



Pre-feasibility Study

MANUFACTURING UNIT FOR ROOM COOLER

October 2022

“The figures and financial projections are approximate due to fluctuations in exchange rates, energy costs, and fuel prices etc. Users are advised to focus on understanding essential elements such as production processes and capacities, space, machinery, human resources, and raw material etc. requirements. Project investment, operating costs, and revenues can change daily. For accurate financial calculations, utilize financial calculators on SMEDA’s website and consult financial experts to stay current with market conditions.”

Small and Medium Enterprises Development Authority
Ministry of Industries and Production
Government of Pakistan

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1. DISCLAIMER

This information memorandum is to introduce the subject matter and provide a general idea and information on the said matter. Although, the material included in this document is based on data/information gathered from various reliable sources; however, it is based upon certain assumptions, which may differ from case to case. The information has been provided on as is where is basis without any warranties or assertions as to the correctness or soundness thereof. Although, due care and diligence has been taken to compile this document, the contained information may vary due to any change in any of the concerned factors, and the actual results may differ substantially from the presented information. SMEDA, its employees or agents do not assume any liability for any financial or other loss resulting from this memorandum in consequence of undertaking this activity. The contained information does not preclude any further professional advice to be obtained by the user. The prospective user of this memorandum is encouraged to carry out additional diligence and gather any information which is necessary for making an informed decision, including taking professional advice from a qualified consultant/technical expert before taking any decision to act upon the information.

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2. EXECUTIVE SUMMARY

Room coolers, also known as evaporative coolers, cool air by evaporating water. As air flows over water, water molecules change phase to convert into vapors. The heat required for that phase change is provided by the air. As heat is removed from the air, it gets cooled. The effectiveness of air coolers is dependent on weather. Water is converted to vapors in air coolers and these water vapors get mixed in the air, making it humid. In a high-humidity environment, there is already a lot of water in the air and there is no further space for humidity to enter the air, which makes the air cooler ineffective. In short, air coolers do not operate well in humid environments. Room coolers consume very less energy as compared to the air conditioners.

Room coolers are mostly used by urban population. Globally, the percentage of population living in urban areas is expected to increase from 55% in 2018 to 68% by 2050.¹ Pakistan's current population comprises of about one-third urban households and is expected to increase to around 50% by 2025.²

The rise in cost of raw materials due to an increase in fuel prices, along with commodity price inflation, disruption in supply chains, and higher demand for air conditioning solutions is pushing the brands to increase prices of the products. Furthermore, Pakistan is also facing the increase in electricity prices. With the increasing prices of air conditioners and electricity, it is becoming difficult for middle class segment of the society to afford air conditioners. This has increased the demand for room coolers as they are affordable and consume less electricity.

In Pakistan, imports of air coolers increased from \$2.97 million in 2020 to \$3.76 million in 2021.³ Increasing imports indicate the rising demand for these products in the local market.

Room cooler is a seasonal product. Small and medium units that manufacture room coolers only, operate for 8 months during the year, from mid-December to mid-August. This is because of upcoming demand of room coolers during summer season. The proposed unit has been assumed to operate only for 8 months in a year.

The proposed unit will manufacture plastic body room coolers by manufacturing the designed parts of room coolers, including upper panel and cover, front panel and grill, inner stand with fan blade, base tub, side and back panel. All these parts are made of plastic and are manufactured by injection molding. The inner parts of room cooler i.e., electric fan motor, water pump, cooling pads, water pump pipe, water distributor pipe, wheel set, knob, knob switches, auto sewing machine for grill, main lead power cord, ice

¹<https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>

²<https://www.files.ethz.ch/isn/159296/4c5b5fa0ebc5684da2b9f244090593bc.pdf>

³<https://comtrade.un.org/Data/>

packs and four core cables and wires are procured from different suppliers. All these parts are assembled in the room cooler frame.

This “Pre-feasibility Document” provides details for setting up “Manufacturing Unit for Room Cooler” (herein after referred to as the proposed unit). The proposed unit manufactures plastic body room coolers, in three different sizes, categorized according to their power (Watts) 180W for Large, 160W for Medium and 140W for Small. The unit has a capacity to manufacture 24,565 room coolers in a year, at a maximum capacity of 100%, including 7,068 room coolers of 180W (Large) capacity, 7,085 room coolers of 160W (Medium) capacity and 10,412 room coolers of 140W (Small) capacity. The initial capacity utilization in “Year One” is assumed to be 60%, which translates into 14,739 room coolers, including 4,241 room coolers of 180W (Large) capacity, 4,251 room coolers of 160W (Medium) capacity and 6,247 room coolers of 140W (Small) capacity. The unit is expected to achieve the maximum capacity utilization of 90% in the 7th operational year.

The proposed business unit targets the local wholesale market. The unit is proposed to be ideally located in industrial areas of larger cities like Karachi, Lahore, Rawalpindi, Gujranwala, Hyderabad, Sukkur, Peshawar, Quetta, Faisalabad, Sialkot, etc. These areas are preferred due to extreme weather conditions and high temperature.

“Manufacturing Unit for Room Cooler” will be set up in a rented building with an area of 7,171 square feet. The project requires a total investment of PKR 80.46 million. This includes capital investment of PKR 62.58 million and working capital of PKR 17.87 million. This project is financed through 100% equity. The Net Present Value (NPV) of project is PKR 183.47 million with an Internal Rate of Return (IRR) of 59% and a Payback period of 2.60 years. Further, this project is expected to generate Gross Annual Revenue of PKR 269.67 million during 1st year, with Gross Profit (GP) ratio ranging from 23% to 42% and Net Profit (NP) ratio ranging from 6% to 22% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 38% at breakeven revenue of PKR 169.72 million (9,276 units) during first year.

The proposed project may also be established using leveraged financing. At 50% financing from debt sources at a cost of KIBOR+3%, the proposed manufacturing unit provides Net Present Value (NPV) of PKR 223.83 million, Internal Rate of Return (IRR) of 58% and Payback period of 2.64 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 6% to 22% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 39% with annual revenue of PKR 177.47 million (9,700 Units).

The proposed project will provide employment opportunities to 74 people. High return on investment and steady growth of business is expected with the entrepreneur having some prior experience or education in the related field of business.

The legal form of this project is proposed as “Private Company” or “Partnership Concern”.

3. INTRODUCTION TO SMEDA

The Small and Medium Enterprises Development Authority (SMEDA) was established in October 1998 with an 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 is 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 provide information to the potential investors about "Manufacturing Unit for Room Cooler". The document provides a general understanding of the business to facilitate potential investors in crucial and effective investment decisions.

The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attain 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 basis of any investment decision.

5. BRIEF DESCRIPTION OF PROJECT & PRODUCTS

Modern day inventions have made the human life very easy. Many household jobs which previously were done manually, are now done using different types of machines and appliances. One such appliance is room cooler. Room cooler is also known as evaporative cooler since it uses evaporation of water to cool the air, adding humidity into the air at the same time. Compared to air conditioning systems, room coolers use no chemical refrigerants and use up to 75 percent less energy.⁴

An evaporating cooler is simply a device that uses a fan to pull in air through wet water pads. The liquid water turns into a moist vapor which is then blown by the fan out into the room. The water absorbs heat from the air to convert into vapors (gaseous state), thereby lowering air's temperature and making it cooler.

Room coolers are an effective cooling solution for a home's living room, bedrooms, home offices or lounges. Commercially, these can be used effectively in many factories, businesses or offices. A modern room cooler requires less space when compared with a traditional room cooler, allowing it to fit into smaller space. Most of the modern room coolers are lightweight and require only electricity and water to function. These can even come with wheels, making it easy to move them from one place to another.

The benefits of room air coolers are:

- energy efficiency
- zero chemical emission
- prevention of air pollution
- portability and flexibility

Numerous technological advancements have been carried out in room coolers during the last decade, leading to higher efficiency in terms of saving water and electricity. This has also enabled key players like Super Asia, Boss, Honeywell, and E-lite to gain a significant market share in the room cooler market. Technological advancements and customer

⁴ <https://evaporative-coolers.com.au/save-on-energy-consumption-with-evaporative-coolers.php>

friendly modifications in their product has led to these major key players capturing healthy market shares.

Room cooler is a seasonal product. The demand for room coolers rises during the summer season and declines during the winter season. Many of the major players in the room cooler manufacturing industry make other products also, such as washing machines, water heaters, fans, and kitchen appliances. This enables them to keep their factories operational throughout the year.

Small and medium manufacturing units, that only manufacture room coolers, operate only for 7 to 8 months from mid-December to mid-August. For the purpose of this study, 8 months have been considered as the operative months during a year. Salaries for direct workers except production manager and engineering manager have been calculated on an 8-month basis, while for administrative workers and aforementioned direct workers, a full year's salary has been assumed.

Proposed Products

The proposed unit will manufacture plastic body room coolers to meet the rising demand of these products in the local market. Room coolers of three different capacities/sizes (180W for Large, 160W for Medium and 140W for Small) have been covered in this document. The proposed business will sell its products in the local wholesale markets. Average profit margin of around 50% of the cost has been assumed for the proposed products.

