Pre-feasibility Study

MANUFACTURING UNIT FOR INDUSTRIAL VALVES

November 2021

"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, andrevenues 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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2. EXECUTIVE SUMMARY

Industrial valves are used in the industry to control and regulate the flow and transportation of fluids (liquids, gases and slurries). The valves are installed on pipes and/or vessels from where the movement of the fluids can be controlled by fully or partially opening or closing these valves. The valves serve as an integral component of every piping system to ensure safe and efficient operations in different types of industries; especially in the process industry.

Different types of industrial valves are used for different applications. Selecting the right type of valve is essential for the proper functioning of an industrial process. Different type of valves are Gate Valve, Check Valve, Butterfly Valve, Globe Valve, Ball Valve, Needle Valve, Check Valve, Plug Valve, Pinch Valve and Vacuum Valve.

Industrial valves may be made from different materials, however, the most commonly used materials for this purpose are cast iron and stainless steel. Brass is also another important material used for this purpose. In the proposed unit, cast iron has been used as it is reliable, easily available, cost-effective, and durable material. The unit is proposed to manufacture four types of valves; Gate Valve, Check Valve, Butterfly Valve and Globe Valve.

This Pre-Feasibility Document provides details for setting up a Manufacturing Unit for Industrial Valves. The manufacturing unit is proposed to be located in large cities like Karachi, Lahore, Islamabad, Peshawar, Rawalpindi, Quetta, Faisalabad, Sialkot, Hyderabad, Faisalabad, Sukkur, Gujranwala, Multan, Lasbela or any other major city of Pakistan. These cities are suitable because of the presence of large number of industrial units. Easy availability of raw materials and skilled labor are also important factors to make these locations suitable for establishing this manufacturing business. Growing number of industrial units in the country is leading to increase the demand of Industrial valves.

The proposed project has an annual capacity of manufacturing 29,656 valves. Capacity utilization in the first year of operations is assumed to be 50% which translates into production of 14,833 valves. Maximum capacity utilization is assumed to be 90% (18,785 valves) to be achieved in the 5th year of operations.

The proposed project will be set up in a rented building having an area of 5,850 square feet. The proposed unit requires a total investment of PKR 18.70 million. This includes capital investment of PKR 13.70 million and working capital of PKR 5.0 million. This project is financed through 100% equity. The Net Present Value (NPV) of project is PKR 113.4 million with an Internal Rate of Return (IRR) of 67% and a Payback period of 2.26 years. Further, the proposed project is expected to generate Gross Annual Revenues of PKR 93.78 million in 1st year of operations, Gross Profit (GP) ratio ranging from of 29% to 34% and Net Profit (NP) ratio ranging from 10% to 20% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 29% (8,700 valves) with breakeven revenue of PKR 55.0 million in a year.

The proposed project may also be established using leveraged financing. With 50% debt financing at a cost of KIBOR+3%, the proposed unit provides Net Present Value (NPV) of PKR 130.28 million, Internal Rate of Return (IRR) of 63% and Payback period of 2.43 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 9% to 21% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 30% (8,853 valves) with breakeven revenue of PKR 55.97 million.

The proposed project will provide employment opportunities to 52 people. The legal status of this business is proposed as “Sole-Proprietorship”.

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 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 establishing a “Manufacturing Unit for Industrial Valves”. 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 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

This document provides details for setting up a manufacturing unit for Industrial valves. Industrial Valves are used in different industries for controlling and regulating the flow and transportation of fluids (liquids, gases and slurries). Specific applications of industrial valves include:

- Starting or stopping the flow
- Increasing or decreasing the flow rate
- Controlling the direction of flow
- Adjusting the flow to manage the fluid pressure

Materials for Industrial Valves:

Different type of materials are used for making different valves. All of these materials have specific applications. These materials are explained as follows:

Cast iron

Cast iron has been used for hundreds of years and is mainly used for low-pressure and low-temperature applications.

Cast Iron with Nylon Lining

The interior and exterior surfaces of these cast iron valves are lined with nylon to make this corrosion resistant. They are used for all varieties of tap water and salt water lines.

Cast Steel

Cast steel valves are commonly used for high-temperature and high-pressure applications in a variety of industries due to their high toughness, hardness and

strength. Cast Steel valves are widely used in petroleum and petrochemical plants throughout the world.

Stainless Steel

Stainless steel valves are widely used in the chemical and petrochemical industries. These valves also have wide usage in general industrial service and applications for construction equipment due to their high performance, resulting from high corrosion resistance and durability.

Bronze

Bronze is an alloy of copper to which tin, zinc and lead are added to achieve particular physical properties. It was the first metal used in casting. It is a valve material that can be used for a wide range of applications.

Brass

Brass is a non-ferrous alloy of copper and zinc which is used mainly for gate and ball valves.

Valve Connection Methods:

The valve is almost always connected at its ports to pipes or other components. There are three basic configurations in which valves may be connected; threaded connection, flanged connection and welded connection. Another lesser common one is compression connection.

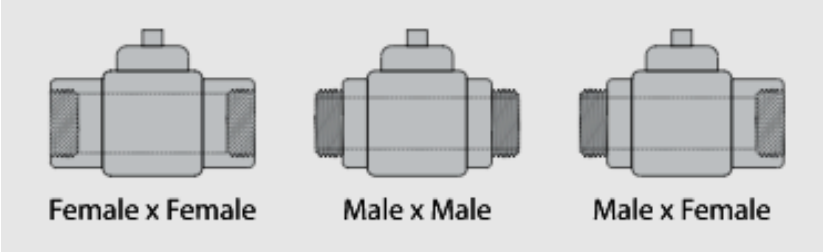
Threaded Connections

The threaded connections used in plumbing installations for the delivery of gases or liquids under pressure have a tapered thread that is slightly conical.[1] Threaded joints probably represent the oldest method of joining piping systems. Threaded fittings are more commonly used for small pipe diameters.

Threaded connections provide a compact and streamlined connection between the valve and pipe. The valve typically has female threaded end connections, into which the male threaded pipe fits. There are valves with male threaded connections as well, and even valves with one female end and one male end. Threaded connections adhere to a standard in order to be useful in industry. The valve and pipe must both be created using the same standard in order for them to make a proper connection. Threaded connection is shown in Figure 1.

[1] In contrast to the parallel sided cylindrical section commonly found on bolts and leadscrews

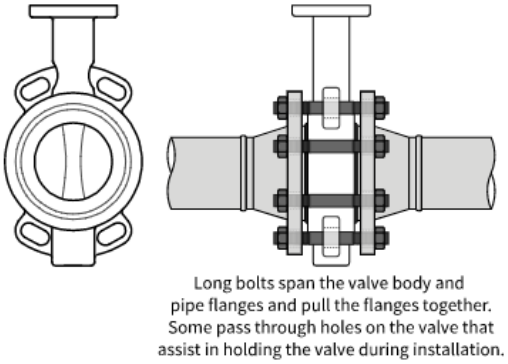
Figure 1: Threaded Connection



Flanged Connection

A flange is a method of connecting pipes, valves, pumps and other equipment to form a piping system. It also provides easy access for cleaning, inspection or modification. Flanges are usually welded or screwed. Flanged joints are made by bolting together two flanges with a gasket between them to provide a seal as shown in Figure 2.

Figure 2: Flanged Connection



Welding

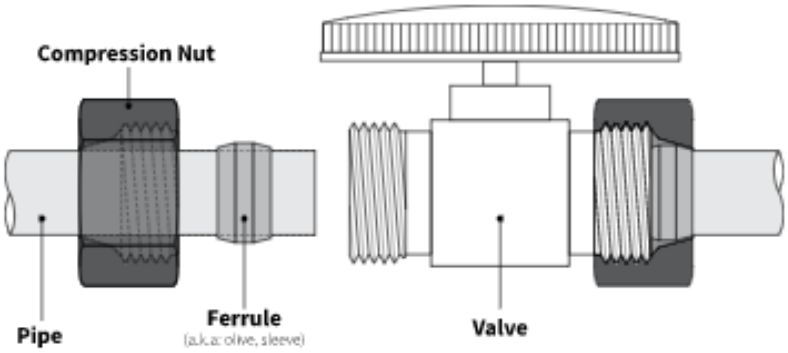
The valve simply has a socket with an inner diameter that is ever so slightly larger than the pipe's outer diameter. The pipe is inserted into the socket, and is welded around the rim. Socket weld connections are usually reserved for smaller sizes, typically 2" and below. A welded connection is shown in Figure 3.

Figure 3: Welded Connection

Compression Connection

This type of connection is typically found on water lines in residential plumbing. They do not require heat like soldered or welded connections making them perfect for installation in places where the use of such would be difficult or dangerous. The connection uses two pieces in addition to the valve and pipe. They are the ferrule (sometimes called an olive or sleeve) and a compression nut. The Compression nut is slid onto the pipe with the threads facing where the valve will be. Then the ferrule is slid onto the pipe. Next the pipe is inserted into the valve and the compression nut is tightened. Tightening this nut forces the ferrule into the valve stub which is tapered on the inside. Since the ferrule is made of a softer metal than the nut and valve, it gets compressed around the pipe. It also gets compressed between the valve and compression nut, forming a fluid tight seal. A compression connection is shown in Figure 4.

Figure 4: Compression Connection



Types of Industrial Valves

Different types of Industrial Valves are produced in the proposed project. These valves are as follows:

Gate Valve

Gate valves are used for basic service of turning the flow on or off. Manual Gate Valves are operated with a simple hand wheel that causes the stem and gate to rise. When closed, the gate seats against a seat ring, both of which have a special treatment to provide reliable shut-off. Gate valves are designed to minimize pressure drop across the valve in the fully opened position and stop the flow of fluid completely. The gate valve does not change the direction of the fluid flow and the diameter through which the fluid passes is essentially equal to that of the pipe. Hence, these valves tend to have minimal pressure drop when opened fully. The valve produced in the proposed project uses a flanged connection.

