



Pre-feasibility Study

MANUFACTURING UNIT FOR BOLTS, NUTS, SCREWS, RIVETS AND WASHERS

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, 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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Document Control

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2. EXECUTIVE SUMMARY

Bolts, nuts, screws, rivets, studs, nails, washers, etc. are known as fasteners. Fasteners are used in different industries to join or fix or connect two or more objects together. The business of manufacturing bolts, nuts, screws, rivets and washers is categorized under light engineering products manufacturing. There are different types of industrial fasteners used in manufacturing large variety of products, such as multiple types of machines and structures. Bolts and nuts are the important industrial fasteners and are used nearly by all the manufacturing industries.

Fasteners may be made by different materials; however, the most commonly used material for this purpose is Carbon Steel. Grades 2, 5, and 8 are typically the standards used for this purpose. Alloyed carbon steel is also used as a higher-end variation on these metals. The selected material must be reliable, cost-effective, and maintain durability in the environment in which it is used; meaning thereby that the material should be corrosion resistant. For such applications, materials like stainless steel, brass, aluminium, etc. may be used. Fasteners find wide applications in a number of manufacturing industries. The manufacturers of passenger and transportation vehicles, agriculture machinery and equipment, machine tools, textile machinery, railways, defense equipment, electronic equipment, telecommunication equipment and large number of other industries need fasteners for completing their sub or main assembly processes. In fact, there is no assembly complete without fasteners.

This Pre-feasibility document provides details for setting up a manufacturing Unit for Bolts, Nuts, Screw, Rivets, and Washers. 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, or any other major city of Pakistan. These cities are preferred because of the presence of large number of industrial clusters. Growing number of industrial units in the country is leading to increase the demand of fasteners.

This pre-feasibility document provides details for “setting up Bolts, Nuts, Screws, Rivets and Washers manufacturing unit”. The proposed project has an annual capacity of manufacturing 100,800 kg of screws, 50,400 kg of rivets, 100,800 kg of bolts, 252,000 kg of washers and 252,000 kg of nuts. The starting capacity utilization in the first year of operations is assumed to be 50%, while maximum capacity utilization is assumed to be 90%.

The proposed project will be set up in a rented building having an area of 3,600 square feet (16 Marla). The proposed unit requires a total investment of PKR 32.67 million. This includes capital investment of PKR 20.68 million and working capital of PKR 11.98 million. This project is financed through 100% equity. The Net Present Value (NPV) of project is PKR 89.78 million with an Internal Rate of Return (IRR) of 49% and a Payback period of 2.64 years. Further, the proposed project is expected to generate Gross Annual Revenues of PKR 159.68 million in 1st year of operations, Gross Profit (GP) ratio ranging from of 14% to 18% and Net Profit (NP) ratio ranging from 4% to 9% during the projection period of ten years. The proposed project will achieve its

estimated breakeven point at capacity of 28% (214,836 kg) with breakeven revenue of PKR 90.75 million in a year.

The proposed project may also be established using leveraged financing. At 50% financing at a cost of KIBOR+3%, the proposed unit provides Net Present Value (NPV) of PKR 103.42 million, Internal Rate of Return (IRR) of 49% and Payback period of 2.65 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 3% to 9% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 30% (228,978 kg) with breakeven revenue of PKR 96.73 million.

The proposed project will provide employment opportunities to 41 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 Bolts, Nuts, Screws Rivets and Washers”. The document provides a general understanding of the business to facilitate potential investors in crucial and effective investment decisions.

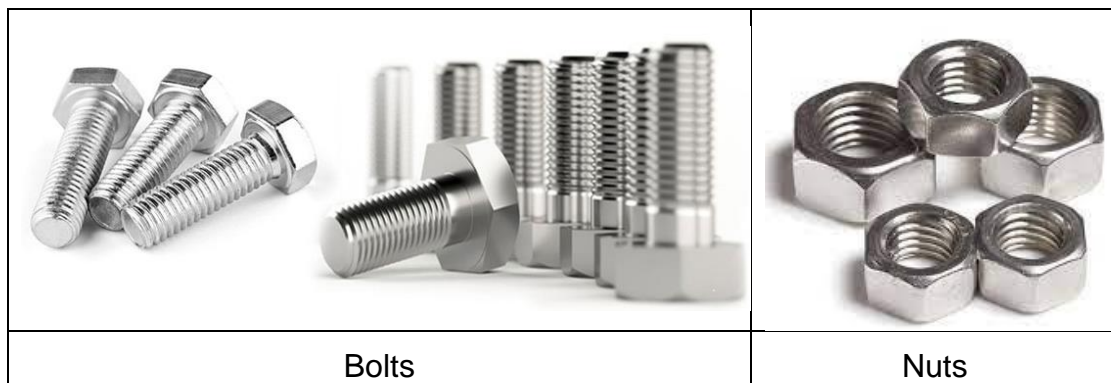
The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attains greater imminence as the research that precedes such reports reveal certain thumb rules; best practices developed by existing enterprises by trial and error, and certain industrial norms that become 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 bolts, nuts, screws, rivets and washers; commonly known as fasteners. These are used in different industries for joining, holding or assembling a single or multiple components of equipment and machinery together. Different types of fasteners are used in construction industry and in the assembly lines of various manufacturing industries. These are extensively used in industrial units for manufacturing automobiles, industrial machinery and equipment, plumbing products, motors, pumps, electrical appliances and many others.