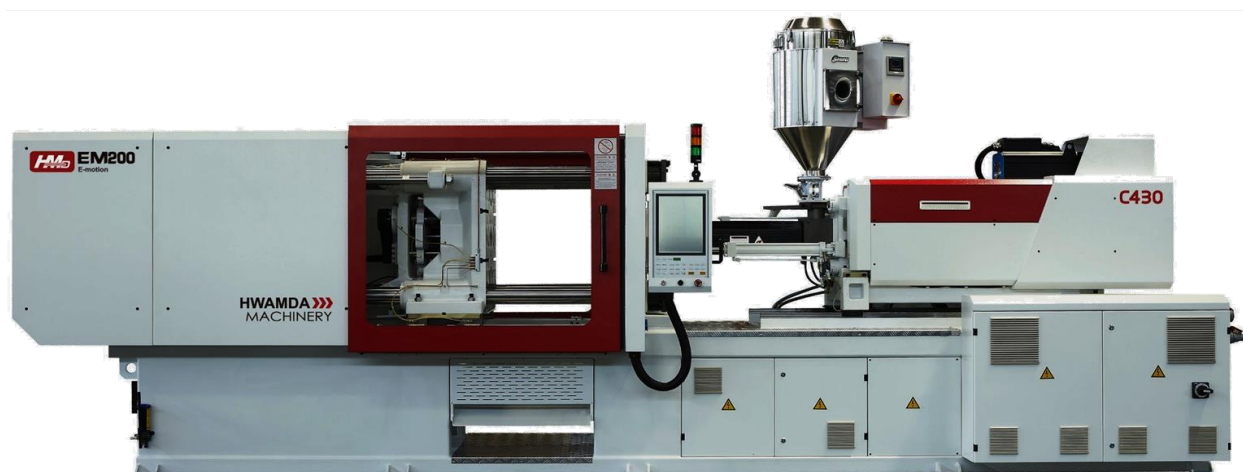
5.1. Machinery and Equipment

Details of the machinery and equipment required for the proposed manufacturing unit are as follows:

Injection Molding Machine

The injection molding process involves heating and injecting plastic granules under pressure into a closed metal mold. The proposed project uses Polypropylene material. The molten plastic cools and hardens into the required shape inside the mold, which is then opened to allow the moldings to be ejected or removed for inspection. The proposed injection molding machine has the clamping force of 10,800 kN, injection rate of 929.78 g/s with an injector force of 246 kN and average cycle time of 25 seconds per kg. The proposed injection molding machine produces plastic body parts of the room cooler, including the Upper Panel and Cover, Front Panel and Grill, Inner Stand, Base Tub, Side and Back Panel. The injection molding machine requires an electricity power of 110 KW. The proposed manufacturing unit will be using a new Chinese origin injection molding machine.

Figure 1 shows an injection molding machine.

Figure 1: Injection Molding Machine

In the proposed business, the injection molding machine will be operated in a single shift of 12 hours and will manufacture plastic parts of three types of room coolers covered under this document (180W (Large), 160W (Medium) and 140W (Small) power). The proposed injection molding machine has a setting up time of 2 hours per mold and productive time of the machine is 10 hours. Table 1, Table 2 and Table 3 shows the details of Injection Molding Machine Capacity Parameters for 180W (Large), 160W (Medium) and 140W (Small) room cooler respectively.

Table 1: Injection Molding Parameter for 180W (Large) Room cooler

Body Part	Weight (kg)	Cycle Time (sec)
Upper Panel and Cover	1.5	37.5
Front Panel with Grill	5	125
Side and Back Panel (3 Sides)	3	75
Base Tub	3	75
Inner Stand with Fan Blade	3	75

Table 2: Injection Molding Parameter for 160W (Medium) Room cooler

Body Part	Weight (kg)	Cycle Time (sec)
Upper Panel and Cover	1.2	30
Front Panel with Grill	4	100
Side and Back Panel (3 Sides)	3	75
Base Tub	3	62.5

Inner Stand with Fan Blade	2.5	62.5
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Table 3: Injection Molding Parameter for 140W (Small) Room cooler

Body Part	Weight (kg)	Cycle Time (sec)
Upper Panel and Cover	1	25
Front Panel with Grill	3	75
Side and Back Panel (3 Sides)	2.5	63
Base Tub	2	50
Inner Stand with Fan Blade	2	50

Molds

A mold is a hollow metal block (usually made of iron or steel) into which molten plastic is injected to form a certain fixed shape. There are many holes drilled in the block for temperature control by circulating water or oil or by using heaters. Molten plastic flows into the mold through a sprue and fills the cavities by way of runners and gates. The mold is opened after cooling and the ejector rod of the injection molding machine pushes the ejector plate of the mold to eject moldings. Different molds are used for manufacturing different parts of room cooler. These molds are imported and designed according to the requirement of the business. Figure 2 shows a mold used for making plastic parts of room cooler.

Figure 2: Molds

1-Ton Overhead Crane

An overhead crane is, generally equipped with an elevator, ropes or chains and sheaves that can be used both to move and to lift and lower materials horizontally (flexibility and movability). The proposed project requires a 1-ton overhead crane to change the molds during the manufacturing of different parts in injection molding machine. Overhead crane requires electricity power of 2 KW. Figure 3 shows an overhead crane.

Figure 3: Overhead Crane



Granules Mixing Machine

This machine is used for mixing plastic granules of different colors. Mixing can be done in a short period of time, because of high performance of this machine. Both mixing barrel and the mixer are made up of stainless steel. This mixing machine has a capacity of mixing 200 kg of granules per hour and requires an electric power of 7.5 KW. Figure 4 shows granules mixing machine.

Figure 4: Granules Mixing Machine**Crushing Machine**

Crushed granules or flakes are reused in production as the recycled raw materials. Plastic crushers are specialized in crushing leftovers and waste materials into granules or flakes. This machine thus helps reduce the volume of plastic waste and save costs and resources. Crushing machine has a capacity to crush 100 kg of waste material per hour and requires electricity consumption of 18 KW. Figure 5 shows crushing machine.

Figure 5: Crushing Machine

Generator 250 KVA

The total load of the proposed unit is 195 KW. The proposed project requires generator of 250 KVA as a backup when normal electricity supply is not available. Figure 6 shows generator 250 KVA.

Figure 6: Generator 250 KVA



Assembly Tools

Drill Machine with Accessories

A drill machine is a tool used for making round holes or driving fasteners. It is fitted with a bit, either a drill or driver, depending on application, secured by a chuck. Some power drills also include a hammer function. Drill machine requires an electric power of 0.55 KW. Figure 7 shows drill machine with accessories.

Figure 7: Drill Machine with Accessories



Adjustable Wrenches

Adjustable wrench is an open-end wrench with a movable jaw, allowing it to be used with different sizes of fastener heads (nut, bolt, etc.) rather than just one fastener sizes, as with a conventional fixed spanner. Figure 8 shows adjustable wrenches.

Figure 8: Adjustable Wrenches



Digital Multi-meter Clamp Meter

A clamp meter is an electrical test tool that combines a basic digital multi-meter with an electric current sensor. Clamp measures current and probes measure voltage. Having a hinged jaw integrated into an electrical meter allows technicians to clamp the jaws around a wire, cable or other conductor at any point in an electrical system, then measure current in that circuit without disconnecting it from the power source. Figure 9 shows digital multi-meter clamp meter.

Figure 9: Digital Multi-meter Clamp Meter



T-Shaped Nut/Screw Driver

A T-shaped nut/screw driver is a tool for tightening nuts, screws and bolts. It consists of a socket attached to a shaft and T-shaped handle and is similar in appearance and use to a screw driver. It generally has a hollow shaft to accommodate a shank onto which a nut/screw is threaded. It is typically used for lower torque applications and is frequently used in appliance repair and electronics industries. Figure 10 shows T shaped nut/screw driver.

Figure 10: T Shaped Nut/Screw Driver



Combination Tool Set (142 Pieces)

Combination tool set includes hexagonal sockets, star sockets, flex handle, ratchet wrench, extension bar, universal joint, three-way adopter, spark plug socket, L-handle, spinner handle, nut spanner, hammer, combination pliers,⁵ curved jaw locked wrench, screw driver and flexible extension bar. Figure 12 shows combination tool set (142 Pieces).

Figure 11: Combination Tool Set (142 Pieces)



⁵ Pliers are hand-operated tool for holding and gripping small objects or for bending and cutting wire.

Soldering Iron (Kaavya)

A soldering iron is a hand tool used for soldering. It is known as 'Kaavya' in the local language. It supplies heat to melt solder⁶ which can flow into the joint between two work pieces. A soldering iron is composed of a heated metal tip and an insulated handle. Heating is often achieved electrically, by passing an electric current (electrical cord or battery cables) through a resistive heating element. Figure 12 shows soldering Iron kavya.

Figure 12: Soldering Iron (Kaavya)



Hole Saw Cutter Set (11 Pieces)

The hole saws represent cylindrical shaped saw blades attachment designed to be used with power drills to cut out perfectly round holes. They are popular in electrical and plumbing trade, and are much more efficient than flat and twist drill bits in applications that require drilling big, deep holes or enlarging existing one. Figure 13 shows hole saw cutter set.

Figure 13: Hole Saw Cutter Set



Disc Cutter and Grinding Machine

A disc cutter is a specialized, often hand-held, power tool used for cutting hard materials. This tool is very similar to an angle grinder, chop saw, or even a die grinder, with the main

⁶ Solder is a fusible metal alloy (tin and lead) used to create a permanent bond between metal workpieces.

difference being the cutting disc itself. Disc cutter is used to cut the extra plastic from the body after the fabrication process. Figure 14 shows disc cutter and grinding machine.

Figure 14: Disc Cutter and Grinding Machine



Air Cooler Lifter Trolley

A lifting trolley is a mobile lifting table with a lowering function that allows the individual employee to work with heavy products at the correct ergonomic⁷ working height. A lifting trolley increases productivity by easing both the work and the product movement. Figure 15 shows machine lifting trolley.

Figure 15: Machine Lifter Trolley



⁷ relating to or designed for efficiency and comfort in the working environment.

Platform Trolley

Platform trolley is used for carrying load or to transport materials from one point to another. In the proposed project, trolley is used to carry raw materials to raw materials store and production department as well as to carry the final products to finished goods store. Figure 16 shows platform trolley.

Figure 16: Platform Trolley



Air Compressor

An air compressor is a pneumatic device that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (compressed air). In the proposed project, air compressor is used for leakage detection in motor using air pressure. Figure 17 shows air compressor.

Figure 17: Air Compressor



Electronic Weighing Scale

Weighing Scale is a device used to measure the quantities of raw materials, which afterwards are mixed together in the mixer in specific ratios. Figure 18 shows Electronic Weighing Scale.

