of mat. Cloth is added below the mat. Figure 35 shows photo of design cloth for fiber glass.

Figure 35 Design Cloth for Fiber Glass Sheet



- **Roofing Fiber Glass Sheet:**

In the preparation of this sheet, dyes will be used. The dye will also be first polished through gel, then first layer of fiber glass solution will be added. After 10 minutes mat type 450g/m² will be added above the first layer on dyes. Another layer of fiber glass solution is applied on the fiber mat with the help of brush and roller will be used to spread the applied solution on the fiber mat evenly. For 1 mm roofing sheet the process is completed. It will also take 1 to 2 hours for complete manufacturing and drying. Figure 36 shows die for roofing sheets.

Figure 36 Molds for Roofing Sheets



For 1.5 mm sheet, one layer is further coated above the first mat. Second mat used is of the type 350 gram per square meter. After the addition of second mat and fiber glass solution coating, it is left for drying. Drying time of 1 mm sheet is less than that of 1.5 mm of less thickness.

Storage and Installation

- **Storage**

After the finished goods are produced, there come the last process, which is the storing and installation of fiber glass sheets. They are removed from the table or die and stored in roll form. These are transferred to finished goods store for sale. Business maintains finished good inventory of one month and follows cash basis for its business transactions.

- **Installation**

When fiber glass sheets are sold out, it's very difficult to be installed into sheds or over the roof by the customers. Due to this reason these sheets are selling along with the installation services and its selling price include both the manufacturing and installation cost.

Installation of Fiber glass Shed

For the installation of fiber glass sheds, initially a frame of desired size is prepared which is outsourced and then installed in the site. While installing frames first pillars are fixed in the ground. Then other pipes are welded on these pillars to make complete support for fiber glass.

Then fiber glass sheets are cut into desired sizes usually according to the frame size. For the cutting of sheets is done through grinding machine with perfection. After its cutting holes are made in the frame for the fixing of these sheets by the help of the drilling machine. Then same size of holes is also made in the fiber sheets. Fiber sheets are then fix tightly on the frame by the help of screw and screw machine. All the sheets are so fixed that no light and rain can pass through it. One team can complete a shed of approximately 300 sq-ft shed in 9 hours. Each team includes one skilled labor and two unskilled labors.

All the machines, grinder, welding plant and drill machine will use the electricity of the customers, so no electricity cost is included in the business model. With the completion of installation of shed, process of manufacturing of fiber glass shed will be completed.

Installation of Roofing Fiber glass

Installation of fiber glass roofing is easy process as compared to the installation process of fiber glass shed. Because roof fiber glass sheets frame does not involve the pillars installation. Frame of for roofing fiber glass is directly fix on the roof instead of using pillars. Same like fiber glass shed initially an iron frame will be made in desired size or equal to the size of roof where roofing fiber glass sheets are to be installed.

In the installation team of roofing fiber glass one skilled and two unskilled labors are included. The 300 sq-ft roof will take a maximum of 7 hours of time to be completed. First the frame will be installed and fixed with the roof. Then pipes of the frame will be welded with each other with the help of a welding plant.

After the installation of the frame, fiber glass sheets are cut into small sizes usually of 1 to 3 sq-ft sheets. After cutting holes are made by the use of drill machine in the frame and roofing fiber glass sheets. Sheets are then fixed by the help of screws and hand screw machine in the frame. Care must be taken in fixing sheets on the frame that no empty space should be remain. With this the installation process will be complete.

5.4. Installed and Operational Capacities

The proposed manufacturing unit will operate in a single shift of 9 hours a day in a day for 300 days in a year. Further, it is assumed that the operational capacity for the manufacturing unit is 50% during the first year of its operations. The capacity will increase at the rate of 5% per annum attaining a capacity of maximum of 95% of its total manufacturing capacity during the projected period of 10 years. The manufacturing unit will manufacture three different fiber glass sheets which includes 705,600 sq ft simple fiber glass sheets at maximum capacity (which includes 302,400 sq ft fiber glass sheets of 1mm per year, 201,600 sq ft fiber glass sheets of 1.5mm per year and 201,600 sq ft fiber glass sheets of 2mm per year), 655,200 sq ft design fiber glass sheets at maximum capacity (which includes 252,000 sq ft fiber glass sheets of 1mm per year, 201,600 sq ft fiber glass sheets of 1.5mm per year and 201,600 sq ft fiber glass sheets of 2mm per year) and 504,000 sq ft roofing fiber glass sheets at maximum capacity (which includes 302,400 sq ft fiber glass sheets of 1mm per year and 201,600 sq ft fiber glass sheets of 1.5mm per year).

The initial year manufacturing capacity of the proposed fiber glass products manufacturing unit is assumed to be 50% at which the proposed unit will manufacture three different fiber glass sheets which includes 352,800 sq ft simple fiber glass sheets (which includes 151,200 sq ft fiber glass sheets of 1mm per year, 100,800 sq ft fiber glass sheets of 1.5mm per year and 100,800 sq ft fiber glass sheets of 2mm per year), 327,600 sq ft design fiber glass sheets (which includes 126,000 sq ft fiber glass sheets of 1mm per year, 100,800 sq ft fiber glass sheets of 1.5mm per year and 100,800 sq ft fiber glass sheets of 2mm per year) and 252,000 sq ft roofing fiber glass sheets (which includes 151,200 sq ft fiber glass sheets of 1mm per year and 100,800 sq ft fiber glass sheets of 1.5mm per year).