Bolt is a piece of metal rod, whose one end is up settled and other end is threaded. Bolt is used along with a nut which rolls on bolt threads. Nuts and bolts can be removed and used again. Nuts and bolts are available in variety of shapes, designs and sizes. Figure 1 shows different types of bolts and nuts.

Figure 1: Bolts and Nuts

Screw is a tapered fastener that mates with an existing thread or creates its own thread in a material as it turns inside that. Screw can be removed and used again. Figure 2 shows different types of screws.

Figure 2: Screws

Rivet is a mechanical fastener, which consists of a smooth cylindrical shaft with a head on one end. Unlike nut, bolt and screw, rivet is a permanent fastener and thus can be used only once. Figure 3 shows different types of rivets.

Figure 3: Rivets

A washer is a thin plate with a hole (typically in the middle) that is normally used to distribute the load of a threaded fastener, such as a bolt or nut. Figure 4 shows different types of washers.

Figure 4: Washers

The most commonly used material for manufacturing fasteners is carbon steel. The grades typically used for this purpose are 2, 5, and 8 whereas alloyed carbon steel is also used, but for higher-end variations. The mechanical strength of these materials ranges from approximately 50 ksi (kilo-pound per square inch) up to 300 ksi in a finished product. There are many considerations when selecting the ideal type and material for fasteners. In addition to the strength, the selected material should also be

cost-effective and maintain durability in the environment in which it is used. This means that the fastener material should be corrosion-resistance.

Key characteristics of different types of steels used for manufacturing fasteners are listed below:

Grade 2: This is a low carbon category that features the least expensive, but also least durable, types of steel. Grade 2 material is highly workable, and forms the bulk of steel grade fasteners.

Grade 5: Grade 5 steels are produced from unalloyed medium carbon groups and are usually work-hardened to improve their strength.

Grade 8: These steels are typically medium carbon alloy. They are work-hardened to a high degree, making them stronger.

Alloy steel: Alloy steel is steel that has small amounts of one or more alloying elements (other than carbon) such as manganese, silicon, nickel, titanium, copper, chromium or aluminum. Alloy steel is used mostly for socket products.

Washers are made from a variety of materials, the most popular of which is galvanized carbon steel and stainless steel.

The main raw material is obtained in the form of steel coil of the required diameter and steel sheet of the required thickness. For manufacturing nuts, bolts, screws and rivets, the required diameter of the steel coil is between 3.5 mm to 11.5 mm, whereas for washers, the required thickness of the steel sheet is between 0.03 inches to 0.14 inches¹. The raw material i.e., fasteners are sold on weight basis. The quality of fasteners depends largely on the composition of raw materials. Therefore, it is very important to select material as per the required specifications. Fasteners are of several types i.e., larger diameter (above 12 mm) bolts, machine bolts, anchor bolts, hex bolts, double end bolts and nuts, etc. In term of shape, bolt and nuts are classified by head shape like hexagonal head, square head, round head, pan head or truss head.

Machine Bolts are regular hex head or square head bolts with externally threaded body. Anchor bolts are bolts that are designed to be used to attach a structural component to a concrete slab or poured foundation.

Hex bolts also called hexagon head bolts or hexagonal head bolts. These represent the most common form of bolt that is available in standard dimensional inch and metric sizes.

Double end bolts are sometimes called stud bolts and feature a threaded portion on each end of the bolt without a traditional head.

Fastener's specification is measured in diameter (mm) and length (inches). Fasteners are sold on weight basis and thus any change in length does not affect the sales price. Different kind of machines dies are used for manufacturing different types of fasteners.

¹ <https://www.albanycountyfasteners.com/Flat-Washers-304-Stainless-Steel-p/1000-105000.htm>

The proposed project will be manufacturing bolts, screws and rivets in the size range from 4 mm (millimeter) to 12 mm in diameter. Length of fastener will vary as per the customer's demand from 0.25 inches up to maximum 6 inches.

Material Loss during Manufacturing

During the manufacturing process, some material will be lost which is sold as byproduct. Usually, this by product is sold on cash basis. Table 1 shows loss per kg of final product during manufacturing of different types of fasteners.