Gate valves are used in many industrial applications including the oil and gas industry, pharmaceuticals, chemicals, food and beverages, automotive, etc. Gate valves are very popular for use on ships, in underground applications, or where vertical space is limited because they do not take up extra space. Gate valves can also be used in

demanding environments such as high temperature and high-pressure environments. They are often seen in power plants, water treatments, mining, and offshore applications. Figure 5 shows a gate valve.

Figure 5: Gate Valve

Check Valve

The valve used to prevent backflow in a piping system is known as a check valve. It is also known as a Non-Return Valve or an NRV. The pressure of the fluid passing through a pipeline opens the valve, while any reversal of flow closes it. Check valve is a two-port valve, meaning that it has two openings in the body, one for fluid to enter and the other for fluid to leave. There are various types of check valves used in a wide variety of applications.

A check valve is used on the discharge of the pump to prevent backflow from the downstream system, when the pump shuts off. Check valves are also used to prevent contaminated media in branches from flowing back into the main trunk line. Check valves are used in many fluid systems in chemical and power plants, and in many other industrial processes. Figure 6 shows a flanged check valve.

Figure 6: Flanged Check Valve

Globe Valve

A Globe valve is a linear motion valve which is primarily designed to stop, start and regulate flow. The disk of a Globe valve can be totally removed from the flow path or it can completely close the flow path.

Conventional Globe valves may be used for isolation and throttling services. Although these valves exhibit slightly higher pressure drops than gate, plug, ball, etc., they may be used where the pressure drop through the valve is not a controlling factor. Figure 7 shows a flanged globe valve.

Figure 7: Globe Valve

Butterfly Valve

Butterfly valves are among the family of quarter-turn valves and work very similar to ball valves. The butterfly is a disk connected to a rod. It closes when the rod rotates the disc by a quarter turn to a position perpendicular to the flow direction. When the valve opens, the disk is rotated back to allow the flow.

Butterfly valves are used for on-off or modulating services and are popular due to their light weight, small installation footprint, lower costs, quick operation and availability in very large sizes. These valves can be operated by handles, gears or automatic actuators. A butterfly valve is shown in Figure 8.

Figure 8: Butterfly Valve

Plug Valve

A Plug Valve is a flow control device designed to regulate the flow of a liquid or gas within a high-pressure system. Along with controlling flow via basic moderate throttling, plug valves can also be used in on/off position or to divert flow or combine flow.

Plug valve is a mechanically simple valve that utilizes cylindrical or conically tapered "plugs" which rotate inside the valve body to control flow through the valve. The plugs within the valve contain one or more hollow channel that cuts sideways through the plug, which allows liquid or gas to flow through the plug when the valve is open. This simple mechanism and ease of operation mean that plug valves are often economical. Figure 9 shows a plug valve.

Figure 9: Plug Valve

Pressure Control Valve

Pressure Control valve enables the regulation of system pressure to adjust the force on a hydraulic piston rod or the torque on a hydraulic motor shaft. Pressure relief valves are used to set the maximum pressure in the circuit and protect it from overloading. A pressure valve with a pressure gauge is shown in Figure 10.

Figure 10: Pressure Control Valve

The valves manufactured in the proposed project are shown in Table 1.

Table 1: Types of Industrial Valves

Types of Industrial Valve	Size (Inches)
Gate Valve	2, 2.5, 3, 4 and 6
Check Valve	2, 2.5, 3, 4 and 6
Butterfly Valve	2, 2.5, 3, 4 and 6
Globe Valve	2, 2.5, 3, 4 and 6

5.1 Machinery and Equipment

The machinery and equipment used in the proposed project is described in the following paragraphs:

Gas Furnace

A furnace is used to melt the iron required for casting different parts of a valve. The gas furnace used in proposed project consists of furnace body, control panel and a tilting control box. It has a self-test function and leaking alarm device, real-time detection of temperature and pressure. Gas furnace used in the proposed project has a capacity of melting 250 kg iron per hour. Gas furnace is shown in Figure 11.

Figure 11: Gas Furnace

Sand Casting Equipment and Tools

Sand casting process involves the following equipment and tools:

- **Wooden Flask**

The flask is a wood or metal frame, which contains the molding sand, providing support to the sand as the metal is poured into the mold.

Figure 12: Wooden Flask

- **Hand Riddle**

Hand riddles are used for the fine sifting of foundry sand onto the mold surface. This ensures uniform coverage to prevent casting defects.

Figure 13: Hand Riddle

- **Shovel**

A shovel is a tool for digging, lifting, and moving bulk materials, such as soil, coal, gravel, snow, sand, etc. Most shovels are hand tools consisting of a broad blade fixed to a medium-length handle. Shovel blades are usually made of sheet steel and are very strong.

Figure 14: Shovel

- **Hand Trowel**

A trowel is a small hand tool used for digging, applying, smoothing, or moving small amounts of viscous or particulate material.

Figure 15: Hand Trowel

- **Hand Rammer**

A hand rammer, also termed as tamper, is a hand tool used for compressing or compacting sand. Sand is compacted or compressed to make it hard and of uniform level.

Figure 16: Hand Rammer

- **Sprue Pins**

Sprue pin is a tapered rod of wood or iron, which is embedded in the sand and later withdrawn to produce a hole, called runner, through which the molten metal is poured into the mold. Figure 17 shows sprue pins made of iron.

Figure 17: Sprue Pins

- **Strike-off bar**

Strike-off Bar is a metallic bar used to remove excess material from mold. It is used as a finishing tool for removing loose sand from mold. Figure 18 shows a strike off bar.

Figure 18: Strike off bar

- **Mallet**
  A mallet is a tool used for striking the sand mass in the molding box to pack it closely around the pattern. These are often made of rubber or sometimes wood, that is smaller than a maul or beetle, and usually has a relatively large head.

Figure 19: Mallet

- **Manual Pallet Jack**
  A manual pallet jack is a hand-powered jack used for lifting, lowering and steering pallets and heavy loads from one place to another. Figure 20 shows a manual pallet jack having a load capacity of 1000 kilograms.

Figure 20: Manual Pallet Jack

- **Smoother (finishing tool)**
  Smoother is a flat device used to give a flat, regular surface of sand on the mold. These are made of metal, plastic or wood. Figure 21 shows a plastic smoother.

Figure 21: Smoother

- **Spirit Level**
  Spirit level is a device consisting of a sealed glass tube partially filled with alcohol or other liquid, containing an air bubble whose position reveals whether a surface is perfectly level.

Figure 22: Spirit leveler

- **Gate Cutter**
  Gate Cutters are used by to cut the sprues or runners from a part after the molding process. Figure 23 shows a gate cutter.

Figure 23: Gate Cutter

Shot Blasting Machine

A Shot blasting machine is an enclosed equipment designed for abrasive blasting for cleaning and preparing metals. It is a machine for shot peening,[2] cleaning metal parts such as forgings, castings, steel surfaces, heavy metal structures, rusted metal parts, etc. Shot blasting machine uses blast metal shots (as a medium) on the metal parts in an enclosed chamber to remove surface rust, welding slag and descaling, making it uniform, shiny and improve coating quality of anti-rust chemicals. Shot blasting machine used in the proposed project have a capacity of blasting 625 kg of metal products per hour and is shown in Figure 24.

[2] The shot peening process is used to add strength and reduce the stress profile of components.

Figure 24: Shot Blasting Machine

The metal shots proposed in the project are steel shots as shown in Figure 25. These are used in shot blasting.

Figure 25: Steel Shots used for Shot Blasting

Bench Grinder

A bench grinder consists of powerful grinding wheels that are used to carry out different tasks. The grinding wheels come in different sizes, generally from 6 to 10 inches and with varying grits for doing a variety of functions. Grit refers to the size of the abrasive particles embedded in the wheel. Different grades are used to identify the grits. Grinding wheels usually will be between 24 grade grit and 100 grade grit. This grinder is installed on a bench or work table where the work piece is held against the grinding wheel to allow for a varying degree of sharpening shaping or buffing. It is a type of machining using a wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the metal through shear deformation. Grinder used in the proposed project has a max wheel size of 10 inches, 1 HP powered motor

with maximum rpm of 3600. Bench grinder used in the proposed project is shown in Figure 26.

Figure 26: Bench Grinder

Different sizes of grinding wheels are shown in Figure 27.

Figure 27: Different Sizes of Grinding Wheels

Bench Drilling Machine

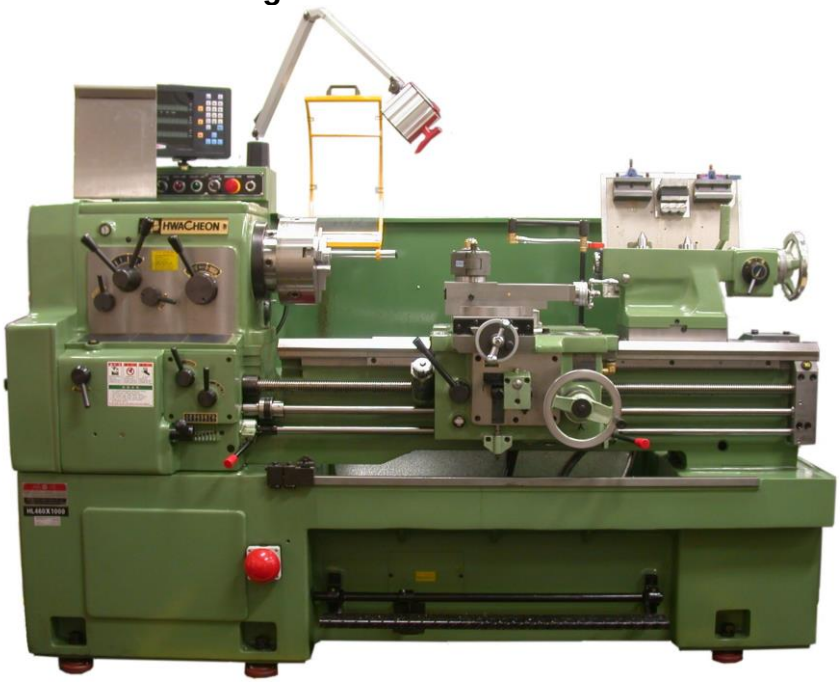
Bench drilling machine is used to drill or to enlarge holes with a boring tool or to finish holes with a reamer. A reamer is a type of rotary cutting tool used in metal working. Reamers are designed to enlarge the size of a previously formed hole but with a high degree of accuracy to leave smooth sides. The machine used in proposed project drills ranging to 15 mm diameter. Bench Drilling machine used in proposed project is shown in Figure 28.