Table 2: Installed Capacity-Simple Fiber Glass Sheet Preparation

Products	Time for the Preparation of Resin (hrs.)	Preparation Fiber Glass Sheets								
		Time Required for 1st Coat (hrs.)	Wait between 1st and 2nd Coat (hrs.)	Time Required for lying mat (hrs)	Time Required For 2nd Coat (hrs.)	Wait between 2nd and Final Coat (hrs.)	Time required for Lying 2nd Mat (hrs)	Time Required For Final Coat (hrs.)	Wait after final coating (hrs.)	Total Time Required for Final Product (hrs.)
Fiber Glass 1 mm	0.10	0.33	0.25	0.07	0.33	-.		-	0.50	1.58
Fiber Glass 1.5 mm	0.10	0.33	0.25	0.07	0.33	0.25	0.07	0.33	0.50	2.23
Fiber Glass 2 mm	0.10	0.33	0.25	0.07	0.33	0.25	0.07	0.33	0.50	2.23

Table 3: Final Products of Simple Fiber Glass Sheet

Products	Sheets Production Per Day (no. of sheets)	Size of One Fiber Glass Sheet (Sq-ft)	Fiber Glass Sheet Production at 100% Capacity Per Year	Fiber Glass Sheet Production at 100% Capacity Per Year in Sq-Feet	Annual Production in Sq-feet @ 50% Capacity
Fiber Glass 1 mm	6	168	1,800	302,400	151,200

Fiber Glass 1.5 mm	4	168	1,200	201,600	100,800
Fiber Glass 2 mm	4	168	1,200	201,600	100,800
Total	14.00			705,600	352,800

Table 4: Installed Capacity-Design Fiber Glass Sheet Preparation

Products	Time for the Preparation of Resin (hrs.)	Preparation Design Fiber Glass Sheets								
		Time Required for 1st Coat (hrs.)	Wait between 1st and 2nd Coat (hrs.)	Time Required for lying mat and design fabric (hrs)	Time Required For 2nd Coat (hrs.)	Wait between 2nd and Final Coat (hrs.)	Time required for Lying 2nd Mat (hrs)	Time Required For Final Coat (hrs.)	Wait after final coating (hrs.)	Total Time Required for Final Product (hrs.)
Fiber Glass Design Sheet 1 mm	0.10	0.33	0.25	0.13	0.33	-		-	0.50	1.65
Fiber Glass Design Sheet 1.5 mm	0.10	0.33	0.25	0.13	0.33	0.25	0.07	0.33	0.50	2.30
Fiber Glass Design Sheet 2 mm	0.10	0.33	0.25	0.13	0.33	0.25	0.07	0.33	0.50	2.30

Table 5: Installed Capacity-Final Product of Design Fiber Glass Sheet

Products	Sheets Production Per Day (no. of sheets)	Size of One Fiber Glass Sheet (Sq-ft)	Fiber Glass Sheet Production at 100% Capacity Per Year	Fiber Glass Sheet Production at 100% Capacity Per Year in Sq-Feet	Annual Production in Sq-feet @ 50% Capacity
Fiber Glass Design Sheet 1 mm	5	168	1,500	252,000	126,000
Fiber Glass Design Sheet 1.5 mm	4	168	1,200	201,600	100,800
Fiber Glass Design Sheet 2 mm	4	168	1,200	201,600	100,800
Total	13			655,200	327,600

Table 6: Installed Capacity-Roofing Fiber Glass Sheet Preparation

Products	Time for the Preparation of Resin (hrs.)	Preparation Fiber Glass Sheets								
		Time Required for 1st Coat (hrs.)	Wait between 1st and 2nd Coat (hrs.)	Time Required for lying mat (hrs)	Time Required For 2nd Coat (hrs.)	Wait between 2nd and Final Coat (hrs.)	Time required for Lying 2nd Mat (hrs)	Time Required For Final Coat (hrs.)	Wait after final coating (hrs.)	Total Time Required for Final Product (hrs.)
Fiber Glass Roofing Sheet 1 mm	0.10	0.33	0.25	0.07	0.33	-	-	-	0.50	1.58
Fiber Glass Roofing Sheet 1.5 mm	0.10	0.33	0.25	0.07	0.33	0.25	0.07	0.33	0.50	2.23

Table 7: Installed Capacity-Final Products of Roofing Fiber Glass Sheet

Products	Sheets Production Per Day (no. of sheets)	Size of One Fiber Glass Sheet (Sq-ft)	Fiber Glass Sheet Production at 100% Capacity Per Year	Fiber Glass Sheet Production at 100% Capacity Per Year in Sq-Feet	Annual Production in Sq-feet @ 60% Capacity
Fiber Glass Roofing Sheet 1 mm	6	168	1,800	302,400	151,200

Fiber Glass Roofing Sheet 1.5 mm	3	168	1,200	201,600	100,800
Total	9			504,000	252,000

6. CRITICAL FACTORS

Before making the decision to invest in fiber glass products manufacturing unit, one should carefully analyze the associated risk factors. The important considerations in this regard include:

- Sound technical knowhow and basic knowledge of the business
- Availability of specialized workforce
- Specific care in preparation of fiber glass solution
- Quality products and customer satisfaction
- Selection of appropriate distribution channel
- Accurate control of different quality parameters

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

For establishing any business unit, it is necessary to point out best geographical area which provides opportunities for the success of the business. The proposed fiber glass products manufacturing unit would ideally be located in major cities of Pakistan like Karachi, Lahore, Faisalabad, Islamabad, Peshawar, Quetta, Multan, Rawalpindi, Bahawalpur, Sargodha, Sialkot, Gujranwala, Gujrat, Hyderabad and other cities of Pakistan.

These cities are suitable due to availability of required resources, of good infrastructure and easy access to raw materials and skilled labor. In these major cities, new housing societies are being established at a fast track, where there is a huge demand for the proposed fiber glass products. the construction in these major cities. People and sellers from other areas also come to these major cities for the purchasing of fiber glass products.

8. POTENTIAL TARGET MARKETS/CUSTOMERS

Pakistan is the fifth most populous country in the world, with 220 million people, growing at around 2% per annum. Many inter-linked industries are developing in

Simple and design fiber glass is mainly used in the houses, building construction and in industries. It has high demand in cities because people in the cities use it in houses for parking. It is also used in parks for sheds, on bus stops and in public area. It is also used in many restaurants in roof top for the protection from sunlight and rain. It also looks beautiful and attract customers. All these increase demand in cities for fiber glass.