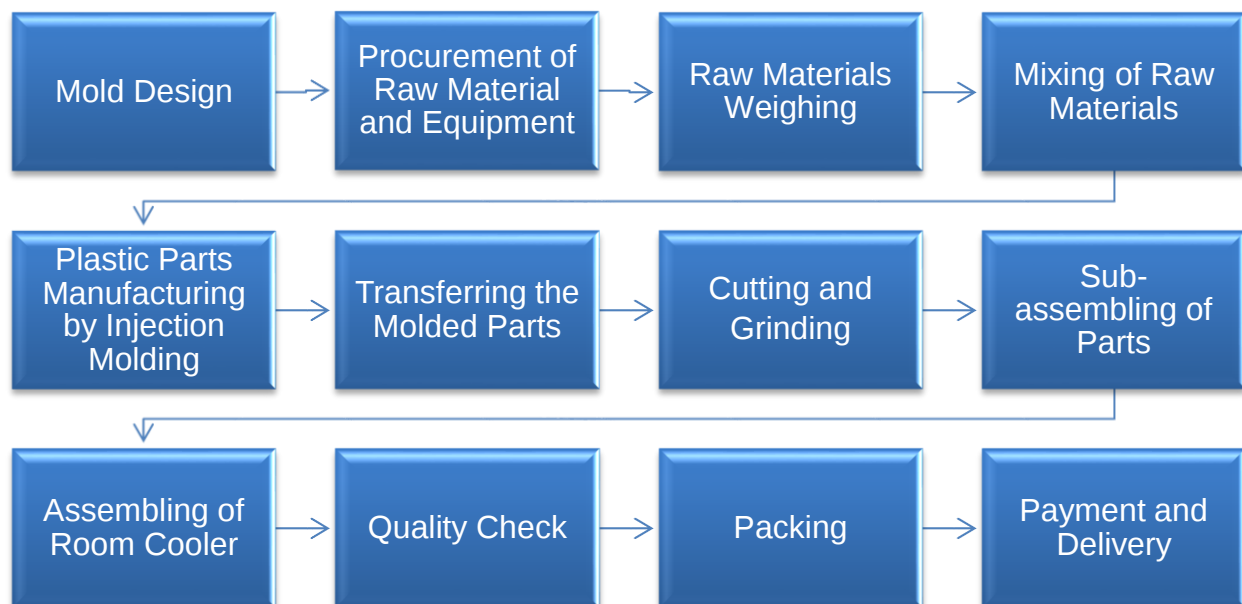
Figure 18: Electronic Weighing Scale



5.2. Production Process Flow

Room cooler manufacturing process flow chart is shown in Figure 19.

Figure 19: Production Process Flow



Brief description of process flow is as follows:

Mold Design

Before starting the business, a detailed Computer-aided design (CAD) for each room cooler is designed by CAD engineers. Auto CAD is commonly used for designing and drafting of product. It allows the manufacturer to conceptualize ideas, product designs and drawings to the required level of technical accuracy, perform rapid design calculations and simulations. Computer-aided design shows the details of the product and where each of the part fits. It shows the length, width and thickness of each part and helps in calculating the material required for manufacturing each part. Without Auto CAD design, accurate weights of room cooler parts, materials to be used and injection molding machine capacity cannot be calculated. Molds are custom designed according to the CAD figure.

Procurement of Raw Materials and Mechanical & Electronic Parts

The main raw material used to manufacture plastic parts of room cooler is Polypropylene (plastic granules). Although Polypropylene is not manufactured in Pakistan and needs to be imported, however, the proposed business does not directly import this material. It sources this material from the existing local importers. Other components required for manufacturing room cooler are:

Mechanical Components:

- Cooling Pad
- Water Pump Pipe
- Water Distributor Pipe
- Wheel Set (4 Piece)
- Knob
- Knob Switches
- Ice Packs

Electrical Components:

- Electric Fan Motor
- Water Pump
- Auto Swing Machine for grill
- Main Lead Power Cord

All parts, purchased from outside manufacturers, are spot checked by the procurement officer through the observation before use. These electronic and mechanical parts are purchased from local markets since they are easily available in all major cities in Pakistan. The proposed project maintains raw material inventory for 30 days.

- **Polypropylene (PP)**

Polypropylene (PP) is an opaque thermoplastic and amorphous polymer. “Thermoplastic” refers to the way the material responds to heat. A thermoplastic is plastic material which melts into a soft, pliable form above a certain temperature and solidifies upon cooling. PP offers a good balance of impact, heat, chemical and abrasion resistance, dimensional stability, tensile strength, surface hardness, rigidity and electrical characteristics. PP plastic is a good insulating material. It remains hard, rigid and tough even at low temperatures. It is available in fire-retardant, heat-resistant and palatable grades.

Generally, plastic granules are imported from international markets and are available in the local market in a 25 kg bag packing. The payment to supplier is made on credit basis within 30 days of receipt of raw material. Figure 20 shows Polypropylene (PP).

Figure 20: Polypropylene (PP)



Electrical Components

- **Electric Fan Motor**

Electric fan motor moves the fan that is attached to a central rotating hub. Electric fan motor is an important part of the room cooler. Electric fan motor rotates the fan with high speed and pushes the cool air from the inside of the cooler. Its speed is controlled with the help of a knob that controls fan speed. Figure 21 shows electric fan motor.

Figure 21: Electric Fan Motor



- **Water Pump Motor**

The main function of water pump motor is to circulate water. It is placed in the water tank. Water pump motor pumps water from the water tank onto ice pad box and then passes through the cooling pads. Figure 22 shows water pump motor.

Figure 22: Water Pump Motor



- **Auto Swing Machine for Grills**

Auto swing is attached on the panel. This is used for the movement of grill, which helps to evenly distribute air into all part of the rooms. Figure 23 shows auto swing motor.

Figure 23: Auto Swing Machine for Grills



Mechanical Components:

- **Ice Pack**

An effective way of increasing the cooling efficiency of coolers is by adding ice to the water in the tank. Many coolers come with ice compartment and ice packs are used to keep the water cool. Ice pack typically contain a thickening agent, silica gel and non-toxic coloring. Figure 24 shows the ice pack bottles used in a water cooler.

Figure 24: Ice Pack Bottles

- **Cooling Pads**

Cooling pads also called honeycomb cooling pads represent a very important component of a room cooler. These are made from cellulose fibers and provide better cooling efficiency than traditional aspen and khuss fiber pads. The room cooler works on the principle of cooling the outdoor air, which passes through these water-saturated cooling pads, thus making the water evaporate with passing dry air. Figure 25 shows cooling pads.

Figure 25: Cooling Pads

- **Knobs**

There are three types of knobs to control the operation of air cooler. One knob is for controlling water or water pumping motor, the second one is for controlling the speed of air or fan and third one is for controlling the swinging of grill to set air direction. Figure 26 shows knobs.

Figure 26: Knobs**Raw Material Weighing Process**

A weighing scale is used to measure the quantities of raw materials. White and colored granules are measured in proportional quantities according to the color of the final products. After weighing, the granules are ready to be mixed and processed.

Raw Material Mixing Process

Before going to the production line, white granules and colored granules are mixed in a mixer machine. After uniform mixing, the granules are ready to be loaded into the hopper of the molding machine. The mixer used in the proposed project have a capacity of 150 kg per hour. Mixing is done in batches as per need.

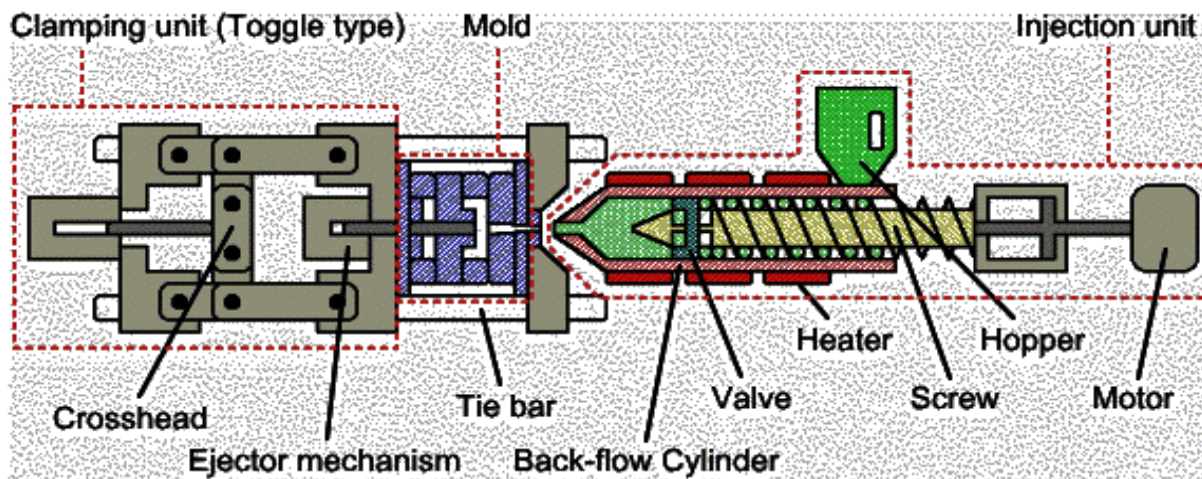
Fabrication

Fabrication is the process of manufacturing products by combining typically standardized parts using one or more individual processes. Plastic parts are produced using a range of processes such as molding, cutting/grinding and assembling.

Injection Molding

Injection molding is a method to obtain molded products by injecting plastic materials; melted by heat, into a mold, and then cooling and solidifying them. Injection molding machine is divided into two units i.e., a clamping unit and an injection unit. The functions of the injection unit are to melt plastic granules by heat and then to inject molten plastic into a mold. The functions of the clamping unit are opening and closing a die and the ejection of products.

The screw of molding machine is rotated to melt plastic introduced from the hopper and to accumulate molten plastic in front of the screw (to be called metering). The mechanical energy supplied by the turning screw, together with frictional heaters, converts the plastic granules into a molten state. After the required amount of molten plastic is accumulated, injection process is started. Figure 27 shows the sections of injection molding machine.

Figure 27: Injection Molding Machine

While molten plastic is flowing in a mold, the machine controls the moving speed of the screw, or injection speed. On the other hand, it controls dwell pressure⁸ after molten plastic fills out cavities. Room cooler components that are made on injection molding machine are upper panel with cover, front panel with grill, side and back panel, base tub, inner stand (motor and fan support).