Figure 28: Vertical Drilling Machine

Lathe Machine

A lathe machine is a machine tool that is used to remove metals from a work piece to give it a desired shape and size. Lathe Machines are used in metal working or metal spinning or other machining operations. The most common lathe operations are turning, facing, grooving, parting, threading, drilling, boring, knurling, and tapping. Figure 29 shows a lathe machine.

Figure 29: Lathe Machine



Pressure Testing Machine

Hydrostatic pressure testing equipment is used to ensure that the manufactured valves, pipes, hoses, and tubes are suited to tolerate predetermined pressures. Hydrostatic pressure testing equipment normally comprises of pumps, pressure gauges, and relief valves. Pressure testing machine used in proposed project is shown in Figure 30.

Figure 30: Pressure Testing Machine

Electric Overhead Crane

An electric overhead crane is used for lifting or moving objects. An electric motor and controller are utilized to lift, lower and accelerate or decelerate the speed of the pulley. Electric chain pulleys are ideal for use in industrial production lines and small machine shops where more frequent and faster lifting is required. The electric chain pulley used in the proposed project is used to lift heavy industrial valves and other heavy objects up to 500 kg. Electric overhead crane is shown in Figure 31.

Figure 31: Electric Chain Pulley

Weighing Scale

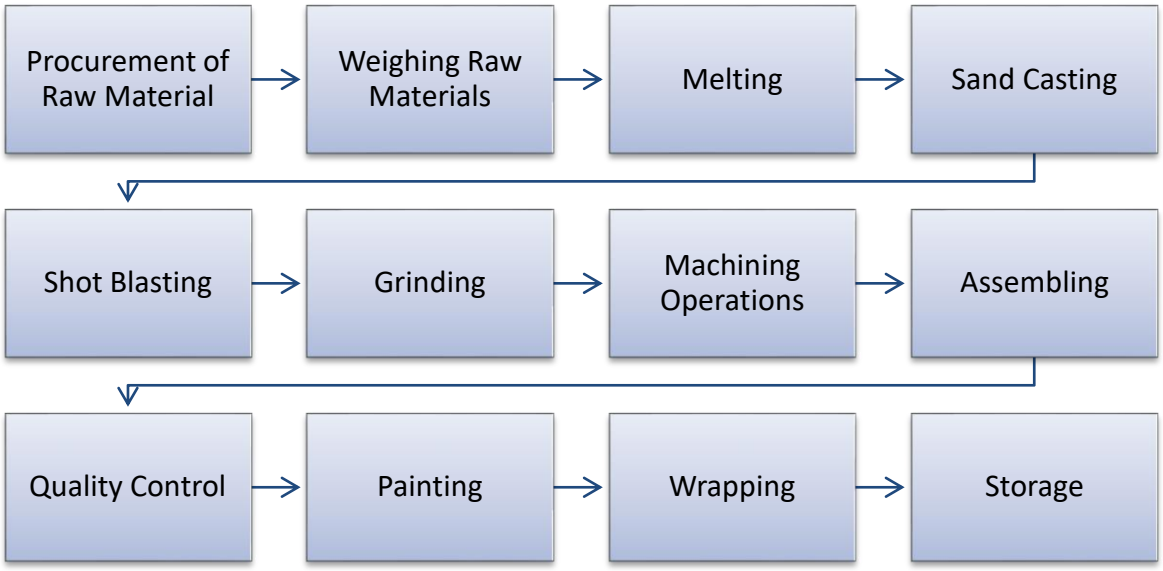
Weigh scale is used to measure the exact quantities of raw materials. A weighing scale used in the proposed project is shown in Figure 32.

Figure 32: Weighing Scale

5.2 Process Flow

Process flow for manufacturing industrial valves is shown in Figure 33.

Figure 33: Process Flow for Manufacturing Industrial Valves



Procurement of Raw Materials

The proposed project manufactures industrial valves from Cast Iron. The required raw material is purchased in the form of cast iron ingots and scrap iron. The iron used for production of valves is specified as grey cast iron (FC 200). Gray cast iron has a long history that dates back to many centuries. It is used mainly for valves in relatively low-pressure and low-temperature service. As a result of its good tensile strength and ductility, malleable cast iron is used for pipe fittings, electrical fittings and equipment, hand tools, washers, brackets, farm equipment, mining hardware and machine parts. Scrap iron is waste iron or used articles made of iron. There are two main categories

of scrap metals i.e. ferrous and non-ferrous.[3] Scrap metals are procured from different scrap metal dealers. These dealers are located in major cities like Lahore, Karachi, Rawalpindi, Quetta, Peshawar, Multan and Gujranwala.

Other components for making industrial valves include spindle, hand-wheel, rubber seats, seat rings, O-rings, hinge pins, washers, nuts and bolts. These are readily available in metropolitan cities. These components are procured by the procurement team of the proposed unit. Figure 34 shows iron ingots and other components used in manufacturing of valves.

Figure 34: Iron and Other Components

Weighing

A weighing scale is used to measure the weight of valves and scrap metals for the record. Pure and/or scrap iron is measured in required quantities, ready to be mixed and melt afterwards.

Melting

Melting of the metal includes the following steps:

- ***Preparing the metal***
  Cast iron ingots and scrap metal are the main materials used in the melting process. Before loading into the furnace, ingots and metal scrap are cleaned of any dirt. Molten metal splash is the most common cause of melt deck injuries and is caused by the addition of wet materials to the molten bath. It can be

[3] Metals which contain iron in them are known as ferrous. Metals without iron are non-ferrous

minimized by diligently inspecting and treating scrap. So, the metals are dried to remove the moisture. An important precaution in using scrap metal is removing the paint, machining oil, and any other contaminants.

- **Loading and melting the metal**
  Metal is continuously loaded by labor into the furnace in the heating process instead of the batch to save the energy consumption and work effectiveness. The furnace runs in an extremely hard environment where molten metal, furnace linings, atmospheric gases, and products from combustion of fuels are at very high temperature. This requires mandatory use of protection equipment by the worker. The loaded metal melts at around 1500 degree Celsius. The operation of the furnace is controlled by the controlling panel.

Figure 35 Molten Metal in Casting

- **Transport the molten metal**
  After melting, the molten liquid is transported from the furnace to the molding line with the help of furnace ladle.

Sand Casting

Casting is one of the most popular ways to make lasting and quality components as it allows for a high level of detail, with less assembly and no additional fabrication. In sand casting, a pattern of the desired finished part including the metal delivery system is constructed out of hardwood, metal, or foam. In the proposed project hardwood patterns have been used. Sand is filled around the pattern with the help of shovels and spades. The sand is then compacted or compressed to make it hard and of uniform level with the help of rammer, mallet and smoothers. Runners and risers are made with the help of sprue pins and the pattern is then removed from the bonded sand, leaving a cavity in the mold in the shape of the part. Molten liquid metal is poured

into the cavity through furnace ladle, and the metal solidifies. The sand is then removed through a shakeout process. The mold can be again processed and reused in the next castings. Figure 36 shows a product being sand cast using a pattern and Figure 37 shows a sand cast valve body.

Figure 36: Sand Casting Process

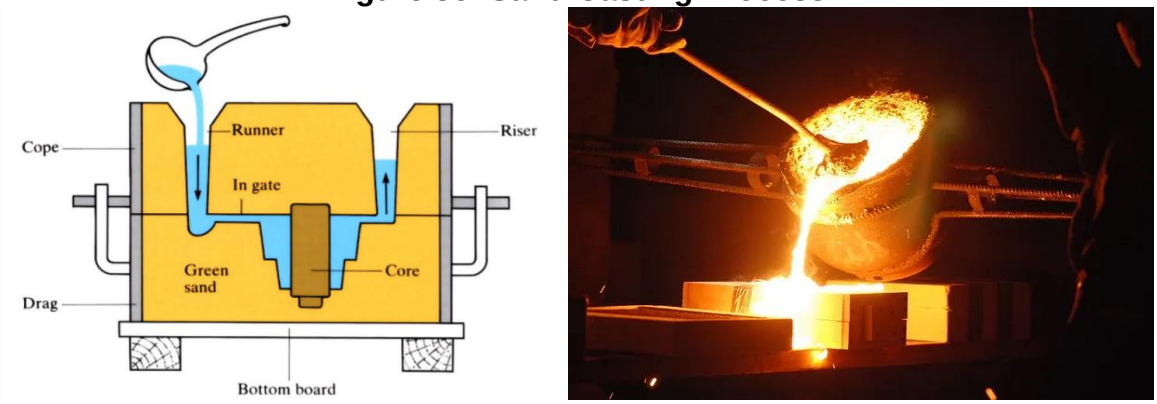


Figure 37: Sand Casted Valve Body

In the proposed unit, the bodies of valves are sand cast and the whole process is carried out by labor. Bodies of all the valves are cast as single piece; wherein other components are then fixed. Other parts, including spindle, hand wheel, rubber seat, nuts and bolts, O-rings, washers, hinge pins and other parts are procured directly from local market as these are easily available.