Target customers of roofing fiber glass are both the people of cities and villages and those who live in hilly areas. In village where weather is hot, people use it for shed as a protection from sunlight. But it is mostly used in hilly areas as a protection from rain

and snowfall. It is used as an alternate of iron or steel sheets which were previously used in hilly areas in pitched roofs.

There are multiple suppliers in this industry. Large suppliers manufacture different products such as fiber glass sheets, fiber glass door, fiber glass water tanks, etc. and also provide installation services. The medium suppliers manufacture one or two products and provide installation services while small suppliers just only trade the fiber glass products, they do not manufacture the products but provide installation services. This industry is mainly depended on the labor efficiency because no machinery is involved in the process. The main clusters of this business in Pakistan is not specific as it is the product which is now in common use so it is available all over the country.

9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of fiber glass products manufacturing unit. Various assumptions relevant to revenue and costs along with the results of the analysis are outlined in this section.

The projected Income Statement, Cash Flow Statement and Balance Sheet are attached as annexures of this document.

All the figures in this financial model have been calculated after carefully considering the relevant assumptions and target market.

9.1. Initial Project Cost

Table 8 provides fixed and working capital requirements for establishment of fiber glass products manufacturing unit.

Table 8: Initial Project Cost estimates

Particulars	Cost (PKR)	Reference
Land	-	9.1.1
Building / Infrastructure	896,530	9.1.2
Tools & equipment	4,773,550	9.1.3
Consumables	48,840	
Furniture & fixtures	633,000	9.1.4
Office vehicles	432,000	9.1.6
Office equipment	964,500	9.1.7
Pre-operating costs	469,011	9.1.8
Advance Against Building Rent	900,000	9.1.9
Total Capital Cost - (A)	9,117,431	

Equipment spare part inventory	19,890	
Raw material inventory	12,996,070	
Upfront building rent	300,000	
Cash	1,000,000	
Total	14,315,960	
Total Project Cost - (A+B)	23,433,390	

9.1.1. Land

The proposed unit will be established on a rented land having an area of 5,125 square feet (23 Marla). Total rental cost has been estimated as PKR 300,000. The breakup of the space requirement is provided in Table 9.

Table 9: Breakup of Space Requirement

Production Area	Number	Length	Width	Area (Sq. Ft.)
Owners' Office	1	10	10	100
Office Area	1	15	20	300
Production Area	1	50	60	3,000
Raw Material Store Area	1	15	15	225
Common Room for Labors	1	25	25	625
Finished Goods Store Area	1	23	20	450
Washrooms	5	5	5	125
Parking Area	1	15	20	300
Total Area				5,125

9.1.2. Building/ Infrastructure

There will be no cost of building construction since the fiber glass products manufacturing unit will be started in a rented building having an area of 5,125 square feet. However, there will be a renovation cost required to make the building usable for the business. Building rent of PKR 300,000 per month has been included in the operating cost as well as it is also included in the capital investment. The proposed project requires electricity load of around 9.76 KW for which an industrial electricity connection will be required. Table 10 provide details of building renovation cost.

Table 10: Building Renovation Cost

Cost Item	Unit of Measurement	Total Units	Cost/Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	111	800	88,880
Labour Cost- Paint	Sq. Feet	11,110	15	166,650
Wall Racks	Units	20	15,000	300,000
Curtains	Units	3	3,000	9,000
Blinds	Units	5	7,000	35,000
Glass Partition	Sq. Feet	540	550	297,000
Total (PKR)				896,530

9.1.3. Tools and Equipment

Table 11 provides details of tools and equipment for the proposed project.

Table 11: Tools and Equipment Cost Details

Cost Item	Number of Items	Unit Cost (PKR)	Total Cost (PKR)
Glass Table (7 ft W & 24 ft L and glass of 5 mm)	8	350,000	2,800,000
Roller	3	650	1,950
Metal Bowl (Mixing)	9	900	8,100
Measuring Cups	3	500	1,500
Grinders	19	10,000	190,000
Molds for Roofing Sheet (Iron) 24-ft length & 7-ft width	4	25,000	100,000
Drilling Machine	19	20,000	380,000
Welding Plant	19	60,000	1,140,000
Hand Scrow Machine	19	8,000	152,000
Total			4,773,550

9.1.4. Consumables

Table 12 shows details of other tools and equipment cost required for the fiber glass products manufacturing unit.

Table 12: Other Tools and Equipment Cost Details

Cost Item	Number of Items	Unit Cost (PKR)	Total Cost (PKR)
Brush	36	100	3,600
Grinder wheels	456	40	18,240
Scissor for Mat Cutting	3	900	2,700
Measuring Tape	21	300	6,300
Stir Sticks (200 Pieces)	3	6,000	18,000
Total			48,840

9.1.5. Office Equipment

Table 13 shows details of equipment cost required for the fiber glass products manufacturing unit.

Table 13: Office Equipment Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Air Conditioner (1 Ton Inverter)	3	105,000	315,000
Laptop	1	150,000	150,000
Desktop Computer	3	50,000	150,000
Laser Printer	1	42,000	42,000
LED/LCD 32"	1	40,000	40,000
Water Dispenser	1	25,000	25,000
Ceiling Fan	15	8,000	120,000
Exhaust Fan	12	4,500	54,000
Pedestal Fan	3	10,000	30,000
Wi-Fi Router and Connection	1	3,500	3,500
Security System (1 MP)	8	2,500	20,000
DVR	1	15,000	15,000
Total			964,500

9.1.6. Furniture and Fixture

Table 14 provides details of furniture and fixtures.