Room Cooler Body Parts Made by Injection Molding Machine

Room Cooler Body

The main parts of the room cooler body are upper panel and cover, front panel and grill, inner stand with fan blade, base tub and side and back panel. A room cooler body as shown in Figure 28.

⁸ Dwell pressure is the pressure that is applied during the period after the entire cavity has been filled with molten plastic until the gate has been sealed (the gate has solidified) so that the plastic does not flow back from the gate. Its unit is MPa or kgf/cm².

Figure 28: Room Cooler Body**Front Panel with Movable Grill**

This grill is fitted in the front panel which moves from to left, right and up, down position to distribute the air in many directions. Figure 29 shows front movable grill.

Figure 29: Front Movable Grill

Upper Panel and Cover

Upper Panel is a room cooler part made from plastic that acts as a roof of room cooler. The upper side of the panel contains space for icepacks and a lid cover to close the ice box. Figure 30 shows upper panel with cover.

Figure 30: Upper Panel with Cover

**Side and Back Panel**

Grills are attached to back, left and right side of the air cooler. Cooling pads are also fitted in these grills which helps in the cooling of the air. Figure 31 shows side and back panel grill.

Figure 31: Side and Back Panel Grill



Fan Blade

Fan blade is one of the specially shaped rotating parts (blades) of a mechanical fan which move and distribute air. Fans blade are attached to the electric fan motor in inner stand for room cooler. Figure 32 shows fan blade.

Figure 32: Fan Blade

**Base Tub**

Base Tub is the lower part of air cooler, which has a holding capacity of 25 o 40 liters and its capacity varies according to the size of air cooler. The water is circulated through the air cooler to wet the cooling pads which then helps in cooling the air. Figure 33 shows base tub.

Figure 33: Base Tub



- **Inner Stand**

Inner stand or panel is made of plastic and used to grip the electric motor inside the room cooler. Figure 34 shows Inner Stand.

Figure 34: Inner Stand



Transferring the Molded Parts

After completing the fabrication process, all the molded parts are transferred to sub assembling department using platform trolleys to assemble the room cooler.

Cutting and Grinding

In this step, the extra plastic attached with the molded parts is cut using disc cutter. After cutting the extra plastic, edges of the molded parts are ground using grinding machine to make rough edges smooth.

Crushing

These plastic bits are mixed with raw material directly for reuse. Due to its purity, it is easy to reuse. The leftovers, waste material produced in the first batch (products not meeting the required specifications) are crushed to small particles again using the crushing machine.

Sub-Assemblies of Room Cooler

The room cooler parts are assembled manually by workers who bolt, snap or press (tight fit) several shafts and gears together using T shaped nut/screw drivers, adjustable wrenches and combination tool set.

In the proposed project, the production and assembly of room coolers is done by 14 teams. Each team consists of one skilled technician to do electrical and mechanical connections and one helper to assemble the parts of machine.

Sub-assembly is divided in five stages.

1. Assembly of Upper Panel
2. Assembly of Front Panel
3. Assembly of Inner Stand
4. Assembly of Base Tub
5. Assembly of Side and Back Panel

Workers use a metered amount of oil to bolt the different parts together. The motor is assembled manually. Soldering iron (kaavya) is used for making electrical connections and clamp meter is used to test voltage.

Assembling of Room Cooler

After installing all the necessary parts in the sub-assemblies, final assembly of all the sub-assemblies and the remaining parts such as ice packs, cooling pads, electric motor, water pump motor, auto swing and water pipe are assembled to complete the assembly. After assembly, remaining parts (wheels, knobs, plug and wire) are installed manually using drill machine and other tools. Holes are made using drill machine and saw cutter machine in pre-determined marked areas and these parts are fitted in the main body through screws and bolts. After screwing together all parts, the equipment is ready for testing. Figure 35 shows the finished room cooler.

Figure 35: Finished Room Cooler



Quality Checks

Once the room cooler is completely assembled, the room coolers are filled with water and tested for noise, leakage of base tub, vibration, visual defects and all the functional controls and mechanisms. This testing is performed by the Quality Controller.

Packing

After quality assurance checks, room cooler is packed manually by labor. Packing of room cooler includes thermopol (covering all the outside body of room cooler), plastic wrapper, carton box. All the packings are strengthened by wrapping a plastic strap around the carton box.

Finished Goods Store

After completion of assembling and packing, the packed room coolers are transferred to finished goods store by trolleys. The room coolers are stored at designated places in the store and are managed by the storekeeper to protect those from any damage. A finished goods inventory of 15 days production is maintained.

Delivery and Payment

Finished products (room coolers) are delivered to the market through loader rickshaw or loader truck. Sales are made to customers on an average credit period of 20 days.

5.3. Installed and Operational Capacities

The injection molding machine and the assembly line operates in a single 12-hour shift. Based on 216 working days (27 days for 8 months) in a year, the total manufacturing capacity is based on the injection molding machine production capacity. The proposed manufacturing unit, at maximum capacity of 100% manufactures 24,565 room coolers annually. This includes 7,068 room coolers of 180W (Large) capacity, 7,085 room cooler of 160W (Medium) capacity and 10,412 room coolers of 140W (Small) capacity. During first year of operation, the manufacturing unit is expected to attain 60% of the installed capacity.

The proposed manufacturing unit shall manufacture 14,739 room coolers during initial year at 60% capacity utilization, which includes 4,241 room coolers of 180W (Large) capacity, 4,251 room coolers of 160W (Medium) capacity and 6,247 room coolers of 140W (Small) capacity.

Based on the current market trend, the production ratio of each product is shown in tables below.

Table 4 depicts injection molding machine production capacity for 180W (Large) room cooler.

Table 5 depicts the injection molding machine production capacity for 160W (Medium) room cooler

Table 6 injection molding machine production capacity for 140W (Small) room cooler.

Table 7 shows the total annual installed and operational capacity.

Table 4: Injection Molding Machine Production Capacity- 180W (Large) Room Cooler

Production Parts	Time Division Ratio per Mold	Total Machine Hours	Total Machine Setup Time (Hours)	Total Available Machine Time Per Day (Hours)	Machine Hours Per Day	Available Machine Time Per Day (Minutes)	Available Machine Time Per Day (Seconds) (A)	Cycle Time (sec) (B)	Machine Capacity / day (Units) (A/B)
Upper Panel and Cover	10%	12	2	10	1.0	58.06	3,483.87	37.5	93
Front Panel with Grill	32%				3.2	193.55	11,612.90	125	93
Side and Back Panel (3 Sides)	19%				1.9	116.13	6,967.74	75	93
Base Tub	19%				1.9	116.13	6,967.74	75	93
Inner Stand with Fan Blade	19%				1.9	116.13	6,967.74	75	93
	100%				10.0	600	36,000		

Table 5: Injection Molding Machine Production Capacity-160W(Medium) Room Cooler

Production Parts	Time Divisun Ratio per Mold	Total Machine Hours	Total Machine Setup Time (Hours)	Total Available Machine Time Per Day (Hours)	Machine Hours Per Day	Available Machine Time Per Day (Minutes)	Available Machine Time Per Day (Seconds) (A)	Cycle Time (sec) (B)	Machine Capacity / day (Units) (A/B))
Upper Panel with Cover	9%	12	2	10	0.9	55	3,273	30	109
Front Panel with Grill	30%				3.0	182	10,909	100	109
Side and Back Panel	23%				2.3	136	8,182	75	109
Base Tub	19%				1.9	114	6,818	62.5	109
Inner Stand (Motor and Fan Support)	19%				1.9	114	6,818	62.5	109
	100%				10.0	600	36,000		

Table 6: Injection Molding Machine Production Capacity- 140W (Small) Room Cooler

Production Parts	Time Divisun Ratio per Mold	Total Machine Hours	Total Machine Setup Time (Hours)	Total Available Machine Time Per Day (Hours)	Machine Hours Per Day	Available Machine Time Per Day (Minutes)	Available Machine Time Per Day (Seconds) (A)	Cycle Time (sec) (B)	Machine Capacity / day (Units) (A/B)
Upper Panel with Cover	10%	12	2	10	1.0	57	3,429	25	137
Front Panel with Grill	29%				2.9	171	10,286	75	137
Side and Back Panel	24%				2.4	143	8,571	63	137
Base Tub	19%				1.9	114	6,857	50	137
Inner Stand (Motor and Fan Support)	19%				1.9	114	6,857	50	137
	100%				10.0	600	36,000		

Table 7: Annual Installed and Operational Capacity

Products	Production Ratio	Total Production Days	Production Days per Room cooler	Production per Day	Production Capacity @100%	Initial Year Production Capacity @60%
Room cooler 180W (Large)	35%	216	76	93	7,068	4,241
Room cooler 160W (Medium)	30%		65	109	7,085	4,251
Room cooler 140W (Small)	35%		76	137	10,412	6,247
Total	100%		217	339	24,565	14,739

6. CRITICAL FACTORS

Following factors should be considered while making the investment decision in “Manufacturing Unit for Room Cooler”.

- Sound technical knowhow and basic knowledge of the business
- Availability of quality raw materials
- Effective market linkages
- Availability of specialized workforce
- Regular and strict checks on quality standards
- Up-to-date knowledge of technological innovations
- Rigorous supervision of the production process at all process stages
- Regular checks on the machinery and equipment for proper working

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

Room coolers work well in regions of the country that have hotter and drier climates. In areas of high humidity, the air cooler does not reduce the temperature effectively.

Target customers for this proposed unit are the household customers, hospitals, hotel, other institutions and industries. Sales are made through wholesale and e-commerce platforms and distribution channels. The unit is proposed to be ideally located in any industrial areas of large cities like Karachi, Lahore, Gujranwala, Rawalpindi, Peshawar, Hyderabad, Sukkur, Quetta, Sialkot, etc. Locating the proposed unit in these cities provides the advantage of being close to buyers which helps in getting consistent orders. Such units may also be established in other smaller cities where the basic requirements like availability of raw materials, skilled manpower, market access, etc. can be fulfilled.