Table 1: By-product Ratio (per kg)

Product	Raw Material Consumption (kg)	Scrap/ Loss (%)	Byproduct Product (kg)
Screw (4-6 mm)	1	10%	0.10
Rivet (4-6 mm)	1	5%	0.05
Bolts (4-6 mm)	1	10%	0.10
Washer (4-6 mm)	1	30%	0.30
Nut (4-6 mm)	1	15%	0.15
Screw (7-9 mm)	1	15%	0.15
Rivet (7-9 mm)	1	10%	0.10
Bolts (7-9 mm)	1	15%	0.15
Washer (7-9 mm)	1	35%	0.35
Nut (7-9 mm)	1	20%	0.20
Screw (10-12 mm)	1	20%	0.20
Rivet (10-12 mm)	1	15%	0.15
Bolts (10-12 mm)	1	20%	0.20
Washer (10-12 mm)	1	40%	0.40
Nut (10-12 mm)	1	25%	0.25

5.1 Machinery and Equipment

Machinery and equipment required for establishing a manufacturing unit for bolts, nuts, screws, rivets and washers are briefly discussed below:

Heading Machine

Heading machine produces screws, semi-tubular and fully tubular rivets and bolts. The production process starts with slug (a small piece of metal which is cut from a continuous coil). The heading machine uses a series of powerful hammers and dies to form a part. Each type of fastener or component has its own series of punches, dies and hammers which are designed for different specifications. The proposed project

will use 3 heading machines; each machine has its upper diameter limit. For producing products of bigger diameter, the production unit uses a bigger machine.

Heading machine for 4-6 mm diameter product can process up to 250 kg of raw material per day; heading machine for 7-9 mm diameter product can process up to 300 kg of raw material per day while heading machine for 10-12 mm diameter product can process up to 350 kg of raw material per day. The machine uses 3 types of dies for each of the three types of products. The dies need to be changed for manufacturing three types of products i.e., bolts, screws and rivets. These dies need to be replaced in few months depending upon the frequency of their usage. Average cost of each die is PKR 8,000. Figure 5 shows heading machine.

Figure 5: Heading Machine



Thread Rolling Machine

Thread rolling machine is used to make threads on screws and bolts. Thread rolling machine generates threads by displacing and flowing metal onto a metal die. Thread rolling is a cold-forming operation used to form external threads in a work piece/blank. Cold forming is the process of forging metals at near room temperatures. In cold forming, metal is formed at high speed and high pressure. The cold working of the metal increases the hardness, yield and tensile strength. During the thread rolling process, a hard die is pressed onto a rotating work piece (work piece/blank is the bolt or screw under production) that is attached to the thread rolling machine. The thread rolling machine gradually increases the force that is applied to the work piece. This

process is different from metal cutting, grinding and chasing because it does not remove any metal from the work piece. Instead, thread rolling uses hardened steel dies to displace and mold ductile metals.

Production unit will use 3 threading machines which will process from 275 to 350 kg of final product per day. Dies will vary with the type of thread to be made. Threading machine will use 4 types of dies to make four types of threads on the products. These are V-thread, square thread, buttress thread and reverse buttress thread. Square thread is one of most commonly used thread. Average cost of each die is PKR 8,000. These dies need to be replaced in few months; depending upon the frequency of their usage. Figure 6 shows thread roll machine and Figure 7 shows types of threads.