Shot Blasting

The shot blasting process utilizes a centrifugal blast wheel that shoots media onto a surface at high velocity. This knocks the surface free of debris[4] and other material. The shot media, which varies from steel shot to cut wire to nut shells, loads into a hopper that feeds the blast wheel. The media used in the proposed project is steel shots. In general, shot blasting blasts steel shots at high speed (65-110 meter per second) in a controlled manner at the cast valves, thereby removing surface

[4] loose natural material consisting especially of broken pieces of metal

contaminations due to the abrasive impact. Figure 38 shows a product (not a part of industrial valve) before and after shot blasting process.

Figure 38: Before and After Shot Blasting

Grinding

Grinding is a machining process that uses a grinding wheel or grinder as the cutting tool. Grinding is a subset of cutting, as grinding is a proper metal-cutting process. Grinding is used to finish industrial valves that must show high surface quality and high accuracy of shape and dimension. It has some roughing applications in which grinding removes high volumes of metal very rapidly. A bench grinder is used for grinding of industrial valves. Figure 39 shows a component in the process of grinding.

Figure 39: Grinding

Machining Operations

Machining is a process that produces parts of desired sizes and shapes by removing material in the form of small chips from a solid work piece using a single or multiple-edged cutting tool. It is often used to improve the tolerances or surface finish of parts made through sand casting by accurately removing small amounts of material from selected portions of the surface. Two major machining operations are done in industrial valves manufacturing:

- Lathe Operations
- Drilling

Lathes are used primarily for the production of cylindrical or conical exterior and interior surfaces of casted body of valves, via turning, facing, boring, and drilling. Lathes are also used for production of screw threads. In a lathe, the valve is rotated while the cutting tool is moved into the valve in a direction parallel and/or perpendicular to the axis of rotation of the valve. Drilling machine is used to drill holes in the industrial valves according to the required design inside the valve body and sides for fixing pins and nuts and bolts. Machining process is shown in Figure 40.

Figure 40: Machining Operations

Assembling

Valve assembly is the last stage in the manufacturing process. Valve assembly is the process of combining all parts and components of the valve together to make it a product according to the specified type and size of the valve. In the proposed project, assembling is done manually by labor. These parts include operating wheel, spindle, O-rings, and washers. Operating wheel is also made from casting but normal practice of valve manufacturers is to procure these from other manufacturers. Same assumption has been held for the purpose of this pre-feasibility document. Figure 41 shows different components of a valve.

Figure 41: Components of a Valve

Quality Control

Each assembled industrial valve is checked manually by an experienced person. The pressure testing of the valve is done on a hydro-pressure testing machine with respect to different uses of the valve. The pressure testing machine tests the pressure can valve should hold, it is also used for checking leakages.

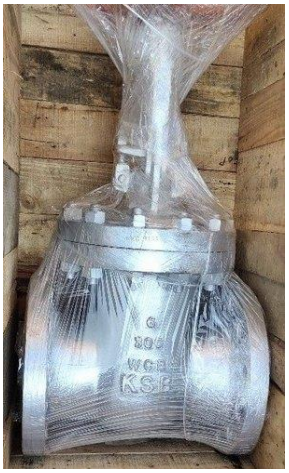
Painting

Painting of the valves is done through an electric-paint sprayer. Paint helps in enhancing the useful life of valves by protecting them from corrosion. After painting, the valves are hung on the hanging stand to dry.

Wrapping

Once the paint dries, the valves are wrapped with polythene bags manually. Each valve is packed separately. A finished product is shown in Figure 42.

Figure 42: Finished Product



Storage

The finished products are stored and are ready to be dispatched.

5.3 Installed and Operational Capacities

Based on 300 working days in a year and a single shift of 8 hours per day, the total installed capacity of the proposed manufacturing unit is 28,055 valves. However, during the 1st year of operations, the unit is expected to achieve 50% of its total installed capacity. The unit shall manufacture 14,032 valves in its first year of operations. Table 2 shows the melting capacity of the furnace and Table 3 shows the installed and operational capacities.

Table 2: Furnace Melting Capacity

Basis	No of Machines	Melting Capacity / Hour (Kgs)	Annual Melting Capacity (Kgs)
Furnace	1	250	600,000

Table 3: Installed and Operational Capacity

Product	Annual Melting Capacity (Kgs)	Production Ratio	Available Melted Cast Iron	Cast Iron Consumption per unit (Kgs)	Annual Capacity (Units)	Initial Year Operational Capacity @ 50%
	*A (*Table 2*)*	*B*	*C=(A*B)*	*D*	*E=(C*D)*	*F= (E*50%)*
Gate Valves						
2 Inches	600,000	3%	18,000	16	1,125	563
2.5 Inches		5%	30,000	21	1,429	715
3 Inches		7%	42,000	28	1,500	750
4 Inches		7%	42,000	36	1,167	584
6 Inches		3%	18,000	54	333	167
Check Valves						
2 Inches		2%	12,000	16	750	375
2.5 Inches		4%	24,000	21	1,143	572
3 Inches		8%	48,000	28	1,714	857
4 Inches		3%	18,000	36	500	250

6 Inches		2%	12,000	54	222	111
Butterfly Valves						
2 Inches		4%	24,000	8	3,000	1500
2.5 Inches		5%	30,000	11	2,727	1364
3 Inches		8%	48,000	13	3,692	1846
4 Inches		8%	48,000	15	3,200	1600
6 Inches		5%	30,000	19	1,579	790
Globe Valves						
2 Inches		3%	18,000	16	1,125	563
2.5 Inches		5%	30,000	20	1,500	750
3 Inches		8%	48,000	28	1,714	857
4 Inches		7%	42,000	44	955	478
6 Inches		3%	18,000	64	281	141
Total	**600,000**	**100%**			**29,656**	**14,833**

6. CRITICAL FACTORS

The following factors should be taken into account while making the investment decision:

- Technical knowhow and basic knowledge of the process
- Strong knowledge of the market requirements
- Production of quality products, specific to users' needs
- Availability of high-quality raw material at economical cost
- Availability of skilled workforce
- Rigorous supervision of the process at every level
- Close supervision of the production processes
- Ability to generate work orders through industrial networking (B2B and B2C)
- Assurance of timely order fulfillment

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The demand for setting up the manufacturing unit for Industrial valves is higher in large cities as majority of industries are located in the big cities of Pakistan. Therefore, the geographical potential for investment in this business is higher in big cities like Karachi, Lahore, Islamabad, Peshawar, Rawalpindi, Quetta, Faisalabad, Sialkot, Hyderabad, Gujranwala, Multan, Sukkur or any other major city.

Availability of skilled labor is vital while selecting a location. The above-mentioned cities have good availability of skilled labor, raw material, and existence of large number of industrial units. The proposed production unit for industrial valves is proposed to be established in these cities.

8. POTENTIAL TARGET CUSTOMERS / MARKETS

Any industry that has to deal with any liquid, gas or slurry; piping system requires valves for process control. Various types of valves are used in in almost every industry. The market demand for valves is directly linked to the growth of these industries.

Following are the potential target customers of the proposed business:

- Oil and gas industry
- Petrochemical industry
- Paint and lacquer industries
- Heat transfer systems
- Pharmaceutical industries

- Food and beverages industry
- Biotech industry
- Water transport systems
- Shore and offshore platforms
- Fertilizer industry
- Power plants
- Sugar industry
- Steel industry

Manufacturers sell valves directly to industries. Other than the above-mentioned industries, distributors and wholesalers are also the potential customers. Wholesalers and distributors purchase valves from the manufacturing units directly and then sell them to local retail markets to be sold to the customers.

According to the Observatory of Economic Complexity (OEC),[5] in 2019, Pakistan imported $203 million worth of valves. Pakistan imported these valves primarily from: China ($125 Million), Italy ($12 Million), Germany ($12 Million), United States ($11 Million), and United Kingdom ($7 Million).

During the same year, Pakistan exported $4.42 Million in valves. At the same year, valves was the 273rd most exported product in Pakistan. The main destination of valves exports from Pakistan are: Saudi Arabia ($1.37 million), United Arab Emirates ($942,000), China ($685,000), Sweden ($31,900), and United States ($265,000). The fastest growing export markets for valves of Pakistan between 2018 and 2019 were Saudi Arabia ($102,000), China ($642,000), and United Arab Emirates ($549,000).The export values of valves from 2017-2020 is shown in Table 4.[6]

Table 4: Export value of Valves

Year of Export	Trade Value in 000 USD
2017	19.5
2018	211.75
2019	141.54
2020	160.15

The net trade during 2019 was negative as imports were more than exports to cater to the local demand. The data shows that there are good opportunities for the prospective investors in industrial valve business.

[5] https://oec.world/en/profile/bilateral-product/valves/reporter/pak

[6] https://wits.worldbank.org/trade/comtrade/en/country/PAK/year/2018/tradeflow/Exports/partner/ALL/product/848130

9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of Manufacturing Unit for Industrial Valves. 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 to be PKR 18.7 million which comprises of capital investment of PKR 13.71 million and working capital of PKR 5.00 million.

9.1 Initial Project Cost

The details of initial project cost calculated for the manufacturing unit are shown in Table 5.

Table 5 Initial Project Cost Estimates

Particulars	Cost (PKR)
Building Renovation Cost	1,526,925
Machinery & equipment	6,270,000
Tools & Material Handling Equipment	1,425,000
Furniture & fixtures	333,300
Office vehicles	1,647,000
Office equipment	717,890
Pre-operating costs	731,987
Security Against Building	1,053,000
Total Capital Cost – (A)	**13,705,102**
Working Capital	
Equipment spare part inventory	26,125
Raw Material Inventory	3,825,995
Consumable inventory	44,117
Upfront building rent	102,383
Cash	1,000,000
Total Working Capital - (B)	**4,998,619**
Total Project Cost - (A+B)	**18,703,721**

9.1.1 Land

The proposed Manufacturing Unit for industrial valves will be established in a rented building. Suitable location for setting up of manufacturing unit like this can be easily found in the industrial areas of cities mentioned above. Therefore, no land cost has

been added to the project cost. Total space requirement for the proposed project has been estimated as 5,850 sq. feet. The breakup of the space requirement is provided in Table 6.