Table 14: Furniture & Fixtures Cost Details

Cost Item	Number of Items	Unit Cost (PKR)	Total Cost (PKR)
Executive Table	1	60,000	60,000
Office Table	4	30,000	120,000
Executive Chairs	1	30,000	30,000
Office Chairs	8	14,000	112,000
Admin Counter	1	30,000	30,000
Visitors Chairs	10	2,000	20,000
Staff Plastic Chairs	45	2,000	90,000
Staff Table	6	6,000	36,000
Sofa Set	3	45,000	135,000
Total			633,000

9.1.7. Vehicles

Table 15 provides details of the vehicles required along with their cost for the proposed project.

Table 15: Office Vehicle Cost Details

Cost Item	Number of Vehicles	Unit Cost (PKR)	Registration Fee Plus Number Plate Charges	Total (PKR)
Loader Rickshaw	1	300,000	6,000	306,000
Motorcycle	1	120,000	6,000	126,000
Total Cost (PKR)				432,000

9.1.8. Pre-Operating Costs

Table 16 provides details of estimated pre-operating costs.

Table 16: Pre-Operating Cost Details

Costs Item	No.	Hiring Months Beforein Year 0	Unit Cost (per month) (PKR)	Cost (PKR)
Production Supervisor	1	1	70,000	70,000
Sale and Marketing Officer	1	1	70,000	70,000
Skilled Labor for Coating	1	1	35,000	35,000
Skilled Labor for Rolling	1	1	35,000	35,000
Unskilled Labor (Helpers)	1	1	75,000	75,000
Drivers	1	1	25,000	25,000
Office Boy	3	1	25,000	75000
Sweeper	1	1	25,000	25,000
Security Guard	1	1	25,000	25,000
Utilities Expense				34,011
Total Cost (PKR)				469,011

9.1.9. Security against Building

Table 17 provides details of estimated security against building.

Table 17: Security against Building

Particular	Months	Rent per month (PKR)	Total (PKR)
Security against building	3	300,000	900,000
Total (PKR)			900,000

9.2. Breakeven Analysis

Table 18 shows calculation of break-even analysis.

Table 18: Breakeven Analysis

Particulars	Amount First Year (PKR)	Profitability Ratio
Sales (PKR) – A	356,937,000	100%
Variable Cost (PKR) – B	338,083,455	95%

Contribution (PKR) (A-B) = C	18,853,545	5%
Fixed Cost (PKR) – D	11,153,511	3%
Contribution Margin	5%	
Breakeven Analysis		
Breakeven Revenue (PKR)	211,159,273	
Break-Even Sheets	551,596	
Breakeven Capacity	30%	

9.3. Revenue Generation

Table 19, Table 20, Table 21 and Table 22 provides details regarding revenue generation from the fiber glass products manufacturing unit during the first year of its operation at 50% capacity.

Table 19: Revenue Details-Simple Fiber Glass Sheet

Products	Number of Sheets Per Sq ft Sold	Price per Sq. ft (PKR)	Total Revenue (PKR)
Fiber Glass 1 mm	144,900	330	47,817,000
Fiber Glass 1.5 mm	96,600	410	39,606,000
Fiber Glass 2 mm	96,600	450	43,470,000
Total (PKR)	338,100		130,893,000

Table 20: Revenue Details-Design Fiber Glass Sheet

Products	Number of Sheets Per Sq ft Sold	Price per Sq. ft (PKR)	Total Revenue (PKR)
Fiber Glass Design Sheet 1 mm	120,750	340	41,055,000
Fiber Glass Design Sheet 1.5 mm	96,600	420	40,572,000
Fiber Glass Design Sheet 2 mm	96,600	470	45,402,000
Total (PKR)	313,950		127,029,000

Table 21: Revenue Details-Roofing Fiber Glass Sheet

Products	Number of Sheets Per Sq ft Sold	Price per Sq. ft (PKR)	Total Revenue (PKR)
Fiber Glass Roofing Sheet 1 mm	144,900	390	56,511,000
Fiber Glass Roofing Sheet 1.5 mm	96,600	440	42,504,000
Total (PKR)	241,500		99,015,000

Table 22: Total Revenue

Products	Total Revenue (PKR) @ 50% Capacity
Simple Fiber Glass Sheet	130,893,000
Design Fiber Glass Sheet	127,029,000
Roofing Fiber Glass Sheet	99,015,000
Total (PKR)	356,937,000

9.4. Variable Cost Estimate

Variable costs of the project have been provided in Table 23.

Table 23: Variable Cost Estimate

Description of Costs	Amount (PKR)
Material Cost	311,905,674
Direct Labor	24,780,000
Direct Electricity Cost	112,982
Machinery Maintenance - Cost	238,678
Communications expense (phone, fax, mail, internet, etc.)	426,000
Office vehicles running expense	194,121
Office expenses (stationery, entertainment, janitorial services, etc.)	426,000
Total Variable Cost (PKR)	338,083,455

Table 24: Material Cost

Cost Item	Number of Sheets Per Sq ft Sold	Cost per Sq. ft (PKR)	Total Cost (PKR)
Simple Fiber Glass Sheet			
Fiber Glass 1 mm	144,900	315	45,635,565
Fiber Glass 1.5 mm	96,600	358	34,620,664
Fiber Glass 2 mm	96,600	398	38,426,100
Subtotal (A)	338,100		118,682,329
Design Fiber Glass Sheet			
Fiber Glass Design Sheet 1 mm	120,750	322	38,849,875
Fiber Glass Design Sheet 1.5 mm	96,600	364	35,181,289
Fiber Glass Design Sheet 2 mm	96,600	404	38,986,725
Subtotal (B)	313,950		113,017,889
Roofing Fiber Glass Sheet			
Fiber Glass Roofing Sheet 1 mm	144,900	312	45,179,475
Fiber Glass Roofing Sheet 1.5 mm	96,600	363	35,025,981
Subtotal (C)	241,500		80,205,456
Total (PKR)(A+B+C)	893,550		311,905,674