8. POTENTIAL TARGET MARKETS/CUSTOMERS

Room coolers can be a suitable option for people living in Pakistan, especially during the hot and dry summer months. Some potential target customers for room coolers in Pakistan could include:

Middle-class households: Many middle-class households in Pakistan cannot afford air conditioning systems, making room coolers a more affordable alternative. As the cost of electricity continues to increase, there is a growing demand for room coolers.

Small shops and businesses: Small shops, offices, and businesses may also benefit from using room coolers to create a comfortable working environment for employees and customers.

Religious places: Mosques and other religious places may also use room coolers to

provide relief during the hot summer months.

Rural areas: In many rural areas of Pakistan, there may be limited access to electricity and air conditioning. Room coolers can provide a cost-effective solution for people living in these areas to stay cool and comfortable during the summer.

Climate change in Pakistan is a major issue for the country. Pakistan is highly vulnerable to climate change. As with the changing climate in South Asia as a whole, the climate of Pakistan has changed over the past several decades, with significant impacts on the environment and people. Between 1999 and 2018, Pakistan was ranked 5th among all the countries which are affected by extreme weather, caused by climate change.⁹ Extreme weather in majority parts of the country is expected to drive the demand for room coolers.

Room coolers are more commonly used by urban population. Globally, the percentage of population living in urban areas is expected to increase from 55% in 2018 to 68% by 2050.¹⁰ Pakistan's current population comprises of about one-third urban households. It is expected to increase to around 50% by 2025.¹¹

The rise in cost of raw materials due to an increase in fuel prices along with commodity price inflation, disruption in supply chain, and higher demand for air conditioning solutions is pushing brands to increase prices of the products. Furthermore, Pakistan is also facing the issue of increase in electricity prices.

With increasing prices of air conditioners and electricity, it is becoming difficult for middle class segment of the society to afford air conditioners. This has increased the demand for room coolers as they are affordable and consume less electricity. Future prospects of Pakistan's room cooler manufacturing industry look promising. The proposed project offers good investment opportunities for potential investment.

In Pakistan there are several small, medium and large enterprises engaged in manufacturing of room coolers. Most of these units are located in Lahore, Karachi and Gujranwala. Current local production of room cooler is not sufficient to meet the rising demand of room coolers in the country. In Pakistan, imports of air coolers increased from \$2.97 million in 2020 to \$3.76 million in 2021¹² which shows increasing demand of these products in the local market.

The local household appliance market has many large players, which claim a significant share of the local market. Some of the major local brands are Super Asia, BOSS, GABA Nationals, NasGas and E-Lite.

⁹https://www.germanwatch.org/sites/germanwatch.org/files/GlobalClimateRiskIndex_16.pdf

¹⁰<https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>

¹¹<https://www.files.ethz.ch/isn/159296/4c5b5fa0ebc5684da2b9f244090593bc.pdf>

¹² <https://comtrade.un.org/Data/>

9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of Manufacturing Unit for Room Cooler. Various costs and revenue related assumptions, along with results of the analysis are outlined in this section.

The projected Income Statement, Cash Flow Statement and Balance Sheet are attached as Annexure.

Project is proposed to be financed through 100% equity. Total project cost has been estimated as PKR 80,455,006 which comprises of capital investment and working capital of PKR 62,580,072 and PKR 17,874,934 respectively.

9.1. Project Cost

The details of initial project cost calculated for the manufacturing unit are shown in Table 8.

Table 8: Initial Project Cost

Cost Item	Cost (PKR)	Details Reference
Land	-	9.1.1
Building / Infrastructure	1,961,597	9.1.2
Molds	13,700,000	
Other Machinery and equipment	34,930,000	9.1.3
Production Tools	2,036,200	
Furniture & fixtures	1,850,000	9.1.4
Office vehicles	1,961,500	0
Office equipment	3,051,000	9.1.6
Security against building	1,290,780	
Pre-operating costs	1,719,995	9.1.7
Incorporation and License costs	79,000	9.1.8
Total Capital Cost	62,580,072	
Working Capital		
Equipment spare part inventory	202,625	
Material Inventory	15,242,049	
Upfront building rent	430,260	
Cash	2,000,000	
Total	17,874,934	

Total Project Cost	80,455,006
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9.1.1. Land

The proposed unit will be established on a rented land having an area of 7,171 square feet. Total rental cost has been estimated as PKR 430,260 per month. 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.)
Raw Material Store Room	1	15	15	225
Production & Packing Department	1	50	45	2,250
Finished Goods Store Room	1	35	30	1,050
Washrooms	3	8	6	144
Office Block				
Executive Office	1	10	12	120
Accounts Department	1	20	25	500
Quality Control Department	1	12	10	120
Procurement Department	1	20	25	500
HR and Admin Department	1	20	25	500
Sales and Marketing Department	1	25	25	625
Conference Hall	1	16	12	192
Electrical and Mechanical Workshop	1	15	15	225
Reception	1	10	10	100
Kitchen	1	10	10	100
Washrooms	5	8	8	320
Parking (Open Area)				200
Total Area				7,171

9.1.2. Building

There will be no cost of building construction since the manufacturing unit for Room Coolers equipment will be started in a rented building having an area of 7,171 square feet. However, there will be a renovation cost required to make the building usable for the business. Building rent of PKR 430,260 per month has been included in the operating cost. The proposed project requires electricity load of around 195 KW for

which an industrial electricity connection will be required. Table 10 provides 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	199	800	159,592
Wall Racks	Units	19	8,000	152,000
Labour Cost	Feet	19,949	15	299,235
Glass partition	Square Feet	1,701	550	935,550
Ceramic Floor Tiles	Square Feet	3,302	110	363,220
Curtains	Units	4	6,000	24,000
Blinds	Units	4	7,000	28,000
Total				1,961,597

9.1.3. Machinery and Equipment Requirement

Table 11 provides details of machinery and equipment required for the project:

Table 11: Machinery and Equipment Requirement

Cost Item	Unit	Unit Cost (PKR)	Total Cost (PKR)
Injection Moulding Machine 1800-ton (200 Mould per day)	1	30,000,000	30,000,000
Overhead Crane 1 ton	1	380,000	380,000
Granules Mixer Machine - 150Kg/ Hour (4000 watts)	2	330,000	660,000
Crusher Machine - 100Kg/Hour (6400 watts)	1	390,000	390,000
Generator 250 KVA	1	3,500,000	3,500,000
Total			34,930,000

Table 12 shows detail of the molds required for the project.

Table 12: Molds

Cost Item	Unit	Unit Cost (PKR)	Total Cost (PKR)
Molds For Room Cooler- Large			
Upper Panel and Cover	1	1,200,000	1,200,000
Front Panel and Grill	1	1,200,000	1,200,000
Inner Stand with Fan Balde	1	800,000	800,000
Base Tub	1	1,200,000	1,200,000
Side and Back Panel	1	900,000	900,000
Molds For Room Cooler- Medium			
Upper Panel and Cover	1	1,000,000	1,000,000
Front Panel and Grill	1	1,000,000	1,000,000
Inner Stand with Fan Balde	1	800,000	800,000
Base Tub	1	1,000,000	1,000,000
Side and Back Panel	1	800,000	800,000
Molds For Room Cooler- Small			
Upper Panel and Cover	1	800,000	800,000
Front Panel and Grill	1	800,000	800,000
Inner Stand with Fan Balde	1	750,000	750,000
Base Tub	1	850,000	850,000
Side and Back Panel	1	600,000	600,000
Total	15		13,700,000

Table 13 shows details of production tools required for the project.

Table 13: Production Tools

Cost Item	Unit	Unit Cost (PKR)	Total Cost (PKR)
Drill Machine with Accessories	14	12,500	175,000
Adjustable Wrench Set	14	3,600	50,400
Digital Multimeter Clamp Meter	14	4,200	58,800
T Shaped Nut/Screw Driver	14	2,000	28,000
Total 142 Pcs Combination Tool Set	14	30,000	420,000

Soldering Iron Kavya Set	14	1,500	21,000
Machine Lifter Trolley	14	27,000	378,000
Platform Trolley	14	38,000	532,000
Air Compressor Machine	14	6,500	91,000
11 Piece Hole Saw Cutter Set	14	6,000	84,000
Electronic Weight Scale (100Kg)	14	10,500	147,000
Disc-Cutter & Grinding Machine	14	17,000	51,000
Total			2,036,200

9.1.4. Office Equipment Requirement

Table 14 presents the office equipment requirement proposed for the unit.

Table 14: Office Equipment Requirement

Cost Item	Units	Unit Cost (PKR)	Total Cost (PKR)
LED TV-32"	2	36,000	72,000
LED TV- Surveillance	1	36,000	36,000
Water Dispenser	4	24,000	96,000
Ceiling Fan	22	8,000	176,000
Exhaust Fan	12	4,500	54,000
Laptops	5	150,000	750,000
Desktop Computers	9	50,000	450,000
Laser Printer	7	51,500	360,500
Wi-Fi / Internet Router	2	3,500	7,000
Air Conditioners	11	85,000	935,000
Bracket Fan	3	10,500	31,500
CCTV Cameras (2MP)	22	2,500	55,000
DVR	2	14,000	28,000
Total			3,051,000

9.1.5. Furniture and Fixture Requirement

Table 15 gives details of the furniture and fixture required for the project.

Table 15: Furniture and Fixtures Requirement

Cost Item	Units	Unit Cost (PKR)	Total Cost (PKR)
Executive Table	1	60,000	60,000
Executive Chair	1	30,000	30,000
Visitors Chairs	16	15,000	240,000
Staff Table	14	30,000	420,000
Reception Counter	1	50,000	50,000
Office racks	10	15,000	150,000
Staff Chairs	50	13,500	675,000
Sofa Sets	5	45,000	225,000
Total			1,850,000

9.1.6. Vehicle Requirement

Details of vehicles required for the project is given in Table 16.

Table 16: Vehicle Requirement

Cost Item	Unit	Unit Cost (PKR)	Registration fee	Total Cost (PKR)
Loader Rickshaw	1	300,000	13,000	313,000
Moter Cycle (70 cc)	2	116,750	6,500	246,500
Loader Van	1	1,350,000	52,000	1,402,000
Total Cost				1,961,500

9.1.7. Pre-Operating Cost Requirement

Details of pre operating cost required for the project is given in Table 17.