Table 6: Breakup of Space Requirement

Break-up of Area	% Break-up	Area (Sq. ft.)
Executive Office	3%	150
Admin and Accounts Department	4%	225
Sales and marketing Department	4%	240
Procurement Office	2%	110
Raw material Store	15%	900
Production Department	55%	3,200
Finished Goods Store	10%	600
Parking and Gate area	4%	225
Washroom	3%	200
Total Area	**100%**	**5,850**

9.1.2 Building and Renovation Cost

There will be no cost of building construction since the manufacturing unit will be started in rented premises. However, there will be a renovation cost required to make the building usable for the business. The proposed unit requires estimated electricity load of 30 KW for which an electricity connection under the Industrial Tariff will be required. Cost of such electricity connection has been included in the project cost. Table 7 provides details of building renovation cost.

Table 7 Renovation Cost Details

Cost Item	Unit of Measurement	Total Units	Cost per Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	119	500	59,625
Labour Cost – Paint	Sq. Feet	12,690	10	126,900
Wall Racks – Production	No.	15	15,000	225,000
Wall Racks - Store Rooms	No.	22	10,000	220,000
Wall Racks – Office	No.	8	10,000	80,000
Curtains	No.	6	5,000	30,000
Blinds	No.	3	5,000	15,000

Glass Partition and Doors	Sq. Feet	963	800	770,400
Total				**1,526,925**

9.1.3 Machinery and Equipment Requirement

Table 8 provides details of office equipment required for the proposed project.

Table 8: Machinery and Equipment Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Gas Furnace (250 KG/Hr)	1	1,500,000	1,500,000
Grinding Machine	2	60,000	120,000
Shot Blasting Machine (5 ton/day)	1	400,000	400,000
Lathe Machine (Spindle Speed 45-1800 rpm, max swing 410 mm, spindle bore 52 mm, 8 KW)	3	950,000	2,850,000
Bench Drilling Machine (Dia. 12.7mm)	2	400,000	800,000
Pressure Testing Machine (pressure range 10-2000 bar, 3.5kw)	2	200,000	400,000
Overhead Crane (500 kg)	1	200,000	200,000
Total			**6,270,000**

9.1.4 Hand Tools & Material Handling Equipment

Table 9 shows details of tools and material handling equipment required for the proposed project.

Table 9: Hand Tools & Material Handling Equipment

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Valve Hangers	1	15,000	15,000
Wooden Flask	30	10,500	315,000
Hand Rammer (Head weight 10 kg)	5	10,000	50,000
Electrical Tool Kit			-
Wire strippers	1	780	780
Insulated screwdrivers	1	750	750
Insulated pliers	1	2,100	2,100
Electrical tape	1	60	60

Hacksaws	1	4,000	4,000
Cable cutters	1	560	560
Spanners	1	160	160
Voltage tester	1	800	800
Safety knife	1	170	170
Hex keys	1	600	600
Claw Hammer	1	660	660
Tape Measure	1	350	350
Torch	1	300	300
Mechanical Tool Kit			
Hammer	1	660	660
Screwdrivers	1	750	750
Pry Bar	1	2,000	2,000
Wrenches	1	800	800
Pliers	1	2,100	2,100
Ratchet and Socket Sets	1	4,200	4,200
Allen Wrenches	1	2,890	2,890
Scissors	1	720	720
Mechanical gloves	1	160	160
Multimeter	1	450	450
Drill	1	5,000	5,000
Digital Vernier Caliper	1	670	670
Wire brush	1	700	700
Manual Pallet Jack (Load Capacity 1000 kg)	3	30,000	90,000
Electrical Paint Sprayer	2	5,000	10,000
Wheel Barrow	8	5,000	40,000
Spirit Level	5	3,000	15,000
Mallet	4	2,500	10,000
Vernier Calipers	10	2,000	20,000
Hand Riddle	30	1,500	45,000
Strike off bar	10	1,500	15,000
Draw Spike	15	1,500	22,500

Gate Cutter	15	1,000	15,000
Spades	10	800	8,000
Shovels	10	600	6,000
Trowels	10	400	4,000
Sprue Pin	20	250	5,000
Total			**717,890**

9.1.5 Furniture and Fixture

Table 10 provides details of furniture and fixtures.

Table 10 Furniture & Fixtures Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Executive Tables	4	35,000	140,000
Executive Chairs	4	20,000	80,000
Office Table	12	25,000	300,000
Office Chairs	12	10,000	120,000
Visitor's Chairs	20	10,000	200,000
Sofa Set	5	35,000	175,000
Table with sofa	2	25,000	50,000
Racks	45	8,000	360,000
Total			**1,425,000**

9.1.6 Vehicle Requirement

Table 11 provides details of the vehicles required along with their cost for the proposed project.

Table 11 Office Vehicle Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Loader - Rickshaw (150 cc)	1	250,000	250,000
Motorcycle	1	80,000	80,000
Registration Charges		1%	3,300
Total Cost (PKR)			**333,300**

9.1.7 Office Equipment

Table 12 provides details of the furniture and fixture requirement of the project.

Table 12: Office Equipment Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Laptops	5	90,000	450,000
Desktop Computers	8	40,000	320,000
Printer	2	40,000	80,000
CCTV Cameras (2MP)	16	2,000	32,000
DVR	2	12,000	24,000
LED TV (32")	1	40,000	40,000
Air Conditioners	5	90,000	450,000
Exhaust Fan	10	4,000	40,000
Bracket Fan	8	4,500	36,000
Ceiling Fan	15	6,000	90,000
Pedastal Fan	5	8,000	40,000
Water Dispenser	2	20,000	40,000
Wi-Fi / Internet Router	1	5,000	5,000
Total Cost (PKR)			**1,647,000**

9.1.8 Security against Building Rent

Details of security against building rent for the project are provided in Table 13.

Table 13: Security against Building Rent

Cost Item	Months	Unit Cost/Month (PKR)	Total Cost (PKR)
Security against Building Rent	3	351,000	1,053,000

9.1.9 Pre-Operating Costs

Table 14 provides details of estimated pre-operating costs.

Table 14 Pre-Operating Cost Details

Costs Item	Hiring Months Before in Year 0	Cost (PKR)
Administrative expenses	2	575,000
Utilities expense	1	156,987
Total Cost (PKR)		**731,987**

9.2 Breakeven Analysis

Table 15 shows calculation of break-even analysis.

Table 15: Breakeven Analysis

Description	First Year Values (PKR)	Ratios
Sales (PKR)	93,779,400	100%
Variable Cost (PKR)	68,793,071	73%
Contribution (PKR)	24,986,329	27%
Fixed Cost (PKR)	14,655,471	16%
Contribution Margin		27%
Breakeven		
Breakeven Revenue (PKR)		55,005,331
Breakeven Units (kg)		8,700
Breakeven Capacity		29%

9.3 Revenue Generation

Table 16 provides details for revenue generation of the manufacturing unit during the first year of operations.

Table 16: Revenue Details

Product	Units Sold[7]	Sale Price per Unit (PKR)	Revenue (PKR)
Gate Valves			
2 Inches	535	5,200	2,782,000
2.5 Inches	679	6,000	4,074,000
3 Inches	712	8,000	5,696,000
4 Inches	555	10,500	5,827,500
6 Inches	159	15,000	2,385,000
Check Valves			
2 Inches	356	5,200	1,851,200
2.5 Inches	543	6,500	3,529,500
3 Inches	814	8,200	6,674,800
4 Inches	237	11,000	2,607,000
6 Inches	105	15,500	1,627,500
Butterfly Valves			
2 Inches	1,425	3,800	5,415,000
2.5 Inches	1,296	4,400	5,702,400
3 Inches	1,754	5,200	9,120,800
4 Inches	1,520	6,700	10,184,000
6 Inches	750	7,800	5,850,000
Globe Valves			
2 Inches	535	4,700	2,514,500
2.5 Inches	712	5,700	4,058,400
3 Inches	814	8,200	6,674,800
4 Inches	454	11,000	4,994,000
6 Inches	134	16,500	2,211,000
Total (PKR)			**93,779,400**

[7] Half month production is maintained as finished good inventory.

9.4 Variable Cost Estimate

Variable costs of the project have been provided in Table 17.

Table 17 Variable Cost Estimate

Description of Costs	Amount (PKR)
Raw material-Iron Cost (Table 18)	34,601,311
Raw material-Other Components Cost (Table 20)	11,236,230
Raw material-Packing Cost (Table 25)	74,402
Electricity	1,823,842
Gas Cost	593,408
Direct Labour	17,760,000
Consumables	529,400
Machinery repair and maintenance	313,500
Vehicle running and maintenance cost	153,236
Communications expense (phone, internet etc.)	535,500
Promotional expense	703,346
Bad debt expense	468,897
Total	**68,793,072**

Table 18 Raw Material – Iron Cost

Cost Item	Number of valves Sold Year-1	Iron Cost/Unit (PKR)Table 19	Total Cost (PKR)
Gate Valves			
2 Inches	535	1,942	1,039,013
2.5 Inches	679	2,549	1,730,757
3 Inches	712	3,399	2,419,832
4 Inches	555	4,370	2,425,172
6 Inches	159	6,555	1,042,169
Check Valves			
2 Inches	356	1,942	691,380
2.5 Inches	543	2,549	1,384,096
3 Inches	814	3,399	2,766,493
4 Inches	237	4,370	1,035,614
6 Inches	105	6,555	688,225

Butterfly Valves			
2 Inches	1,425	971	1,383,732
2.5 Inches	1,296	1,335	1,730,393
3 Inches	1,754	1,578	2,767,707
4 Inches	1,520	1,821	2,767,464
6 Inches	750	2,306	1,729,665
Globe Valves			
2 Inches	535	1,942	1,039,013
2.5 Inches	712	2,428	1,728,451
3 Inches	814	3,399	2,766,493
4 Inches	454	5,341	2,424,687
6 Inches	134	7,768	1,040,955
Total			**34,601,311**