Table 25: Raw Material of Simple Fiber Glass Sheet 1mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	17	550	9,350
Mat (450g/m2)	Kg	7.5	500	3,750
Gel for Polishing the Table	Kg	0.005	3,500	18
MEKP (for hardness)	Liter	0.15	1,300	195
Cobalt (6% naphthenate)	Kg	0.038	2,600	99
Color	Liter	0.6	380	228
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	0.51	550	281
Total				13,936

Size in Sq-ft				168
Cost Per Sq-ft (PKR)				82.9
Manufacturing Cost of Sheds	sq-ft			232
Total Cost Per Sq-ft (PKR)				315

Table 26: Raw Material of Simple Fiber Glass Sheet 1.5mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	25	550	13,750
Mat (450g/m2)	Kg	7.5	500	3,750
Mat (300g/m2)	Kg	5	500	2,500
Gel for Polishing the Table	Kg	0.0075	3,500	26
MEKP (for hardness)	Liter	0.225	1,300	293
Cobalt (6% naphthenate)	Kg	0.056	2,600	146
Color	Liter	0.9	380	342
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	0.75	550	413
Total				21,235
Size in Sq-ft				168
Cost Per Sq-ft (PKR)				126
Manufacturing Cost of Sheds	sq-ft			232
Total Cost Per Sq-ft (PKR)				358

Table 27: Raw Material of Simple Fiber Glass Sheet 2mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	34	550	18,700
Mat (450g/m2)	Kg	15	500	7,500
Gel for Polishing the Table	Kg	0.01	3500	35
MEKP (for hardness)	Liter	0.3	1300	390

Cobalt (6% naphthenate)	Kg	0.075	2600	195
Color	Liter	1.2	380	456
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	1.02	550	561
Total				27,852
Size in Sq-ft				168
Cost Per Sq-ft (PKR)				166
Manufacturing Cost of Sheds	sq-ft			232
Total Cost Per Sq-ft (PKR)				398

Table 28: Raw Material of Roofing Sheet 1 mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	19	550	10,450
Mat (450g/m ²)	Kg	7.5	500	3,750
Gel for Polishing the Table	Kg	0.005	3,500	18
MEKP (for hardness)	Liter	0.16	1,300	208
Cobalt (6% naphthenate)	Kg	0.04	2,600	104
Color	Liter	0.6	380	228
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	0.57	550	314
Total				15,087
Size in Sq-ft				168
Cost Per Sq-ft (PKR)				90
Installation Cost Roofing sheets	sq-ft			222
Total Cost Per Sq-ft (PKR)				312

Table 29: Raw Material of Roofing Sheet 1.5 mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	29	550	15,950
Mat (450g/m2)	Kg	7.5	500	3,750
Mat (300g/m2)	Kg	5	500	2,500
Gel for Polishing the Table	Kg	0.0075	3,500	26
MEKP (for hardness)	Liter	0.24	1,300	312
Cobalt (6% naphthenate)	Kg	0.065	2,600	169
Color	Liter	1.1	380	418
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	0.87	550	479
Total				23,619
Size in Sq-ft				168
Cost Per Sq-ft (PKR)				141
Installation Cost Roofing sheets	sq-ft			222
Total Cost Per Sq-ft (PKR)				363

Table 30: Raw Material of Design Fiber Glass Sheet 1 mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	17	550	9,350
Mat (450g/m2)	Kg	7.5	500	3,750
Gel for Polishing the Table	Kg	0.01	3,500	35
MEKP (for hardness)	Liter	0.3	1,300	390
Cobalt (6% naphthenate)	Kg	0.075	2,600	195
Color	Liter	0.225	380	86
Design Cloth	Meter	7.5	130	975
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	0.51	550	281
Total				15,077

Size in Sq-ft				168
Cost Per Sq-ft (PKR)				89.7
Manufacturing Cost of Sheds	sq-ft			232
Total Cost Per Sq-ft (PKR)				322

Table 31: Raw Material of Design Fiber Glass Sheet 1.5 mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	25	550	13,750
Mat (450g/m2)	Kg	7.5	500	3,750
Mat (300g/m2)	Kg	5	500	2,500
Gel for Polishing the Table	Kg	0.0075	3,500	26
MEKP (for hardness)	Liter	0.225	1,300	293
Cobalt (6% naphthenate)	Kg	0.056	2,600	146
Color	Liter	0.9	380	342
Design Cloth	Meter	7.5	130	975
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	0.75	550	413
Total				22,210
Size in Sq-ft				168
Cost Per Sq-ft (PKR)				132.2
Manufacturing Cost of Sheds	sq-ft			232
Total Cost Per Sq-ft (PKR)				364

Table 32: Raw Material of Design Fiber Glass Sheet 2 mm

Particulars	Unit	Usage Per Sheet (24ft by 7 ft) Per Unit	Price Per Unit (PKR)	Total (PKR)
Resin (Gp Resin)	Kg	34	550	18,700
Mat (450g/m2)	Kg	15	500	7,500
Gel for Polishing the Table	Kg	0.01	3,500	35

MEKP (for hardness)	Liter	0.3	1,300	390
Cobalt (6% naphthenate)	Kg	0.075	2,600	195
Color	Liter	1.2	380	456
Design Cloth	Meter	7.5	130	975
Thinner (for cleaning brush)	Liter	0.05	300	15
Wastage (3%)	Kg	1.02	550	561
Total				28,827
Size in Sq-ft				168
Cost Per Sq-ft (PKR)				171.6
Manufacturing Cost of Sheds	sq-ft			232
Total Cost Per Sq-ft (PKR)				404

Table 33: Direct Labor

Personnel	Number of Personnel	Salary per Head (PKR)	Annual Salaries (PKR)
Production Supervisor	1	70,000	840,000
Skilled Labor for Coating	3	35,000	1,260,000
Skilled Labor for Rolling	3	35,000	1,260,000
Unskilled Labor (Helpers)	3	25,000	900,000
Skilled Labor for Sheds & Roofing	19	40,000	9,120,000
Unskilled Labor for Sheds & Roofing	38	25,000	11,400,000
Total	67		24,780,000

Table 34: Vehicle Running Expenses

Particulars	Loader Rickshaw	Motorcycle	Total (PKR)
KM Per Year	12,000	9,000	
Fuel cost (PKR)	128,400	48,150	176,550
Oil & Tuning Cost per Year (PKR)	8,571	9,000	17,571
Yearly Cost	136,971	57,150	194,121

Table 35: Variable Cost Assumption

Description of Costs	Rational
Machinery Maintenance Cost	5% of Cost of Machinery
Commuication expense	10% of Management staff expense
Office expenses (stationery, entertainment, etc.)	10% of Management staff expense

9.5. Fixed Cost Estimate

Table 36 shows the estimated fixed cost of the project.