Figure 6: Thread Roll Machine

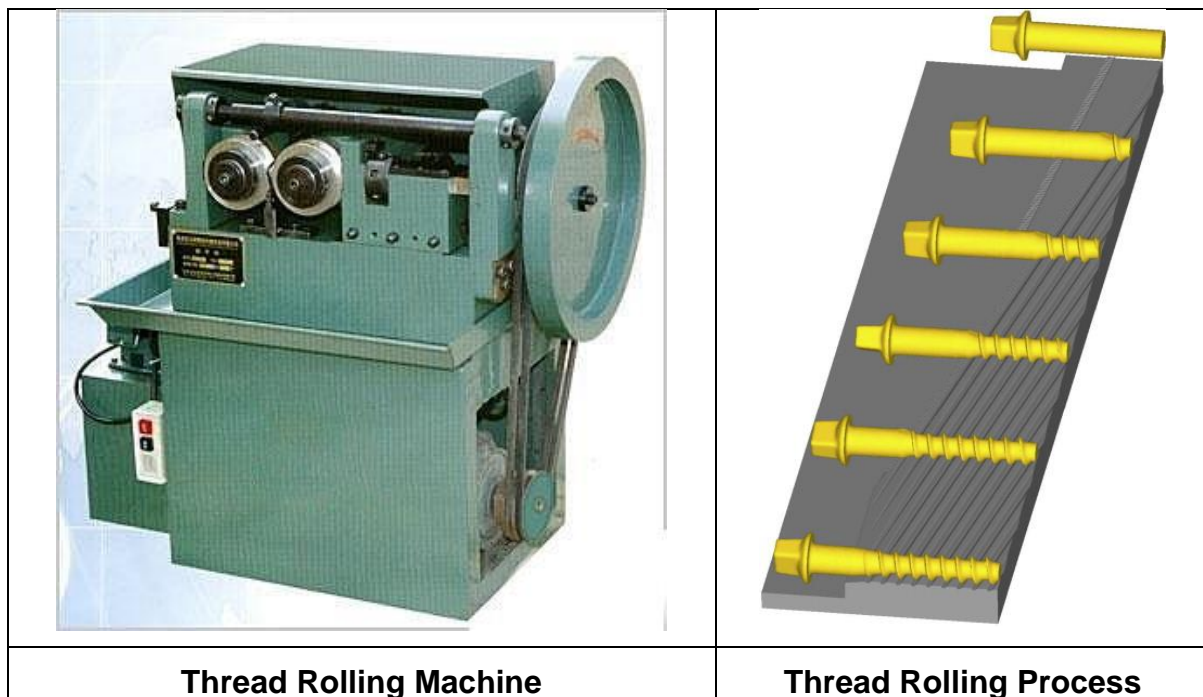
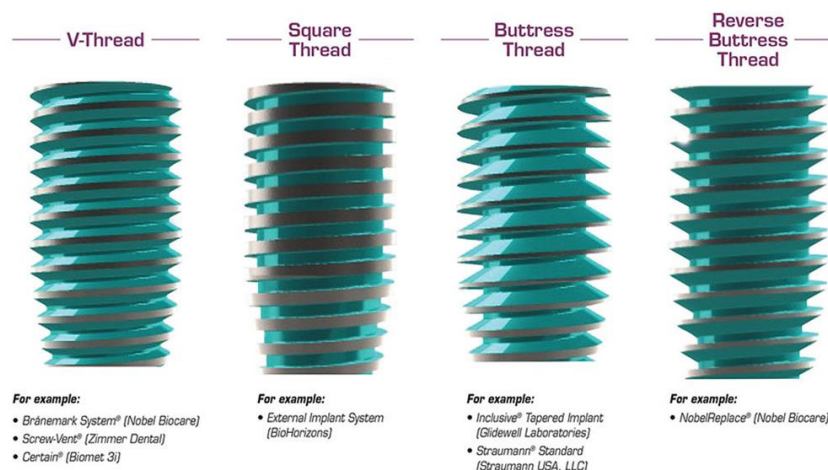


Figure 7: Thread Types



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Head Trimming Machine

Head trimming machine is used to shape the header of the fasteners. In terms of shape, bolt and nuts are classified by hexagonal head, square head, round head, pan head, truss head, etc. Different dies are used to shape the heads i.e., hexagonal, round and square. The production unit will use 3 head trimming machines which process from 250 to 350 kg of final product per day. Head trimming machine will use 3 types of dies. Average cost of each die is PKR 8,000. These dies need to be replaced in few months depending upon the frequency of their usage. Figure 8 shows head trimming machine and Figure 9 shows different types of heads.

Figure 8: Head Trimming Machine



Figure 9: Head Types

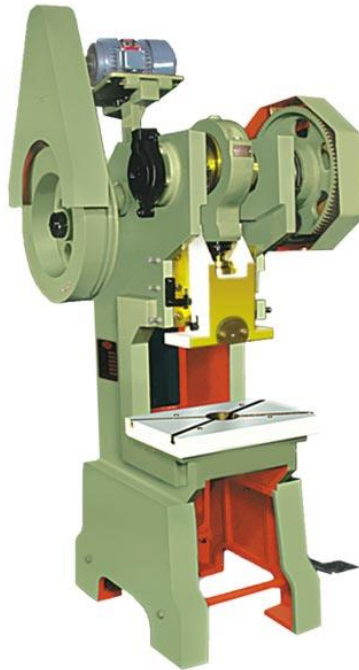


Mechanical Press (2 Stroke) For Making Washers

Mechanical presses are semi-automatic large machines used for sheet metal blanking, piercing and forming. The machine suggested for the proposed project is semi-automatic, 2-stroke machine, powered by 1 HP motor. The material (steel sheet) is placed on the machine table, and the operator applies pressure through pedal to

shape and/or alter the material as needed. The finished product then ejects out of the machine. The production will use 3 mechanical presses to process 250-350 kg of raw material per day. Mechanical press will use 3 types of dies. The average cost of each die is PKR 8,000. These dies need to be replaced in few months depending the frequency of their usage. Figure 10 shows mechanical press.