Table 19: Iron Cost per Unit

Types (Inches)	Net Iron Consumption (KG)	Loss	Gross Iron Consumption (KG)	Iron Price Per KG (PKR)	Total Cost (PKR)
Gate Valves					
2 Inches	16		16.32		1,942
2.5 Inches	21		21.42		2,549
3 Inches	28		28.56		3,399
4 Inches	36		36.72		4,370
6 Inches	54		55.08		6,555
Check Valves					
2 Inches	16	2%	16.32	119	1,942
2.5 Inches	21		21.42		2,549
3 Inches	28		28.56		3,399
4 Inches	36		36.72		4,370
6 Inches	54		55.08		6,555
Butterfly Valves					
2 Inches	8		8.16		971

2.5 Inches	11		11.22		1,335
3 Inches	13		13.26		1,578
4 Inches	15		15.30		1,821
6 Inches	19		19.38		2,306
Globe Valves					
2 Inches	16		16.32		1,942
2.5 Inches	20		20.4		2,428
3 Inches	28		28.56		3,399
4 Inches	44		44.88		5,341
6 Inches	64		65.28		7,768

Table 20: Other Components Cost

Cost Item	Number of valves Sold Year-1	Other Components Cost /Unit (PKR)	Total Cost (PKR)
Gate Valves		(Table 21)	
2 Inches	535	505	270,175
2.5 Inches	679	645	437,955
3 Inches	712	915	651,480
4 Inches	555	1,195	663,225
6 Inches	159	1,745	277,455
Check Valves		(Table 22)	
2 Inches	356	370	131,720
2.5 Inches	543	555	301,365
3 Inches	814	750	610,500
4 Inches	237	1,070	253,590
6 Inches	105	1,400	147,000
Butterfly Valves		(Table 23)	
2 Inches	1,425	255	363,375
2.5 Inches	1,296	330	427,680
3 Inches	1,754	465	815,610
4 Inches	1,520	595	904,400
6 Inches	750	860	645,000

Globe Valves		(Table 24)	
2 Inches	535	960	513,600
2.5 Inches	712	1,290	918,480
3 Inches	814	1,730	1,408,220
4 Inches	454	2,370	1,075,980
6 Inches	134	3,130	419,420
Total			**11,236,230**

Table 21: Gate Valves other Components Cost per Unit

Gate Valves	Spindle (PKR)	Hand Wheel (PKR)	Rubber Seat (PKR)	Nuts and Bolts (PKR)	O-Rings (PKR)	Total Cost / Valve (PKR)
	Per Valve					
2 Inches	270	150	15	55	15	505
2.5 Inches	320	200	20	85	20	645
3 Inches	450	290	25	125	25	915
4 Inches	600	360	35	165	35	1195
6 Inches	850	540	45	260	50	1745

Table 22: Check Valves other Components Cost per Unit

Check Valves	Seat Ring (PKR)	Washer (PKR)	Hinge Pin (PKR)	Nuts and Bolts (PKR)	O-Rings (PKR)	Total Cost / Valve (PKR)
	Per Valve					
2 Inches	270	20	10	55	15	370
2.5 Inches	410	25	15	85	20	555
3 Inches	550	30	20	125	25	750
4 Inches	800	40	30	165	35	1070
6 Inches	1000	50	40	260	50	1400

Table 23: Butterfly Valves other Components Cost per Unit

Butterfly Valves	Hand Wheel (PKR)	Nuts and Bolts (PKR)	O-Rings(PKR)	Total Cost / Valve (PKR)
	Per Valve			
2 Inches	160	80	15	255
2.5 Inches	210	100	20	330
3 Inches	300	140	25	465
4 Inches	380	180	35	595
6 Inches	550	260	50	860

Table 24: Globe Valves other Components Cost per Unit

Globe Valves	Cage (PKR)	Hand Wheel (PKR)	Nuts and Bolts (PKR)	O-Rings(PKR)	Yoke Nut (PKR)	Seat Ring (PKR)	Total Cost / Valve (PKR)
2 Inches	360	150	80	15	55	300	960
2.5 Inches	450	200	100	20	70	450	1,290
3 Inches	560	290	140	25	95	620	1,730
4 Inches	780	360	180	35	135	880	2,370
6 Inches	1,000	540	260	50	180	1,100	3,130

Table 25: Packing Cost

Cost Item	Number of valves Sold Year-1	Packing Cost /Unit (PKR)	Total Cost (PKR)
Gate Valves			
2 Inches	535	2	2,449
2.5 Inches	679	4	3,198
3 Inches	712	6	4,319
4 Inches	555	8	5,572
6 Inches	159	9	8,308

Check Valves			
2 Inches	356	2	2,314
2.5 Inches	543	4	3,108
3 Inches	814	6	4,154
4 Inches	237	8	5,447
6 Inches	105	9	7,963
Butterfly Valves			
2 Inches	1,425	2	1,228
2.5 Inches	1,296	4	1,670
3 Inches	1,754	6	2,048
4 Inches	1,520	8	2,423
6 Inches	750	9	3,175
Globe Valves			
2 Inches	535	2	2,904
2.5 Inches	712	4	3,722
3 Inches	814	6	5,134
4 Inches	454	8	7,718
6 Inches	134	9	10,907
Total			**87,766**

Table 26 Direct Labor

Personnel	Number of Personnel	Salary Per Month Per-Person (PKR)	Annual Salaries (PKR)
Production Manager	1	100,000	1,200,000
Design Engineers	2	80,000	1,920,000
Production Supervisors	2	60,000	1,440,000
Mechanical Foreman	1	50,000	600,000
Coremakers	2	35,000	840,000
Coremakers - Unskilled	5	25,000	1,500,000
Grinding Machine Operators	2	35,000	840,000
Grinding Labor – Unskilled	2	25,000	600,000

Shot Blasting Machine Operator	1	35,000	420,000
Shot Blasting Labor – Unskilled	1	25,000	300,000
Lathe Machine Operator	3	40,000	1,440,000
Lathe Machine Labor – Unskilled	6	25,000	1,800,000
Boring/Drill Machine Operator	2	35,000	840,000
Drill Machine Labor – Unskilled	1	25,000	300,000
Assembling Labor	2	25,000	600,000
Painters	3	30,000	1,080,000
Packing Labor	2	25,000	600,000
Quality Controllers	2	60,000	1,440,000
Total			**17,760,000**

Table 27 Consumables Cost

Cost Item	Unit of Measurement	Consumption per year	Unit Cost (PKR)	Total Cost (PKR)
Grinder Wheels	Number	50	1,200	60,000
Cutting wheels	Number	30	1,000	30,000
Steel Shots (for shot blasting)	KG	15	420	6,300
Swab	Number	30	220	6,600
Drill Bits	Sets	60	2,500	150,000
Smoother	Number	30	850	25,500
Mobil Oil	Liters	20	250	5,000
Safety Gloves	Number	384	150	57,600
Safety Helmets	Number	64	600	38,400
Green Sand				150,000
Total Consumables Cost (PKR)				**529,400**

Swabs are hemp fiber brushes used for moistening the edges of sand molds, which are in contact with the pattern surface. These are also used to clean dust after grinding.

Drill Bits are tools used to drill holes in the metal. These are of different types and sizes depending upon the material to be drilled and diameter of hole.

Smoothers are used to buff the area to make it smooth and bright after grinding.

Mobil oil is used as a lubricant. Lubricants help in smooth working of machinery i.e. lathe, drill machine etc. by reducing friction and wear between metallic surfaces.

Table 28 Machinery Maintenance Cost

Cost Item	Machinery Cost (PKR)	Rate	Total Cost (PKR)
Machinery Maintenance Cost	6,270,000	5%	**313,500**

9.5 Fixed Cost Estimate

Table 29 shows the estimated fixed cost of the project.

Table 29: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Administration expense	7,140,000
Administration benefits expense	499,800
Building rental expense	4,212,000
Office expenses (stationery, entertainment, janitorial services, etc.)	714,000
Insurance expense	102,383
Depreciation expense	1,840,891
Amortization of pre-operating costs	146,397
Total	**14,655,471**

Table 30 Fixed Cost Assumption

Description of Costs	Basis
Depreciation	
Building	10% of cost
Machinery and Equipment/Office Equipment/Office Vehicle/Furniture & Fixture	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 31.

Table 31: Financial Feasibility Analysis

Description	Project
IRR	67%
NPV (PKR)	113,455,610
Payback Period (years)	2.26
Projection Years	10
Discount rate used for NPV	15%

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 32.

Table 32: Financial Feasibility Analysis with 50% Debt

Description	Project
IRR	63%
NPV (PKR)	130,276,117
Payback Period (years)	2.43
Projection Years	10
Discount rate used for NPV	13%

9.8 Human Resource Requirement

The proposed project shall require the workforce as provided in Table 33.