Table 36: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Management Staff	4,260,000
Building rental expense	3,600,000
Indirect Electricity	295,146
Promotional expense	1,784,685
Depreciation expense	1,119,879
Amortization of pre-operating costs	93,802
Total Fixed Cost	11,153,512

Table 37: Management Staff

Personnel	Number of Personnel	Salary per Head (PKR)	Annual Salaries (PKR)
Admin Officer	1	40,000	480,000
Accounts Officer	1	45,000	540,000
Sale and Marketing Officer	1	70,000	840,000
Drivers	1	25,000	300,000
Office Boy	3	25,000	900,000
Sweeper	2	25,000	600,000
Security Guard	2	25,000	600,000
Total			4,260,000

Table 38: Fixed Cost Assumptions

Description of Costs	Rational
Promotional expense	0.5% of revenue
Depreciation	
Building & infrastructure	10% of cost
Machinery & equipment	15% of cost
Office equipment, Furniture & Fixture, Office vehicles	15% of cost

9.6. Financial Feasibility Analysis

The financial feasibility analysis provides the information regarding projected Internal Rate of Return (IRR), Net Present Value (NPV) and Payback period of the study, which is shown in Table 39.

Table 39: Financial Feasibility Analysis

Description	Project
IRR	78%
NPV (PKR)	126,691,549
Payback Period (years)	2.11
Projection Years	10
Discount rate used for NPV	25%

9.7. Financial Feasibility Analysis with 50% Debt

The financial feasibility analysis provides the information regarding projected IRR, NPV and payback period of the study on the basis of Debt: Equity Model (50:50), which is shown in Table 40.

Table 40: Financial Feasibility Analysis with 50% Debt

Description	Project
IRR	76%
NPV (PKR)	153,376,597
Payback Period (years)	2.17
Projection Years	10
Discount rate used for NPV	22%

9.8. Human Resource Requirement

The proposed services shall require the workforce as provided in Table 41.

Table 41: Human Resource

Personnel	Number of Personnel	Salary per Head (PKR)	Annual Salaries (PKR)
Admin Officer	1	40,000	480,000
Accounts Officer	1	45,000	540,000
Production Supervisor	1	70,000	840,000
Sale and Marketing Officer	1	70,000	840,000
Skilled Labor for Coating	3	35,000	1,260,000
Skilled Labor for Rolling	3	35,000	1,260,000
Unskilled Labor (Helpers)	3	25,000	900,000
Skilled Labor for Sheds	19	40,000	9,120,000
Unskilled Labor for Sheds	38	25,000	11,400,000
Drivers	1	25,000	300,000
Office Boy	3	25,000	900,000
Sweeper	2	25,000	600,000
Security Guard	2	25,000	600,000
Total			29,040,000

10. CONTACT DETAILS

The contact details of all the major suppliers of tools and equipment are given in Table 42.

Table 42: Contact Details

Name of Supplier	Contact	Website/Email
DTL Plastic Industries (Pvt.) Ltd.	0331 4542461	dtl.plastic.shed.ltd@gmail.com
Skylite Sheet	0302 8431293	www.SkyliteSheet
Usman Fiber Glass	0300 4396034	www.usmanfiberglass.business.site
Mughal Fiber Glass Sheets	0331 4848797	www.mughal-fiber-glass-sheets.business.site
Unique Fiber Glass	0308 4300407	www.fiberglass-shed-and-fiber-sheets.business.site
AL Rehman Fiber Glass Traders Fiber Glass Suppliers Lahore	0324 4665733	www.arehmanfiberglass.com

11. USEFUL LINKS

Table 43: Useful Links

Name of Organization	E-mail Address
Small and Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
National Business Development Program (NBDP)	www.nbdp.org.pk
Government of Pakistan	www.pakistan.gov.pk
Government of Punjab	www.punjab.gov.pk
Government of Sindh	sindh.gov.pk/
Government of Balochistan	balochistan.gov.pk/
Government of KPK	kp.gov.pk/
Government of Gilgit Baltistan	gilgitbaltistan.gov.pk/
Government of Azad Jammu & Kashmir	ajk.gov.pk/
Trade Development Authority of Pakistan	www.tdap.gov.pk
Securities and Exchange Commission of Pakistan	www.secp.gov.pk
State Bank of Pakistan	www.sbp.gov.pk
Federal Board of Revenue	www.fbr.gov.pk
Federation of Pakistan Chambers of Commerce and Industry (FPCCI)	www.fpcci.com.pk
Pakistan Stock Exchange (PSX)	www.psx.com.pk
Punjab Small Industries Corporation	https://www.psic.gop.pk/
Sindh Small Industries Corporation	https://ssic.gos.pk/
Government of KPK	https://kp.gov.pk/
Government of Balochistan Industries and Commerce	https://balochistan.gov.pk/departments-download/industries-and-commerce/