Figure 10: Mechanical Press (2 Stroke)



Nut Former (4 Stroke) For Making Nuts

Multi-stroke Nut Former is a specialized machine with high efficiency and automation among forging machinery². Nut Former is used for producing different kinds of nuts. The machine suggested for proposed project is a 4-stroke machine with 1.5 HP. The production unit will use 3 nut former which can process 250-350 kg of raw per. Nut former machine will use 3 types of dies; each die will cost PKR 8,000. dies need to be replaced in few months depending upon the frequency of their usage.

² Forging machine is a metal and mechanical cold working equipment. It only changes the metal's outer shape.

Figure 11 shows nut former machine and Figure 12 shows different types of nuts.

Figure 11: Nut Former (4 Stroke)**Figure 12: Different Types of Nuts****Wire De-coiler (For Wire Handling)**

Wire de-coiler is a rotatable wire handling machine, which is used for holding coiled wire. Coiled wire is placed on wire de-coiler and one end of the wire is fed to the machine (Nut former and Heading machine). Wire de-coiler rotates and lets the coil go smoothly in the machine without much effort. These machines can also be made on order from the local market. Figure 13 shows wire de-coiler.

Figure 13: Wire De-Coiler

Hand Tools & Material Handling Equipment

The proposed manufacturing unit will also require hand tools and material handling equipment. These tools and equipment are required for cutting sheet and coil, tool kits for machines, hand carts and manual hand pallet truck for moving raw materials and finished products. Figure 14 shows hand tools and material handling equipment.

Figure 14: Hand Tools & Material Handling Equipment

5.2 Process Flow for Production of Bolts, Screws and Rivets

In modern fastening technology, the majority of fasteners are made using the cold forming procedure. In this procedure, the fastener is formed, usually by multistage processes, by using techniques/procedures such as pressure forging³ and cold extrusion⁴, or a combination of these procedures. Cold forming is usually used for manufacturing large quantities, since it is more economical.

³ Press forging is the process of shaping a metal that is placed between two dies by applying mechanical or hydraulic pressure.

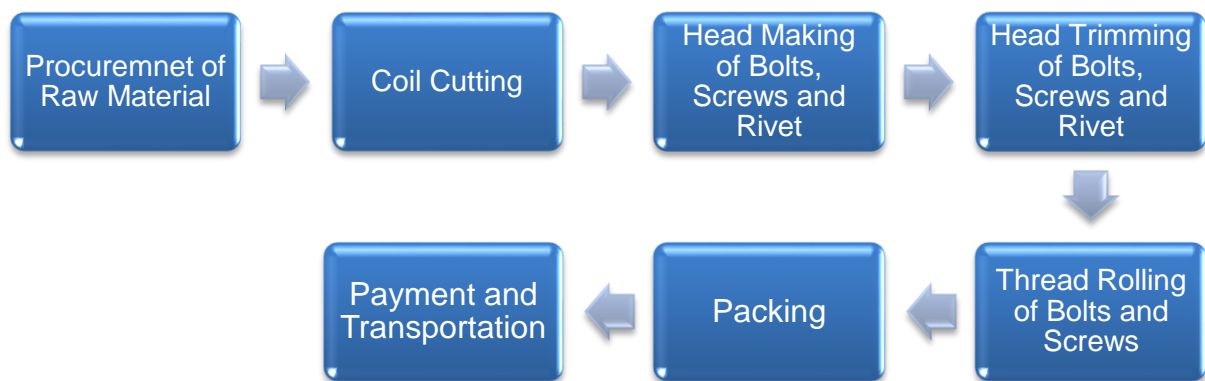
⁴ Cold extrusion can be defined as the process of shaping of a cold metal by striking a slug.

The choice of the suitable forming machine depends on the size of the fastener and on the quantity to be produced. The greater the degree of forming, the more forming stages are required. Sharp-edged transitions or thin profiles are unfavorable for cold forming and lead to increased tool wear. A decisive role for the quality of the final product is dependent on the quality of the raw material. The key benefits for using cold forming procedure are:

- Optimal use of material
- Very high output
- High dimensional accuracy and surface quality
- Increase of strength of raw material

The process flow for production of bolts, screw and rivets is shown in Figure 15.

Figure 15: Process Flow for Production of Bolts Screw and Rivets



Brief description of the process flow is as follows:

Raw Material for Production of Bolts, Screws and Rivets

The proposed project will be manufacturing bolts, screws and rivets from carbon steel in the range of 4 mm (millimeter) to 12 mm diameter. The length of fastener will vary as per the customer's demand and usually lies in the range from 0.25 inches to 6 inches; depending on the diameter. Due to the expansion of diameter during forging process, 0.5 mm small diameter wire of the required product is purchased. This phenomenon is called as spring back, or elastic spring back. After the deforming force is removed from the work piece, the work piece springs back slightly. The amount a material springs back is equal to the yield strain (the strain at the yield point) for the material.