Table 17: Pre-Operating Cost Requirement

Description	No.of Months	Unit Cost (PKR)	Total (PKR)
Administration expense	1	1,220,333	1,220,333
Utilities expense	1	416,661	416,661
Autocad Charges for preparation of Mold Design			83,000
Total (PKR)			1,719,995

9.1.8. Incorporation and License Cost

Details of company Incorporation and License costs as shown in Table 18.

Table 18: Incorporation and License costs

Particular	Amount
Trade Mark Registration	
Professional charges for registration of trade mark	30,000
Trade Mark search fee	500
Trade Mark application fee	1,000
Trade Mark Certificate fee	3,000
Miscellaneous Expenses	1,500
Total	36,000
Company Registration Charges -SECP	
Professional charges for registration	40,000
Company Incorporation fee	3,000
Total	79,000

9.1.9. Working Capital Requirement

Details of working capital required for the project is given in Table 19.

Table 19: Working Capital Requirement

Cost Item	Month	Total Cost (PKR)
Equipment spare part inventory	1	202,625
Material Inventory	1	15,242,049
Upfront building rent	1	430,260
Cash		2,000,000
Total Initial Working Capital Cost		17,874,934

9.2. Breakeven Analysis

Table 20 shows calculation of break-even analysis.

Table 20: Break-Even Analysis

Description	Amount First Year (PKR)	Ratios
Sales (PKR) – A	269,668,500	100%
Variable Cost (PKR) – B	210,612,548	78%
Contribution (PKR) (A-B) = C	59,055,952	22%

Fixed Cost (PKR) – D	37,167,500	14%
Contribution Margin Per Unit	4,007	
Breakeven		
Breakeven Revenue		169,718,777
Breakeven Units		9,276
Breakeven Capacity		38%

9.3. Revenue Generation

Based on 60% capacity utilization, sales revenue during the first year of operations is shown in Table 21. The revenue is generated from wholesale channel.

Table 21: Revenue Generation

Products	Unit Sold	Cost per Unit (PKR)	Sale Price (PKR)	Revenue (PKR)
Room cooler 180W (Large)	4,064	14,580	22,500	91,440,000
Room cooler 160W (Medium)	4,074	13,084	19,500	79,443,000
Room cooler 140W (Small)	5,987	11,750	16,500	98,785,500
Total	14,125			269,668,500

9.4. Cost of Goods Sold Estimate

Based on 60% capacity utilization, the calculation of cost of goods sold during the first year of operations is shown in Table 22.

Table 22: Cost of Goods Sold Estimate

Product	Total Cost of Goods Sold (PKR)	Reference
Raw Material Cost		
Room cooler 180W (Large)	20,157,440	Table 23
Room cooler 160W (Medium)	17,860,416	
Room cooler 140W (Small)	21,074,240	
Machinery and Component Cost		
Room cooler 180W (Large)	37,673,280	Table 24

Room cooler 160W (Medium)	34,017,900	
Room cooler 140W (Small)	47,177,560	
Packing Cost	4,943,750	Table 25
Transportation Cost	1,829,046	
Direct Electricity	4,432,944	
Generator Fuel cost	487,992	
Direct Labor	16,240,000	Table 30
Machinery Maintenance – Cost	2,431,500	Table 31
Total Cost of Goods Sold	208,326,068	

Table 23: Total Raw Material Cost

Products	Quantity Sold (Units)	Material cost per unit (PKR)	Total Cost (PKR)	Reference
Room cooler 180W (Large)	4,064	4,960	20,157,440	Table 26
Room cooler 160W (Medium)	4,074	4,384	17,860,416	Table 27
Room cooler 140W (Small)	5,987	3,520	21,074,240	Table 28
Total	14,125		59,092,096	

Table 24: Total Equipment Cost

Products	Quantity Sold (Units)	Total Equipment cost per unit (PKR)	Total Cost (PKR)	Reference
Room cooler 180W (Large)	4,064	9,270	37,673,280	Table 26
Room cooler 160W (Medium)	4,074	8,350	34,017,900	Table 27
Room cooler 140W (Small)	5,987	7,880	47,177,560	Table 28
Total	14,125		118,868,740	

Table 25: Total Packing Cost

Products	Quantity Sold (Units)	Packing cost per unit (PKR)	Total Packing Cost (PKR)	Reference
Packing Cost	14,125	350	4,943,750	Table 29

Table 26: Raw Material and Equipment Cost Room cooler (180W capacity)

Cost Item	Unit of Measurement	Cost/Unit/Feet(PKR)	Quantity/KG	Total Cost (PKR)
Polypropylene for Upper Panel	kg	320	1.5	480
Polypropylene for Front Panel			5	1,600
Polypropylene for Inner Stand			3	960
Polypropylene for Base Tub			3	960
Polypropylene for Side and Back Panel			3	960
Total Raw Material Cost				4,960
Electric Fan Motor 180 W	Units	4,000	1	4000
Water Pump	Units	650	1	650
Cooling Pad	Units	800	3	2400
Water Pump Pipe	Units	50	1	50
Water Distributor Pipe	Units	130	1	130
Wheel Set (4 Piece)	Units	350	1	350
Knob	Units	30	3	90
Knob Switches	Units	100	3	300
Autoswing machine for grill	Units	200	1	200
Main Lead Power Cord	Units	150	1	150

Ice Packs	Units	200	4	800
Four Core Cable 0.5mm ²	Units	150	1	150
Total Equipment Cost				9,270
Total				14,230

Table 27: Raw Material and Equipment Cost - Room cooler (160W Capacity)

Cost Item	Unit of Measurement	Cost/Unit/Feet(PKR)	Quantity/KG	Total Cost (PKR)
Polypropylene for Upper Panel	KG	320	1.2	384
Polypropylene for Front Panel			4	1,280
Polypropylene for Inner Stand			3	960
Polypropylene for Base Tub			3	800
Polypropylene for Side and Back Panel			2.5	800
Total Raw Material Cost				4,384
Electric Fan Motor 160 W	Units	3,500	1	3500
Water Pump	Units	550	1	550
Cooling Pad	Units	800	3	2400
Water Pump Pipe	Units	50	1	50
Water Distributor Pipe	Units	110	1	110
Wheel Set (4 Piece)	Units	300	1	300
Knob	Units	30	3	90
Knob Switches	Units	100	3	300
Autoswing machine for grill	Units	180	1	180
Main Lead Power Cord	Units	150	1	150

Ice Packs	Units	200	3	600
Four Core Cable 0.5mm ²	Units	120	1	120
Total Equipment Cost				8,350
Total				12,734

Table 28: Raw Material and Equipment Cost - Room cooler (140W Capacity)

Cost Item	Unit of Measurement	Cost/Unit/Feet(PKR)	Quantity/KG	Total Cost (PKR)
Polypropylene for Upper Panel	KG	320	1	320
Polypropylene for Front Panel			3	960
Polypropylene for Inner Stand			2.5	800
Polypropylene for Base Tub			2	640
Polypropylene for Side and Back Panel			2	640
Total Raw Material Cost				3,520
Electric Fan Motor 140 W	Units	3,000	1	3000
Water Pump	Units	500	1	500
Cooling Pad	Units	800	3	2400
Water Pump Pipe	Units	50	1	50
Water Distributor Pipe	Units	100	1	100
Wheel Set (4 Piece)	Units	300	1	300
Knob	Units	30	3	90
Knob Switches	Units	100	3	300
Autoswing machine for grill	Units	120	1	120

Main Lead Power Cord	Units	100	1	100
Ice Packs	Units	200	4	800
Four Core Cable 0.5mm ²	Units	120	1	120
Total Equipment Cost				7,880
Total				11,400

Table 29: Packing Cost

Cost Item	Unit of Measurement	Cost/Unit (PKR)	Quantity (kg)	Total Cost per unit (PKR)
Packing Cost (plastic, plastic Strap, wrapper, thermopol, carton)	Units	350	1	350

Table 30: Cost of Goods Sold Assumption – Direct Labor

Post	No of Persons	Monthly Salary (PKR)	Annual Salary (PKR)
Production Manager	1	150,000	1,800,000
Production Supervisor	1	80,000	640,000
Quality Controller	2	100,000	1,600,000
Skilled Labour-Assembly	14	35,000	3,920,000
Unskilled Labour-Assembly	14	25,000	2,800,000
Skilled Labour- Molding	2	40,000	640,000
Unskilled Labour-Molding	3	25,000	600,000
Engineering Manager	1	150,000	1,800,000
Mechanical Foreman	1	50,000	400,000
Mechanical Technician	1	40,000	320,000
Electrical Foreman	1	50,000	400,000
Electrical Technician	1	40,000	320,000
Packing labour	5	25,000	1,000,000
Total Direct Labor (PKR)	47		16,240,000

*The cost of direct labor except production manager and engineering manager is based on 8 operational months.

Table 31: Cost of Goods Sold Assumption – Machinery Maintenance Cost

Cost Item	Cost of Machinery (PKR)	Machinery Maintenance Rate	Total Cost (PKR)
Maintenance Cost	48,630,000	5%	2,431,500
Total Cost (PKR)			2,431,500

9.5. Variable Cost Estimate

Variable costs of the project have been provided in Table 32.

Table 32: Variable Cost Estimate

Description of Costs	Amount (PKR)
Raw Material	
Room cooler 180W (Large)	20,157,440
Room cooler 160W (Medium)	17,860,416
Room cooler 140W (Small)	21,074,240
Equipment	
Room cooler 180W (Large)	37,673,280
Room cooler 160W (Medium)	34,017,900
Room cooler 140W (Small)	47,177,560
Packing Cost	4,943,750
Transportation Cost	1,829,046
Utilities Cost	4,432,944
Direct Labor	16,240,000
Machinery Maintenance – Cost	2,431,500
Fuel Cost – Generator	487,992
Communications expense (internet, Telephone etc.)	816,600
Office vehicles running expense	816,600
Office expenses (stationery, entertainment, services, etc.)	653,280
Total	210,612,548

9.6. Fixed Cost Estimate

Table 33 shows the estimated fixed cost of the project.