12. ANNEXURES

12.1. Income Statement

Calculations	SMEDA									
Income Statement										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Simple Fiber Glass Sheet	130,893,000	166,436,710	201,966,834	243,367,923	291,509,385	347,381,727	412,112,780	486,986,033	573,461,351	673,198,388
Design Fiber Glass Sheet	127,029,000	161,523,449	196,004,713	236,183,630	282,903,942	337,126,916	399,947,089	472,610,061	556,532,603	653,325,373
Roofing Fiber Glass Sheet	99,015,000	121,115,148	146,923,685	176,994,066	211,957,201	252,531,866	299,536,463	353,902,332	416,688,769	489,100,017
Revenue	356,937,000	449,075,306	544,895,232	656,545,620	786,370,529	937,040,509	1,111,596,333	1,313,498,426	1,546,682,723	1,815,623,778
Cost of sales										
Material Cost	311,905,674	389,546,690	468,842,327	560,340,164	665,712,607	786,847,124	925,872,807	1,085,190,120	1,267,504,215	1,475,862,230
Direct Labor	24,780,000	27,183,660	29,820,475	32,713,061	35,886,228	39,367,192	43,185,810	47,374,833	51,970,192	57,011,301
Machinery Maintenance - Cost	238,678	263,261	290,377	320,286	353,276	389,663	429,798	474,067	522,896	576,755
Direct Electricity Cost	112,982	124,280	135,579	146,877	158,175	169,473	180,772	192,070	203,368	214,666
Total cost of sales	337,037,333	417,117,892	499,088,758	593,520,388	702,110,286	826,773,453	969,669,187	1,133,231,091	1,320,200,671	1,533,664,952
Gross Profit	19,899,667	31,957,414	45,806,474	63,025,232	84,260,243	110,267,056	141,927,146	180,267,335	226,482,052	281,958,826
General administration & selling expenses										
Management Staff	4,260,000	6,976,920	7,653,681	8,396,088	9,210,509	10,103,928	11,084,009	12,159,158	13,338,597	14,632,440
Building rental expense	3,600,000	3,960,000	4,356,000	4,791,600	5,270,760	5,797,836	6,377,620	7,015,382	7,716,920	8,488,612
Indirect Electricity	295,146	318,462	343,621	370,767	400,057	431,662	465,763	502,558	542,261	585,099
Communications expense (phone, fax, mail, internet, etc.)	426,000	697,692	765,368	839,609	921,051	1,010,393	1,108,401	1,215,916	1,333,860	1,463,244
Office vehicles running expense	194,121	214,116	236,170	260,495	287,326	316,921	349,564	385,569	425,283	469,087
Office expenses (stationery, entertainment, janitorial services, etc.)	426,000	697,692	765,368	839,609	921,051	1,010,393	1,108,401	1,215,916	1,333,860	1,463,244
Promotional expense	1,784,685	2,245,377	2,724,476	3,282,728	3,931,853	4,685,203	5,557,982	6,567,492	7,733,414	9,078,119
Depreciation expense	1,119,879	1,119,879	1,119,879	1,119,879	1,119,879	2,242,473	1,902,321	1,830,310	1,830,310	1,830,310
Amortization of pre-operating costs	93,802	93,802	93,802	93,802	93,802	-	-	-	-	-
Subtotal	12,199,633	16,323,939	18,058,365	19,994,577	22,156,288	25,598,808	27,954,060	30,892,301	34,254,503	38,010,155
Operating Income	7,700,034	15,633,475	27,748,109	43,030,655	62,103,955	84,668,248	113,973,086	149,375,034	192,227,549	243,948,671
Other income (interest on cash)										
Gain / (loss) on sale of machinery & equipment	-	-	-	-	1,909,420	-	-	-	-	-
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	241,125	-	-	-
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	108,000	-	-	-
Earnings Before Interest & Taxes	7,700,034	15,633,475	27,748,109	43,030,655	64,013,375	84,668,248	114,322,211	149,375,034	192,227,549	243,948,671
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	7,700,034	15,633,475	27,748,109	43,030,655	64,013,375	84,668,248	114,322,211	149,375,034	192,227,549	243,948,671
Tax	4,461,713	5,613,441	6,811,190	18,704,196	22,074,681	11,713,006	13,894,954	16,418,730	19,333,534	22,695,297
NET PROFIT/(LOSS) AFTER TAX	3,238,321	10,020,034	20,936,919	24,326,458	41,938,694	72,955,242	100,427,257	132,956,304	172,894,015	221,253,374