The required raw material is purchased in the form of coil. At the time of feeding the raw material into the machine, it has to be uncoiled first; following which the head of coil is inserted into the machine. For this purpose, wire de-coiler is used. The proposed

project will maintain raw material inventory of one month but production will start after receiving the order.

Coil Cutting

Once raw material (coil) is selected, uncoiled and straightened, the wire rods are fed into heading machine. Wire de-coiler is used to uncoil the wire and feed the wire into the heading machine. The specifications for the desired product are fed to the machine. The automated cutter cuts the wire rod into required lengths as per the required product specifications.

Head Forming of Bolts, Screws and Rivets

After cutting, the specific length wire rod is moved to the next stage for further processing. The wire is then cold forged into the predefined shape through series of dies. This is basically where the material is molded, while at room temperature, by forcing it through a series of dies at high pressure. Head forming process is also performed by heading machine.

Head Trimming of Bolts, Screws and Rivets

In this process, the fasteners heads are customized into specific shapes through head trimming machine. Different dies are used to shape the heads. In terms of shape, bolt and nuts are classified into hexagonal head, square head, round head, pan head, truss head, etc.

The manufacturing process of rivets is complete at this stage and produced rivets will be directly move to packaging and dispatch stage.

Thread Rolling of Bolts and Screws

Once cold headed, the bolt/screw/blanks (blanks are headed bolts/screws that have not been threaded yet) are automatically fed to the thread rolling machine through a hopper. The hopper of this machine directs the bolt/screw blanks down a chute to the dies, while making sure they are in the correct position.

The shank of bolt/screw blanks are then cut using threading dies. In this process, two threading dies are used to cut the screw thread. In thread rolling process, the flat length surface is cut to make the thread with the help of die; whereas in head trimming process, only the head is cut to make the required head shape. One die is stationary, while the other moves in a reciprocating manner and the bolt/screw blanks are rolled between the two dies. After thread rolling, the production process of bolts and screws is completed.

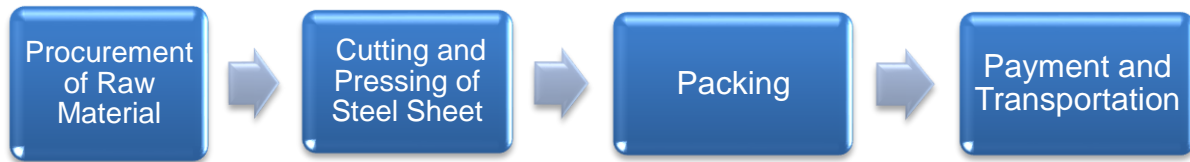
Packing of Bolts, Screws and Rivets

After checking uniformity, quality and consistency of bolts, screws and rivets, these fasteners are packed in sacks/bags (normally sacks of 50 kg) and are ready to be delivered to customers.

5.3 Process Flow for Production of Washers

The process flow for production of washers is shown in Figure 16.

Figure 16: Process Flow for Production of Washers



Raw Material for Production of Washers

Mild steel sheet is used for production of washers. The quality of the product depends upon the thickness of the sheet which is measured in millimeter (mm). Usually, a steel sheet between 0.03 inches to 0.14 inches of thickness is used for making washers. Steel sheet is purchased on weight basis. The specification of the final product depends upon the customer's demand. This raw material is easily available in the major cities of Pakistan.

Cutting and Pressing of Steel Sheet

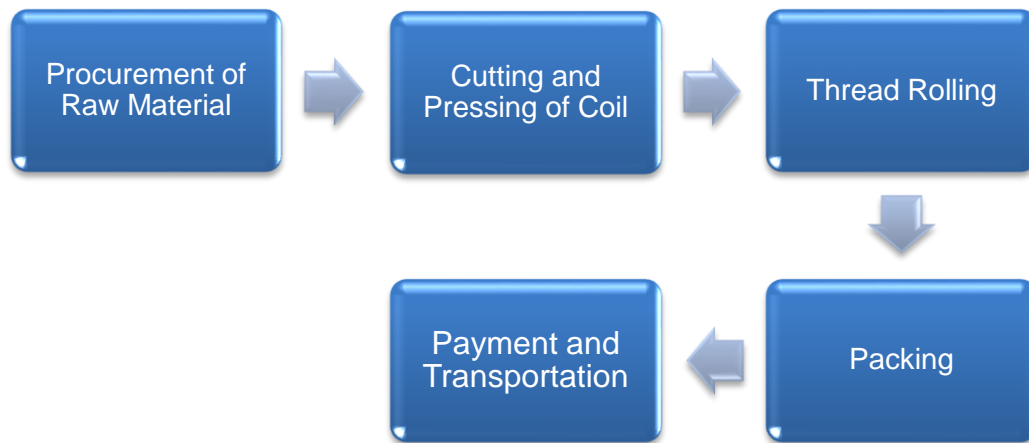
In this process, the sheet is cut into predefined shapes using different dies. For manufacturing of washers, the sheet is placed on the Mechanical Press Machine. The machine applies first stroke from the upper side, which makes inner hole. After the upper stroke, the machine applies stroke from the bottom and detaches the washer from the sheet. 30%-40% material is received as the wastage in this process.