Table 33: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Management Staff	16,332,000
Administration benefits expense	1,628,600
Building rental expense	5,163,120
Promotional expense	2,696,685
Amortization of Legal & License Fee	15,800
Depreciation expense	9,191,981
Utilities	446,973
Amortization of pre-operating costs	343,999
Bad debt expense	1,348,343
Total	37,167,500

9.7. 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 34.

Table 34: Financial Feasibility Analysis

Description	Project
IRR	59%
NPV (PKR)	183,467,049
Payback Period (years)	2.60
Projection Years	10
Discount rate used for NPV	25%

9.8. 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) with the interest rate of KIBOR+3%, which is shown in Table 35.

Table 35: Financial Feasibility Analysis with 50% Debt

Description	Project
IRR	58%
NPV (PKR)	223,825,601
Payback Period (years)	2.64
Projection Years	10
Discount rate used for NPV	22%

9.9. Human Resource Requirement

For the 1st year of operations, the proposed unit shall require the workforce at a salary cost shown in Table 36. The salary for direct labor except production manager and engineering manager has been taken for 8 operational months whereas the salary for administrative and aforementioned direct labor has been taken for 12 months.

Table 36: Human Resource Requirement

Post	No. of Employees	Monthly Salary (PKR)	Annual Salary (PKR)
Marketing Manager	1	150,000	1,800,000
Sales & Marketing officer	2	80,000	1,920,000
Production Manager	1	150,000	1,800,000
Production Supervisor	1	80,000	640,000
Accounts Manager	1	150,000	1,800,000
Accounts Assistant	1	60,000	720,000
Admin and HR manager	1	150,000	1,800,000
Admin and HR Executive	1	60,000	720,000
Quality Controller	2	100,000	1,600,000
Procurement Officer	1	75,000	900,000
Procurement Assistant	1	50,000	600,000
Skilled Labour-Assembly	14	35,000	3,920,000
Unskilled Labour-Assembly	14	25,000	2,800,000
Skilled Labour- Molding	2	40,000	640,000
Unskilled Labour-Molding	3	25,000	600,000
Raw Material Store Incharge	1	60,000	720,000

Finished Goods Store Incharge	1	60,000	720,000
Engineering Manager	1	150,000	1,800,000
Mechanical Foreman	1	50,000	400,000
Mechanical Technician	1	40,000	320,000
Electrical Foreman	1	50,000	400,000
Electrical Technician	1	40,000	320,000
Packing labour	5	25,000	1,000,000
Receptionist	1	40,000	480,000
Driver	2	30,000	720,000
Office boy	3	22,000	792,000
Security Guard	8	22,000	2,112,000
Sweeper	2	22,000	528,000
Total	74		32,572,000

*The labor will work in a single shift of 12 hours.

10. CONTACT DETAILS

The contact details of all the major suppliers of machinery and equipment and raw materials are given in Table 37.

Table 37: Details of Suppliers

Name Of Supplier	Location	Name of the Item	Contact No	E-mail/Web Address
Overhead Crane Supplier	China	Overhead Crane	0336 4263318	cranehouse.com.pk
Tianjin Yihezongwei Precision Machine Co., Ltd.	China	Injection Molding Machine		https://zoweimachinery.en.made-in-china.com/
Guangdong Jieman Technology Co.,Ltd	China	Molds		https://injectionmachine.en.made-in-china.com/
YIZUMI	China	Molds		https://Injection-Moulding-Machine-Plastic-
PowerZone	Lahore	Backup Generator	0421111 11087	powerzone.com.pk
Engi Plastic Co	Lahore	Polypropylene (PP)	(042) 3529753 4	
SAMAD PLASTIC STORE	Lahore	Polypropylene (PP)	0300 9425441	
S.S.Plastic Works	Karachi	Polypropylene (PP)		
ABS PRODUCTS PAKISTAN (PVT) LTD.	Karachi	Polypropylene (PP)	(021) 3506464 4	
Plastic abs dana	Karachi	Polypropylene (PP)		https://plastic-abs-dana
ILYAS PLASTIC INDUSTRIES	Peshawar	Polypropylene (PP)	0314 9192926	
MKB Enterprises (Pvt) Ltd	Peshawar	Polypropylene (PP)	0313 0522323	
A One Electronics	Lahore	Electrical parts	(042) 3735158	
Bobby Electronics	Lahore	Electrical parts	(042) 3724653 5	

Electronics Pro (epro.pk)	Karachi	Electrical parts	0301 5755775	
Nadeem Electronics	Karachi	Electrical parts	(021) 36658781	
A to Z Electronics Center	Peshawar	Electrical parts	0312 9126698	
City Electronics	Gujranwala	Electrical parts	(055) 4222234	

11. USEFUL LINKS

Table 38: Useful Web 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
Pakistan Plastic Manufacturers Association	https://www.pakplas.com.pk/
Pakistan Electronics Manufacturers Association – PEMA	http://pema.org.pk/
Government of Punjab	www.punjab.gov.pk
Government of Sindh	sindh.gov.pk/
Government of Balochistan	balochistan.gov.pk/
Government of Khyber Pakhtunkhwa	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
Pakistan Standards and Quality Control Authority (PSQCA)	http://www.psqca.com.pk
Punjab Small Industries Corporation	https://www.psic.gop.pk/
Sindh Small Industries Corporation	https://ssic.gos.pk/
Government of Khyber Pakhtun Khwa	https://small_industries_de.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										
Income Statement										SMEDA
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Revenue-Room Cooler 180w (Large)	91,440,000	114,591,600	137,247,110	163,540,017	194,000,908	229,310,105	269,967,391	300,913,328	334,615,621	372,092,571
Revenue-Room Cooler 160w (Medium)	79,443,000	99,529,560	119,236,847	142,110,067	168,351,548	199,166,449	234,561,645	261,447,527	290,729,651	323,291,371
Revenue-Room Cooler 140w (Small)	98,785,500	123,775,608	148,248,024	176,694,995	209,604,007	247,668,176	291,691,839	325,089,837	361,499,899	401,987,887
Total Revenue	269,668,500	337,896,768	404,731,980	482,345,079	572,156,463	676,144,729	796,220,875	887,450,693	986,845,171	1,097,371,830
Cost of sales										
Raw Material Cost										
Room Cooler 180w (Large)	20,157,440	24,602,294	28,697,873	33,303,832	38,476,681	44,293,571	50,786,991	55,132,320	59,708,303	64,664,092
Room Cooler 160w (Medium)	17,860,416	21,792,732	25,426,920	29,514,252	34,092,854	39,234,711	45,002,325	48,852,429	52,907,180	57,298,476
Room Cooler 140w (Small)	21,074,240	25,716,831	29,998,184	34,822,021	40,230,273	46,296,405	53,103,728	57,640,508	62,424,670	67,605,917
Machinery and Component Cost										
Room Cooler 180w (Large)	37,673,280	45,980,498	53,634,936	62,243,250	71,911,054	82,782,542	94,918,429	103,039,638	111,591,928	120,854,058
Room Cooler 160w (Medium)	34,017,900	41,507,600	48,429,466	56,214,418	64,935,066	74,728,522	85,713,826	93,046,939	100,769,835	109,133,731
Room Cooler 140w (Small)	47,177,560	57,570,634	67,155,026	77,953,843	90,060,952	103,640,816	118,879,938	129,036,137	139,746,136	151,345,065
Packing Cost	4,943,750	5,570,600	6,000,400	6,430,900	6,860,000	7,290,150	7,720,300	7,738,150	7,738,150	7,738,150
Transportation Cost	1,829,046	2,227,412	2,593,428	3,004,825	3,465,669	3,982,667	4,561,255	4,944,861	5,348,862	5,786,395
Direct Electricity	4,432,944	5,117,588	5,882,740	6,736,846	7,689,188	8,749,954	9,930,334	10,714,830	11,561,302	12,474,645
Generator Fuel cost	487,992	563,359	647,590	741,612	846,449	963,221	1,093,161	1,179,520	1,272,703	1,373,246
Direct Labor	16,240,000	17,815,280	19,543,362	21,439,068	23,518,658	25,799,968	28,302,565	31,047,913	34,059,561	37,363,338
Machinery Maintenance - Cost	2,431,500	2,633,315	2,851,880	3,088,586	3,344,938	3,622,568	3,923,241	4,248,870	4,601,526	4,983,453
Total cost of sales	208,326,068	251,098,143	290,861,804	335,493,454	385,431,781	441,385,096	503,936,092	546,622,115	591,730,155	640,620,567
Gross Profit	61,342,432	86,798,625	113,870,176	146,851,625	186,724,682	234,759,633	292,284,783	340,828,577	395,115,015	456,751,263
General administration & selling expenses										
Management Staff	16,332,000	17,916,204	19,654,076	21,560,521	23,651,892	25,946,125	28,462,899	31,223,801	34,252,509	37,575,003
Administration benefits expense	1,628,600	1,786,574	1,959,872	2,149,979	2,358,527	2,587,305	2,838,273	3,113,586	3,415,604	3,746,917
Building rental expense	5,163,120	5,679,432	6,247,375	6,872,113	7,559,324	8,315,256	9,146,782	10,061,460	11,067,606	12,174,367
Indirect Electricity	446,973	516,005	593,155	679,275	775,299	882,256	1,001,274	1,080,374	1,165,724	1,257,816
Communications expense (internet, Telephone etc.)	816,600	895,810	982,704	1,078,026	1,182,595	1,297,306	1,423,145	1,561,190	1,712,625	1,878,750
Office vehicles running expense	816,600	900,710	993,483	1,095,812	1,208,680	1,333,174	1,470,491	1,561,190	1,721,993	1,899,358
Office expenses (stationery, entertainment, etc.)	653,280	716,648	786,163	862,421	946,076	1,037,845	1,138,516	1,248,952	1,370,100	1,503,000
Promotional expense	2,696,685	3,378,968	4,047,320	4,823,451	5,721,565	6,761,447	7,962,209	8,874,507	9,868,452	10,973,718
Amortization of Legal & License Fee	15,800	15,800	15,800	15,800	15,800	24,987	24,987	24,987	24,987	24,987
Depreciation expense	9,191,981	9,191,981	9,191,981	9,425,036	9,404,674	9,404,674	6,936,873	17,225,209	17,225,209	17,629,153
Amortization of pre-operating costs	343,999	343,999	343,999	343,999	343,999	-	-	-	-	-
Bad debt expense	1,348,343	1,689,484	2,023,660	2,411,725	2,860,782	3,380,724	3,981,104	4,437,253	4,934,226	5,486,859
Miscellaneous expense 1	-	-	-	-	-	-	-	-	-	-
Subtotal	39,453,980	43,031,615	46,839,587	51,318,157	56,029,212	60,971,099	64,386,553	80,412,509	86,759,034	94,149,928
Operating Income	21,888,452	43,767,010	67,030,588	95,533,468	130,695,470	173,788,534	227,898,230	260,416,069	308,355,981	362,601,335
Gain / (loss) on sale of machinery & equipment	-	-	-	-	-	-	12,157,500	-	-	-
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	762,750	-	-	-
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	490,375	-	-	-
Earnings Before Interest & Taxes	21,888,452	43,767,010	67,030,588	95,533,468	130,695,470	173,788,534	241,308,855	260,416,069	308,355,981	362,601,335
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	21,888,452	43,767,010	67,030,588	95,533,468	130,695,470	173,788,534	241,308,855	260,416,069	308,355,981	362,601,335
NET PROFIT/(LOSS) AFTER TAX	16,824,128	32,341,907	48,200,647	95,533,468	89,782,055	117,792,547	161,680,756	174,100,445	205,261,388	240,520,868