12.2. Balance Sheet

Calculations	SMEDA										
Balance Sheet											
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
<i>Current assets</i>											
Cash & Bank	1,000,000	11,977,766	15,019,344	19,911,824	21,214,870	49,460,907	114,731,571	199,779,267	317,011,643	468,660,341	825,233,894
Raw material inventory	12,996,070	17,902,917	23,766,575	31,330,480	41,056,090	53,525,001	69,469,338	89,809,686	115,702,374	148,598,419	-
Equipment spare part inventory	19,890	24,045	29,067	35,139	42,479	51,352	62,079	75,047	90,723	109,674	-
Finished Goods inventory	-	14,043,222	17,379,912	20,795,365	24,730,016	29,254,595	34,448,894	40,402,883	47,217,962	55,008,361	63,902,706
Pre-paid building rent	300,000	330,000	363,000	399,300	439,230	483,153	531,468	584,615	643,077	707,384	-
Total Current Assets	14,315,960	44,277,950	56,557,898	72,472,108	87,482,686	132,775,008	219,243,351	330,651,498	480,665,779	673,084,180	889,136,600
<i>Fixed assets</i>											
Land	-	-	-	-	-	-	-	-	-	-	-
Building/Infrastructure	896,530	806,877	717,224	627,571	537,918	448,265	358,612	268,959	179,306	89,653	-
Machinery & equipment	4,773,550	4,057,518	3,341,485	2,625,453	1,909,420	8,742,471	6,894,076	5,284,359	4,151,996	3,019,634	13,825,695
Tools and Equipment	48,840	39,072	29,304	19,536	9,768	-	-	92,779	74,223	55,667	37,112
Furniture & fixtures	633,000	538,050	443,100	348,150	253,200	158,250	63,300	1,202,479	1,022,107	841,735	661,364
Office vehicles	432,000	367,200	302,400	237,600	172,800	108,000	43,200	896,901	762,366	627,831	493,296
Office equipment	964,500	819,825	675,150	530,475	385,800	241,125	96,450	1,832,214	1,557,382	1,282,550	1,007,717
Advance Against Building Rent	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000
Total Fixed Assets	8,648,420	7,528,542	6,408,663	5,288,785	4,168,906	10,598,111	8,355,638	10,477,691	8,647,380	6,817,070	16,925,184
<i>Intangible assets</i>											
Pre-operation costs	469,011	375,209	281,406	187,604	93,802	-	-	-	-	-	-
Total Intangible Assets	469,011	375,209	281,406	187,604	93,802	-	-	-	-	-	-
TOTAL ASSETS	23,433,390	52,181,700	63,247,968	77,948,496	91,745,394	143,373,120	227,598,989	341,129,189	489,313,159	679,901,250	906,061,784
Liabilities & Shareholders' Equity											
<i>Current liabilities</i>											
Accounts payable		27,129,149	33,994,980	41,136,848	49,459,645	59,148,677	70,419,305	83,522,247	98,749,914	116,443,989	121,351,149
<i>Other liabilities</i>											
Total Current Liabilities	-	27,129,149	33,994,980	41,136,848	49,459,645	59,148,677	70,419,305	83,522,247	98,749,914	116,443,989	121,351,149
<i>Other liabilities</i>											
Total Long Term Liabilities	-	-	-	-	-	-	-	-	-	-	-
<i>Shareholders' equity</i>											
Paid-up capital	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390	23,433,390
Retained earnings		1,619,161	5,819,597	13,378,258	18,852,358	60,791,053	133,746,294	234,173,551	367,129,855	540,023,870	761,277,244
Total Equity	23,433,390	25,052,551	29,252,987	36,811,648	42,285,748	84,224,443	157,179,684	257,606,942	390,563,245	563,457,261	784,710,634
TOTAL CAPITAL AND LIABILITIES	23,433,390	52,181,700	63,247,968	77,948,496	91,745,394	143,373,120	227,598,989	341,129,189	489,313,159	679,901,250	906,061,784

12.3.Cash Flow Statement

Calculations	SMEDA										
Cash Flow Statement											
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<i>Operating activities</i>											
Net profit		3,238,321	10,020,034	20,936,919	24,326,458	41,938,694	72,955,242	100,427,257	132,956,304	172,894,015	221,253,374
Add: depreciation expense		1,119,879	1,119,879	1,119,879	1,119,879	1,119,879	2,242,473	1,902,321	1,830,310	1,830,310	1,830,310
amortization of pre-operating costs		93,802	93,802	93,802	93,802	93,802	-	-	-	-	-
Finished goods inventory		(14,043,222)	(3,336,690)	(3,415,453)	(3,934,651)	(4,524,579)	(5,194,299)	(5,953,989)	(6,815,079)	(7,790,399)	(8,894,345)
Equipment inventory	(19,890)	(4,155)	(5,023)	(6,072)	(7,340)	(8,873)	(10,727)	(12,968)	(15,676)	(18,951)	109,674
Raw Material Inventory	(12,996,070)	(4,906,847)	(5,863,658)	(7,563,905)	(9,725,610)	(12,468,911)	(15,944,337)	(20,340,347)	(25,892,688)	(32,896,045)	148,598,419
Pre-paid building rent	(300,000)	(30,000)	(33,000)	(36,300)	(39,930)	(43,923)	(48,315)	(53,147)	(58,462)	(64,308)	707,384
Accounts payable		27,129,149	6,865,831	7,141,868	8,322,797	9,689,031	11,270,628	13,102,942	15,227,667	17,694,076	4,907,160
Other liabilities		-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(13,315,960)	12,596,927	8,861,175	18,270,738	20,155,404	35,795,121	65,270,664	89,072,069	117,232,376	151,648,698	368,511,977
<i>Financing activities</i>											
Issuance of shares	23,433,390	-	-	-	-	-	-	-	-	-	-
Cash provided by / (used for) financing activit	23,433,390	-	-	-	-	-	-	-	-	-	-
<i>Investing activities</i>											
Capital expenditure	(9,117,431)	-	-	-	-	(7,549,084)	-	(4,024,373)	-	-	(11,938,425)
Cash (used for) / provided by investing activit	(9,117,431)	-	-	-	-	(7,549,084)	-	(4,024,373)	-	-	(11,938,425)
NET CASH	1,000,000	12,596,927	8,861,175	18,270,738	20,155,404	28,246,037	65,270,664	85,047,696	117,232,376	151,648,698	356,573,552

13. KEY ASSUMPTIONS

13.1. Operating Cost Assumptions

Table 44: Operating Cost Assumptions

Description	Details
Operating costs growth rate	10.1%
Electricity growth rate	9.0%
Water price growth rate	9.0%
Gas price growth rate	9.0%
Wage growth rate	9.7%
Office equipment price growth rate	9.6%
Office vehicles price growth rate	6.2%

13.2. Revenue Assumptions

Table 45: Revenue Assumptions

Description	Details
Sale price growth rate	10.1%
Capacity utilization	50%
Capacity utilization growth rate	5%
Maximum capacity	95%

13.3. Financial Assumptions

Table 46: Financial Assumptions

Description	Details
Project life (Years)	10
Debt: Equity	0:100
Discount Rate	25%

13.4. Debt Related Assumptions**Table 47: Debt Related Assumption**

Description of Cost	Details
Project Life (Years)	10
Debt: Equity	50:50
Discount Rate	22%
Debt Grace Period	1 Years
Interest Rate (KIBOR+3%)	19%

13.5. Cash Flow Assumptions**Table 48: Cash Flow Assumptions**

Description	Details
Accounts receivable cycle (in days)	-
Accounts payable cycle (in days)	30