Packing

After checking uniformity and consistency of washers, the washers are packed in sacks (normally sacks of 50 kg) and are ready to be delivered to customers.

5.4 Process Flow for Production of Nuts

The process flow for production of nuts is shown in Figure 17.

Figure 17: Process Flow for Production of Nuts**Raw Material for Production of Nuts**

For manufacturing nuts, carbon steel is used as the basic raw material. Diameter of the coil is measured in millimeter (mm). For producing nuts, a coil, with of diameter in the range from 4 mm to 12 mm, is required. These raw materials are purchased on weight basis and are easily available from all the major cities of Pakistan.

Cutting and Pressing of Coil

For manufacturing nuts, carbon steel coil is inserted into the Nut Forming Machine, which cuts the rod according to the specifications fed into the machine. Skilled workers are hired to feed the required specifications and operate these machines. Wire de-coiler is used for placing the coil and feeding the coil to the machine. A changeable die is already installed into the nut forming machine. Stroke from top and bottom is applied onto the piece by the machine to create a mark for whole. After the second stroke from both sides, hole is created in the rod piece.

Thread Rolling

The next step is to create internal thread in the nut. Different kind of threads are used by the fastener industry. Some of the types of treads rolled on the nuts are shown in Figure 18.

Figure 18: Types of threads

Different type of thread rolling dies are used to create the required thread. 15%-25% of material is received as the wastage in this process.

Packing

After thread rolling, the nuts are ready for packing and dispatch. Nuts are packed in sacks (normally sacks of 50 kg) and delivered to customers.

Payment and Transportation of Bolts, Nuts, Screws, Rivets and Washers

After packing, the products are dispatched to the customers and the payment begins. Usually, payment is made in cash but for reliable customers, credit facility is also provided. Normal credit period in fastener industry in Pakistan is 30 days. The manufacturing unit will only provide delivery service for large orders and long-standing customers. Loader rickshaw will be used to deliver the products. Byproduct/waste is sold on cash and unit does not provide delivery service for byproduct.

5.5 Installed and Operational Capacities

The proposed project will manufacture bolts, screws, rivets, nuts and washers in the following three size ranges:

1. 4-6 millimeters
2. 7-9 millimeters
3. 10-12 millimeters

The installed and operational capacities for the above-mentioned different-sized products will be different since these will be made on different machines. The manufacturing capacity of bolts, screws and rivets will be determined by the capacity of the Heading Machines. The manufacturing capacity of nuts will be determined by the capacity of the Nut Forming Machines; whereas the manufacturing capacity of washers will be determined by the capacity of the Mechanical Presses.

Installed and Operational Capacities of Products of 4-6 mm size

Based on 280 working days in a year in a single shift of 8 hours per day, the total installed capacity of the proposed manufacturing unit for 4-6 mm diameter products is 28,000 kg of screws, 14,000 kg of rivets, 28,000 kg of bolts, 70,000 kg of washers and 70,000 kg of nuts. However, during the 1st year of operations, the unit is expected to achieve 50% of its total installed capacity. The unit shall manufacture 14,000 kg of screws, 7,000 kg of rivets, 14,000 kg of bolts, 35,000 kg of washers and 35,000 kg of nuts. Table 2 shows the installed and operational capacities of screws, rivets and bolts of 4-6 mm size. Table 3 shows the installed and operational capacities of nuts of 4-6 mm size and Table 4 shows the installed and operational capacities of washers of 4-6 mm size.

Table 2: Installed and Operational Capacity of Screws, Rivets & Bolts (4-6 mm)

Product	Ratios	Header Capacity Per Day (kg)	Annual Working Days	Annual Production (kg) @ 100%	Initial Year Production (kg) @ 50%
Screws (4-6 mm diameter)	40%	250	280	28,000	14,000
Rivets (4-6 mm diameter)	20%			14,000	7,000
Bolts (4-6 mm diameter)	40%			28,000	14,000
Total	100%			70,000	35,000

Table 3: Installed and Operational Capacity of Nuts (4-6 mm)

Product	Nut Former Machine Capacity (Kg) / Day	Annual Working Days	Annual Production (Kg) @ 100%	Initial Year Production (Kg) @ 50%
Nuts (4-6 mm diameter)	250	280	70,000	35,000

Table 4: Installed and Operational Capacity of Washers (4-6 mm)

Product	Semi Auto Mechanical Press Machine Capacity (Kg)/Day	Annual Working Days	Annual Production (kg) @ 100%	Initial Year Production (kg) @ 50%
Washers (4-6 mm diameter)	250	280	70,000	35,000