Table 33: Human Resource

Personnel	Number of Personnel	Salary Per Month Per-Resource (PKR)	Annual Salaries (PKR)
Owner	1	150,000	1,800,000
Production Manager	1	100,000	1,200,000
Design Engineers	2	80,000	1,920,000
Production Supervisors	2	60,000	1,440,000
Mechanical Foreman	1	50,000	600,000
Coremakers	2	35,000	840,000
Coremakers – Unskilled	5	25,000	1,500,000
Grinding Machine Operators	2	35,000	840,000
Grinding Labor – Unskilled	2	25,000	600,000
Shot Blasting Machine Operator	1	35,000	420,000
Shot Blasting Labor – Unskilled	1	25,000	300,000
Lathe Machine Operator	3	40,000	1,440,000
Lathe Machine Labor – Unskilled	6	25,000	1,800,000
Boring/Drill Machine Operator	2	35,000	840,000
Drill Machine Labor – Unskilled	1	25,000	300,000
Assembling Labor	2	25,000	600,000
Painters	3	30,000	1,080,000
Packing Labor	2	25,000	600,000
Quality Controllers	2	60,000	1,440,000
Sales and Marketing Manager	1	70,000	840,000
Sales Assistant	1	40,000	480,000
Procurement Cum Store Keeper	1	50,000	600,000
Store Assistant	1	35,000	420,000
Admin and Accounts Manager	1	70,000	840,000

Admin Assistant	1	40,000	480,000
Accounts Assistant	1	40,000	480,000
Security Guard	2	25,000	600,000
Office Boy	2	25,000	600,000
Total	**52**		**24,900,000**

10. CONTACT DETAILS

The contact details of all the major suppliers of machinery and equipment used in the proposed project is given in Table 34.

Table 34: Contact Details

Name of Supplier	Supplies	City	Address	Contact
Arsalan Chaudhary Enterprises	Cast Iron	Lahore	S-36-R, 67/3, Ghalib Street, Railway Road, Lahore	03324375857
Asif & Sons Nut Bolt Factory	Raw Material	Gujranwala	Industrial, Industrial Estate, Gujranwala, Punjab	(081) 2460001
United Screw Industries	Machinery	Lahore	C8VF+PM5, Quaid-e-Azam Industrial Estate Quaid e Azam Industrial Estate, Lahore, Punjab	(042) 35215633
MBI Industries (Pvt) Limited	Raw Material	Karachir	A-51 SITE PAKISTAN، Sindh Industrial Trading Estate, Karachi, Karachi City, Sind,	(021) 32590187
Pakistan fastener	Machinery	Lahore	Old Mughal Rd, Shahdara Town, Lahore, Sheikhupura, Punjab	0300 4793172
Abdul Traders	Linear Guide, Needle Bearing, Ball Screw, CNC Machine Parts	Lahore	Rehman Gali No. 4, Brandreth Rd, Lahore, 54000	(042) 37653390
Fine Machinery Store	Machinery	Karachi	W25X+3Q3, Laloo Khait Block 10 Liaquatabad Town, Karachi	0300 2590764
Arbaz Waseem	Cast Iron	Karachi	Chand Godown D-234, Haroonabad, Sher Shah Village, Karachi	-
Rastgar Engineering Co. (Pvt) Ltd.	Cast Iron	Islamabad	Plot No.307, Street 3, Industrial Area, I-9/3	(051)-4433544

Kamraj Enterprise Pvt. Ltd.	Scrap Metal	Lahore	73 Jail Road, G.O.R 1	(042)-35408279
Haji Amil Scrap Yard	Scrap Metal	Peshawar	Peshawar Ring Rd., sardargarhi	0300 9325188
Ghazi Steel MIlls	Metal/ Scrap Metal	Quetta	Railway Road near amreli steel railway Pathak new adda, Sariab Road	

11. USEFUL LINKS

Table 35: Useful Links

Name of Organization	Link
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
Securities and Exchange Commission of Pakistan	www.secp.gov.pk
State Bank of Pakistan	www.sbp.org.pk
Trade Development Authority of Pakistan	www.tdap.gov.pk
Federal Board of Revenue	www.fbr.gov.pk
Government of Punjab	www.punjab.gov.pk
Government of Sindh	www.sindh.gov.pk
Government of Khyber Pakhtunkhwa	www.kp.gov.pk
Government of Balochistan	www.balochistan.gov.pk
Government of Azad Jammu and Kashmir	www.ajk.gov.pk
Government of Gilgit Baltistan	www.gilgitbaltistan.gov.pk
Punjab Board of Investment and Trade	www.pbit.gop.pk/
Punjab Small Industries Corporation	www.psic.gop.pk
Sindh Small Industries Corporation	https://ssic.gos.pk
Small Industries Development Board Khyber Pakhtunkhwa	https://small_industries_de.kp.gov.pk
Directorate of Small Industries Balochistan	https://balochistan.gov.pk/departments
Industries Department Government of Khyber Pakhtunkhwa	www.industries.kp.gov.pk
Industries and Commerce Department Balochistan	www.dgicd.gob.pk
Industries and Commerce Department Sindh	www.industries.sindh.gov.pk
Department of Industries and Commerce AJ&K	www.industries.ajk.gov.pk
Pakistan Steel Melters Association (PSMA)	www.steelmelters.com
Pakistan Foundry Association	http://www.pfa.org.pk/
The Pakistan Steel Re-Rolling Mills Association	https://psrma.com

12. ANNEXURES

12.1 Income Statement

Income Statement										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Gate Valves	20,764,500	27,403,560	35,194,801	44,297,147	54,859,600	60,400,419	66,500,862	73,217,449	80,612,411	88,754,265
Check Valves	16,290,000	21,533,138	27,654,305	34,809,772	43,132,804	47,489,217	52,285,628	57,566,476	63,380,690	69,782,140
Butterfly Valves	36,272,200	39,935,692	43,969,197	48,410,086	53,299,505	58,682,755	64,609,713	71,135,294	78,319,959	86,230,274
Globe Valves	20,452,700	22,518,423	24,792,783	27,296,855	30,053,837	33,089,274	36,431,291	40,110,851	44,162,047	48,622,414
Total Revenue	93,779,400	111,390,812	131,611,087	154,813,859	181,345,745	199,661,665	219,827,494	242,030,070	266,475,107	293,389,093
Cost of sales										
Raw material-Iron Cost	34,601,311	41,439,701	49,309,420	58,361,648	68,732,286	75,674,247	83,317,346	91,732,398	100,997,370	111,198,104
Raw material-Other Components Cost	11,236,230	13,193,283	15,431,864	17,992,058	20,909,838	23,021,732	25,346,926	27,906,966	30,725,570	33,828,852
Raw material-Packing Cost	74,402	87,223	101,877	118,627	137,709	151,617	166,931	183,791	202,353	222,791
Direct Electricity	1,400,746	1,526,813	1,664,226	1,814,006	1,977,267	2,155,221	2,349,191	2,560,618	2,791,074	3,042,270
Gas Cost	593,408	776,177	987,039	1,229,568	1,507,758	1,643,456	1,791,367	1,952,591	2,128,324	2,319,873
Direct Labour	17,760,000	19,482,720	21,372,544	23,445,681	25,719,912	28,214,743	30,951,573	33,953,876	37,247,402	40,860,400
Consumables	529,400	582,869	582,869	582,869	582,869	582,869	582,869	582,869	582,869	582,869
Machinery repair and maintenance	313,500	345,164	380,025	418,408	460,667	507,194	558,421	614,821	676,918	745,287
Vehicle running and maintenance cost	153,236	168,713	185,752	204,513	225,169	247,911	272,951	300,519	330,871	364,289
Total cost of sales	66,662,232	77,602,663	90,015,617	104,167,378	120,253,475	132,198,991	145,337,575	159,788,448	175,682,750	193,164,735
Gross Profit	27,117,168	33,788,150	41,595,470	50,646,481	61,092,270	67,462,674	74,489,919	82,241,623	90,792,357	100,224,358
	29%	30%	32%	33%	34%	34%	34%	34%	34%	34%
General administration & selling expenses										
Administration expense	7,140,000	7,832,580	8,592,340	9,425,797	10,340,100	11,343,089	12,443,369	13,650,376	14,974,462	16,426,985
Administration benefits expense	499,800	548,281	601,464	659,806	723,807	794,016	871,036	955,526	1,048,212	1,149,889
Building rental expense	4,212,000	4,633,200	5,096,520	5,606,172	6,166,789	6,783,468	7,461,815	8,207,996	9,028,796	9,931,676
Indirect electricity	423,097	461,175	502,681	547,923	597,236	650,987	709,576	773,437	843,047	918,921
Communications expense (phone, internet etc.)	535,500	587,444	644,426	706,935	775,507	850,732	933,253	1,023,778	1,123,085	1,232,024
Office expenses (stationery, entertainment, janitorial services, e	714,000	783,258	859,234	942,580	1,034,010	1,134,309	1,244,337	1,365,038	1,497,446	1,642,698
Promotional expense	703,346	835,431	987,083	1,161,104	1,360,093	1,497,462	1,648,706	1,815,226	1,998,563	2,200,418
Insurance expense	102,383	87,025	71,668	56,310	40,953	25,596	10,238	191,358	162,654	133,950
Depreciation expense	1,840,891	1,840,891	1,840,891	1,923,058	1,915,879	1,915,879	1,540,289	3,301,462	3,301,462	3,443,878
Amortization of pre-operating costs	146,397	146,397	146,397	146,397	146,397	-	-	-	-	-
Bad debt expense	468,897	556,954	658,055	774,069	906,729	998,308	1,099,137	1,210,150	1,332,376	1,466,945
Subtotal	16,786,310	18,312,636	20,000,760	21,950,151	24,007,500	25,993,846	27,961,756	32,494,347	35,310,103	38,547,385
Operating Income	10,330,858	15,475,513	21,594,710	28,696,330	37,084,771	41,468,828	46,528,163	49,747,276	55,482,255	61,676,974
Gain / (loss) on sale of machinery & equipment	-	-	-	-	-	-	1,567,500	-	-	
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	411,750	-	-	
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	83,325	-	-	
Earnings Before Interest & Taxes	10,330,858	15,475,513	21,594,710	28,696,330	37,084,771	41,468,828	48,590,738	49,747,276	55,482,255	61,676,974
Earnings Before Tax	10,330,858	15,475,513	21,594,710	28,696,330	37,084,771	41,468,828	48,590,738	49,747,276	55,482,255	61,676,974
Tax	1,172,243	1,392,385	1,645,139	1,935,173	2,266,822	2,495,771	2,747,844	3,025,376	3,330,939	3,667,364
NET PROFIT/(LOSS) AFTER TAX	**9,158,615**	**14,083,128**	**19,949,572**	**26,761,157**	**34,817,949**	**38,973,057**	**45,842,894**	**46,721,900**	**52,151,316**	**58,009,610**