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	2,000,000	10,811,045	25,338,862	37,874,791	68,244,536	78,045,374	89,270,981	153,883,871	329,719,435	529,651,432	868,608,805
Accounts receivable	-	24,969,306	31,286,738	37,475,183	44,661,581	52,977,450	62,605,993	73,724,155	82,171,360	91,374,553	101,608,503
Equipment spare part inventory	202,625	240,509	285,477	338,852	402,206	477,406	566,666	672,614	798,372	947,642	-
Raw material inventory	15,242,049	20,102,392	25,348,360	31,807,046	39,730,098	49,446,443	61,330,129	72,006,559	84,354,412	98,828,666	-
Finished Goods Closing Stock	-	8,678,486	10,457,836	12,127,699	13,966,754	16,062,926	18,391,046	20,992,589	22,770,771	24,649,847	26,686,487
Pre-paid building rent	430,260	473,286	520,615	572,676	629,944	692,938	762,232	838,455	922,301	1,014,531	-
Total Current Assets	17,874,934	65,275,024	93,237,887	120,196,247	167,635,119	197,702,538	232,927,048	322,118,242	520,736,650	746,466,670	996,903,794
<i>Fixed assets</i>											
Building/Infrastructure	1,961,597	1,765,437	1,569,278	1,373,118	1,176,958	980,799	784,639	588,479	392,319	196,160	0
Machinery & equipment	48,630,000	41,335,500	34,041,000	26,746,500	19,452,000	12,157,500	4,863,000	92,380,041	78,523,034	64,666,028	50,809,022
Production Tools	2,036,200	1,364,254	692,308	2,701,086	1,796,085	911,446	3,556,068	2,364,605	1,199,949	4,681,680	3,113,080
Furniture & fixtures	1,850,000	1,572,500	1,295,000	1,017,500	740,000	462,500	185,000	3,514,355	2,987,202	2,460,048	1,932,895
Office vehicles	1,961,500	1,667,275	1,373,050	1,078,825	784,600	490,375	196,150	4,072,388	3,461,530	2,850,672	2,239,813
Office equipment	3,051,000	2,593,350	2,135,700	1,678,050	1,220,400	762,750	305,100	5,795,836	4,926,461	4,057,085	3,187,710
Total Fixed Assets	60,781,077	51,589,096	42,397,116	35,885,859	26,460,823	17,056,150	11,180,737	110,006,483	92,781,275	80,202,453	62,573,300
<i>Intangible assets</i>											
Pre-operation costs	1,719,995	1,375,996	1,031,997	687,998	343,999	-	-	-	-	-	-
Legal, licensing, & training costs	79,000	63,200	47,400	31,600	15,800	124,934	99,947	74,960	49,974	24,987	197,575
Total Intangible Assets	1,798,995	1,439,196	1,079,397	719,598	359,799	124,934	99,947	74,960	49,974	24,987	197,575
TOTAL ASSETS	80,455,006	118,303,316	136,714,399	156,801,704	194,455,742	214,883,621	244,207,732	432,199,686	613,567,898	826,694,110	1,059,674,670
Liabilities & Shareholders' Equity											
<i>Current liabilities</i>											
Accounts payable	-	29,436,247	35,882,408	42,057,882	49,089,594	57,082,017	66,183,153	76,002,714	83,270,481	91,135,305	83,594,998
Total Current Liabilities	-	29,436,247	35,882,408	42,057,882	49,089,594	57,082,017	66,183,153	76,002,714	83,270,481	91,135,305	83,594,998
<i>Other liabilities</i>											
Total Long Term Liabilities	-	-	-	-	-	-	-	-	-	-	-
<i>Shareholders' equity</i>											
Paid-up capital	80,455,006	80,455,006	80,455,006	80,455,006	80,455,006	80,455,006	80,455,006	96,946,644	96,946,644	96,946,644	96,946,644
Retained earnings	-	8,412,064	20,376,985	34,288,816	64,911,142	77,346,599	97,569,573	259,250,329	433,350,773	638,612,161	879,133,029
Total Equity	80,455,006	88,867,069	100,831,991	114,743,822	145,366,147	157,801,604	178,024,578	356,196,972	530,297,417	735,558,805	976,079,672
TOTAL CAPITAL AND LIABILITIES	80,455,006	118,303,316	136,714,399	156,801,704	194,455,742	214,883,621	244,207,732	432,199,686	613,567,898	826,694,110	1,059,674,670

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		16,824,128	32,341,907	48,200,647	95,533,468	89,782,055	117,792,547	161,680,756	174,100,445	205,261,388	240,520,868
Add: depreciation expense		9,191,981	9,191,981	9,191,981	9,425,036	9,404,674	9,404,674	6,936,873	17,225,209	17,225,209	17,629,153
amortization of pre-operating costs		343,999	343,999	343,999	343,999	343,999	-	-	-	-	-
amortization of License Cost		15,800	15,800	15,800	15,800	15,800	24,987	24,987	24,987	24,987	24,987
Accounts receivable		(24,969,306)	(6,317,432)	(6,188,446)	(7,186,398)	(8,315,869)	(9,628,543)	(11,118,162)	(8,447,205)	(9,203,192)	(10,233,950)
Equipment inventory	(202,625)	(37,884)	(44,968)	(53,375)	(63,354)	(75,200)	(89,260)	(105,948)	(125,757)	(149,270)	947,642
Raw Material Inventory	(15,242,049)	(4,860,344)	(5,245,968)	(6,458,685)	(7,923,052)	(9,716,345)	(11,883,687)	(10,676,429)	(12,347,853)	(14,474,254)	98,828,666
Closing Inventory	-	(8,678,486)	(1,779,350)	(1,669,863)	(1,839,055)	(2,096,172)	(2,328,119)	(2,601,543)	(1,778,182)	(1,879,077)	(2,036,640)
Pre-paid building rent	(430,260)	(43,026)	(47,329)	(52,061)	(57,268)	(62,994)	(69,294)	(76,223)	(83,846)	(92,230)	1,014,531
Accounts payable		29,436,247	6,446,162	6,175,473	7,031,712	7,992,423	9,101,136	9,819,561	7,267,767	7,864,824	(7,540,308)
Other liabilities		-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(15,874,934)	17,223,109	34,904,802	49,505,470	95,280,887	87,272,371	112,324,441	153,883,871	175,835,564	204,578,384	339,154,948
Issuance of shares	80,455,006	-	-	-	-	-	-	16,491,638	-	-	-
Purchase of (treasury) shares											
Cash provided by / (used for) financing activities:	80,455,006	-	-	-	-	-	-	16,491,638	-	-	-
Capital expenditure	(62,580,072)	-	-	(2,680,724)	-	(124,934)	(3,529,261)	(105,762,620)	-	(4,646,387)	(197,575)
Cash (used for) / provided by investing activities:	(62,580,072)	-	-	(2,680,724)	-	(124,934)	(3,529,261)	(105,762,620)	-	(4,646,387)	(197,575)
NET CASH	2,000,000	17,223,109	34,904,802	46,824,746	95,280,887	87,147,437	108,795,180	64,612,889	175,835,564	199,931,997	338,957,373

13. KEY ASSUMPTIONS

13.1. Operating Cost Assumptions

Table 39: Operating Cost Assumptions

Description	Details
Transportation Cost	1% of material cost
Machinery Maintenance – Cost	5% Cost of Machinery
Genertor Fuel cost	10% Utility cost
Raw Material costs growth rate	8.3%
Administration benefits expense	5% of administration expense
Commuication expense	5% of Management staff expense
Office vehicles running expense	5% of Management staff expense
Office expenses (stationery, entertainment, etc.)	4% of Management staff expense
Advertisment and Promotional Expense	1% of revenue
Furniture and fixture depreciation	15%
Vehicle depreciation	15%
Office equipment depreciation	15%
Inflation growth rate	10.3%
Wage growth rate	9.7%
Electricity price growth rate	7.9%
Office equipment price growth rate	9.6%
Office vehicle price growth rate	11.0%

13.2. Revenue Assumptions

Table 40: Revenue Assumptions

Description	Details
Sale price growth rate	11.2%
Initial year capacity utilization	60%
Capacity growth rate	5%
Maximum capacity utilization	90%

13.3. Financial Assumptions**Table 41: Financial Assumptions**

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

13.4. Debt-Related Assumptions**Table 42: 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 Assumption**Table 43: Cash Flow Assumption**

Description	Details
Accounts receivable cycle (in days)	20 Days
Accounts payable cycle (in days)	30 Days

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