12.2 Balance Sheet

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											
Current assets											
Cash & Bank	1,000,000	1,642,800	3,571,113	4,973,685	7,934,077	11,983,348	13,252,556	41,980,960	85,927,784	132,616,744	219,492,111
Accounts receivable		7,707,896	8,431,653	9,986,379	11,770,888	13,814,778	15,657,839	17,239,281	18,980,448	20,897,473	23,008,118
Finished goods inventory		2,777,593	3,233,444	3,750,651	4,340,307	5,010,561	5,508,291	6,055,732	6,657,852	7,320,115	8,048,531
Spares Inventory	26,125	31,525	38,041	45,904	55,392	66,841	80,657	97,329	117,446	141,722	-
Raw material inventory	3,825,995	5,020,579	6,550,245	8,505,210	10,993,774	13,326,664	16,154,596	19,582,617	23,738,068	28,775,310	-
Consumables inventory	44,117	53,478	58,880	64,826	71,374	78,583	86,519	95,258	104,879	115,472	-
Pre-paid building rent	-	386,100	424,710	467,181	513,899	565,289	621,818	684,000	752,400	827,640	-
Pre-paid insurance	102,383	87,025	71,668	56,310	40,953	25,596	10,238	191,358	162,654	133,950	-
Total Current Assets	4,998,619	17,706,996	22,379,754	27,850,147	35,720,665	44,871,661	51,372,515	85,926,534	136,441,531	190,828,425	250,548,760
Fixed assets											
Land	-	-	-	-	-	-	-	-	-	-	-
Building / Infrastructure	1,526,925	1,374,233	1,221,540	1,068,848	916,155	763,463	610,770	458,078	305,385	152,693	-
Machinery & equipment	6,270,000	5,329,500	4,389,000	3,448,500	2,508,000	1,567,500	627,000	11,910,813	10,124,191	8,337,569	6,550,947
Tools & Material Handling Equipment	717,890	480,986	244,083	952,305	633,234	321,343	1,253,740	833,674	423,058	1,650,590	1,097,559
Furniture & fixtures	1,425,000	1,211,250	997,500	783,750	570,000	356,250	142,500	2,707,003	2,300,953	1,894,902	1,488,852
Office vehicles	333,300	283,305	233,310	183,315	133,320	83,325	33,330	507,817	431,644	355,472	279,299
Office equipment	1,647,000	1,399,950	1,152,900	905,850	658,800	411,750	164,700	3,128,726	2,659,417	2,190,108	1,720,799
Security Against Building	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000	1,053,000
Total Fixed Assets	12,973,115	11,132,224	9,291,333	8,395,567	6,472,509	4,556,630	3,885,040	20,599,110	17,297,648	15,634,334	12,190,456
Intangible assets											
Pre-operation costs	731,987	585,589	439,192	292,795	146,397	-	-	-	-	-	-
Total Intangible Assets	731,987	585,589	439,192	292,795	146,397	-	-	-	-	-	-
TOTAL ASSETS	**18,703,721**	**29,424,809**	**32,110,278**	**36,538,508**	**42,339,571**	**49,428,291**	**55,257,555**	**106,525,644**	**153,739,179**	**206,462,759**	**262,739,216**
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable		1,562,473	1,785,685	2,049,566	2,362,661	2,679,001	3,044,520	3,467,912	3,959,547	4,531,811	2,798,658
Total Current Liabilities	-	1,562,473	1,785,685	2,049,566	2,362,661	2,679,001	3,044,520	3,467,912	3,959,547	4,531,811	2,798,658
Shareholders' equity											
Paid-up capital	18,703,721	18,703,721	18,703,721	18,703,721	18,703,721	18,703,721	18,703,721	23,705,524	23,705,524	23,705,524	23,705,524
Retained earnings		9,158,615	11,620,872	15,785,222	21,273,189	28,045,569	33,509,313	79,352,207	126,074,108	178,225,424	236,235,034
Total Equity	18,703,721	27,862,336	30,324,593	34,488,943	39,976,911	46,749,290	52,213,034	103,057,732	149,779,632	201,930,948	259,940,558
TOTAL CAPITAL AND LIABILITIES	**18,703,721**	**29,424,809**	**32,110,278**	**36,538,508**	**42,339,571**	**49,428,291**	**55,257,555**	**106,525,644**	**153,739,179**	**206,462,759**	**262,739,216**

12.3 Cash Flow Statement

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
Operating activities											
Net profit		9,158,615	14,083,128	19,949,572	26,761,157	34,817,949	38,973,057	45,842,894	46,721,900	52,151,316	58,009,610
Add: depreciation expense		1,840,891	1,840,891	1,840,891	1,923,058	1,915,879	1,915,879	1,540,289	3,301,462	3,301,462	3,443,878
amortization of pre-operating costs		146,397	146,397	146,397	146,397	146,397	-	-	-	-	-
Accounts receivable		(7,707,896)	(723,757)	(1,554,727)	(1,784,509)	(2,043,890)	(1,843,061)	(1,581,442)	(1,741,167)	(1,917,025)	(2,110,645)
Finished goods inventory		(2,777,593)	(455,851)	(517,206)	(589,657)	(670,254)	(497,730)	(547,441)	(602,120)	(662,263)	(728,416)
Spares inventory	(26,125)	(5,400)	(6,516)	(7,863)	(9,488)	(11,449)	(13,816)	(16,672)	(20,117)	(24,276)	141,722
Raw material inventory	(3,825,995)	(1,194,584)	(1,529,666)	(1,954,965)	(2,488,564)	(2,332,890)	(2,827,931)	(3,428,021)	(4,155,451)	(5,037,242)	28,775,310
Consumables inventory	(44,117)	(9,362)	(5,401)	(5,947)	(6,547)	(7,209)	(7,937)	(8,738)	(9,621)	(10,593)	115,472
Pre-paid building rent	-	(386,100)	(38,610)	(42,471)	(46,718)	(51,390)	(56,529)	(62,182)	(68,400)	(75,240)	827,640
Advance insurance premium	(102,383)	15,357	15,357	15,357	15,357	15,357	15,357	(181,119)	28,704	28,704	133,950
Accounts payable		1,562,473	223,213	263,880	313,095	316,340	365,519	423,392	491,635	572,263	(1,733,153)
Other liabilities		-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(3,998,619)	642,800	13,549,185	18,132,919	24,233,581	32,094,841	36,022,809	41,980,960	43,946,824	48,327,106	86,875,368
Financing activities											
Issuance of shares	18,703,721	-	-	-	-	-	-	5,001,803	-	-	-
Purchase of (treasury) shares											
Cash provided by / (used for) financing activitie	18,703,721	-	-	-	-	-	-	5,001,803	-	-	-
Investing activities											
Capital expenditure	(13,705,102)	-	-	(945,126)	-	-	(1,244,289)	(18,254,359)	-	(1,638,147)	-
Acquisitions											
Cash (used for) / provided by investing activitie	(13,705,102)	-	-	(945,126)	-	-	(1,244,289)	(18,254,359)	-	(1,638,147)	-
NET CASH	1,000,000	642,800	13,549,185	17,187,793	24,233,581	32,094,841	34,778,520	28,728,404	43,946,824	46,688,959	86,875,368

13. KEY ASSUMPTIONS

13.1 Operating Cost Assumptions

Table 36: Operating Cost Assumptions

Description	Details
Operating costs growth rate	10.1%
Communication expenses	7.5% of management staff expenses
Office expenses (stationery, janitorial, etc.)	10% of management staff expenses
Depreciation	
Building	10% of cost
Machinery and Equipment/Office Equipment/Office Vehicle/Furniture & Fixture	15% of cost

13.2 Revenue Assumptions

Table 37: Revenue Assumptions

Description	Details
Sale price growth rate	11.2%
Capacity utilization	50%
Capacity utilization growth rate	10%
Maximum capacity	90%

13.3 Financial Assumptions

Table 38: Financial Assumptions

Description	Details
Project life (Years)	10
Debt: Equity	0:100
Discount Rate with Equity	15%

13.4 Debt Related Assumptions

Table 39: Debt Related Assumptions

Description	Details
Project life (Years)	10

Debt: Equity	50:50
Discount Rate with Equity	13%
Debt Tenure	5 years
Grace Period	1 Year
Interest Rate (KIBOR+3%)	10.3%

13.5 Cash Flow Assumptions

Table 40: Cash Flow Assumptions

Description	Day
Account Payable Days	30
Account Receivable Days	25

Small and Medium Enterprises Development Authority

HEAD OFFICE

4th Floor, Building No. 3, Aiwan-e-Iqbal Complex, Egerton Road, Lahore
Tel: (92 42) 111 111 456, Fax: (92 42) 36304926-7

www.smeda.org.pk, **helpdesk@smeda.org.pk**

REGIONAL OFFICE PUNJAB	REGIONAL OFFICE SINDH	REGIONAL OFFICE KPK	REGIONAL OFFICE BALOCHISTAN
3rd Floor, Building No. 3, Aiwan-e-Iqbal Complex, Egerton Road Lahore, Tel: (042) 111-111-456 Fax: (042) 36304926-7 helpdesk.punjab@smeda.org.pk	5TH Floor, Bahria Complex II, M.T. Khan Road, Karachi. Tel: (021) 111-111-456 Fax: (021) 5610572 helpdesk-khi@smeda.org.pk	Ground Floor State Life Building The Mall, Peshawar. Tel: (091) 9213046-47 Fax: (091) 286908 helpdesk-pew@smeda.org.pk	Bungalow No. 15-A Chaman Housing Scheme Airport Road, Quetta. Tel: (081) 831623, 831702 Fax: (081) 831922 helpdesk-qta@smeda.org.pk