Installed and Operational Capacities of Products of 7-9 mm Size

Installed capacity for 7-9 mm diameter products is 33,600 kg of screws. 16,800 kg of rivets, 33,600 kg of bolts, 84,000 kg of washers and 84,000 kg of nuts. However, during the 1st year of operations, the unit is expected to achieve 50% of its total installed capacity. The unit shall manufacture 16,800 kg of screws. 8,400 kg of rivets, 16,800 kg of bolts, 42,000 kg of washers and 42,000 kg of nuts. Table 5 shows the installed and operational capacities of screws, rivets and bolts of 7-9 mm size. Table 6 shows the installed and operational capacities of nuts of 7-9 mm size and Table 7 shows the installed and operational capacities of washers of 7-9 mm size.

Table 5: Installed and Operational Capacity of Screws, Rivets & Bolts (7-9 mm)

Product	Ratios	Header Capacity Per Day (kg)	Annual Working Days	Annual Production (kg) @ 100%	Initial Year Production (kg) @ 50%
Screw (7-9mm diameter)	40%	300	280	33,600	16,800
Rivet (7-9mm diameter)	20%			16,800	8,400
Bolts (7-9 mm diameter)	40%			33,600	16,800
Total	100%			84,000	42,000

Table 6: Installed and Operational Capacity of Nuts (7-9 mm)

Product	Nut Former Machine Capacity (Kg) / Day	Annual Working Days	Annual Production (Kg) @ 100%	Initial Year Production (Kg) @ 50%
Nuts (7-9 mm diameter)	300	280	84,000	42,000
Total			84,000	42,000

Table 7: Installed and Operational Capacity of Washers (7-9 mm)

Product	Semi Auto Mechanical Press Machine Capacity (Kg)/Day)	Annual Working Days	Annual Production (kg) @ 100%	Initial Year Production (kg) @ 50%
Washer (7-9 mm diameter)	300	280	84,000	42,000
Total			70,000	42,000

Installed and Operational Capacities of Products of 10-12 mm Size

Installed capacity for 10-12 mm diameter products is 39,200 kg of screws, 19,600 kg of rivets, 39,200 kg of bolts, 98,000 kg of washers and 98,000 kg of nuts. However, during the 1st year of operations, the unit is expected to achieve 50% of its total installed capacity. The unit shall manufacture 19,600 kg of screws, 9,800 kg of rivets, 19,600 kg of bolts, 49,000 kg of washers and 49,000 kg of nuts. Table 8 shows the installed and operational capacities of screws, rivets and bolts of 10-12 mm size. Table 9 shows the installed and operational capacities of nuts of 10-12 mm size and Table 10 shows the installed and operational capacities of washers of 10-12 mm size.

Table 8: Installed & Operational Capacity of Screws, Rivets & Bolts (10-12 mm)

Product	Ratios	Header Capacity Per Day (kg)	Annual Working Days	Annual Production (kg) @ 100%	Initial Year Production (kg) @ 50%
Screw (10-12 mm diameter)	40%	350	280	39,200	19,600
Rivet (10-12 mm diameter)	20%			19,600	9,800
Bolts (10-12 mm diameter)	40%			39,200	19,600
Total	100%			98,000	49,000

Table 9: Installed and Operational Capacity of Nuts (10-12 mm)

Product	Nut Former Machine Capacity (Kg) / Day	Annual Working Days	Annual Production (Kg) @ 100%	Initial Year Production (Kg) @ 50%
Nuts (10-12 mm diameter)	350	280	98,000	49,000
Total			98,000	49,600

Table 10: Installed and Operational Capacity of Washers (10-12 mm)

Product	Semi Auto Mechanical Press Machine Capacity (Kg)/Day)	Annual Working Days	Annual Production (kg) @ 100%	Initial Year Production (kg) @ 50%
Washer (10-12 mm diameter)	350	280	98,000	49,000
Total			98,000	49,000

Scrap production

Table 11 shows the share of scrap material from different products manufactured by the proposed business.

Table 11: By-product Ratio per kg Production

Product	Raw Material Consumption (Kg)	Scrap/ Loss (%)	Finished Product (Kg)
Screw (4-6 mm)	1	10%	0.90
Rivet (4-6 mm)	1	5%	0.95
Bolts (4-6 mm)	1	10%	0.90
Washer (4-6 mm)	1	30%	0.70

Nut (4-6 mm)	1	15%	0.85
Screw (7-9 mm)	1	15%	0.85
Rivet (7-9 mm)	1	10%	0.90
Bolts (7-9 mm)	1	15%	0.85
Washer (7-9 mm)	1	35%	0.65
Nut (7-9 mm)	1	20%	0.80
Screw (10-12 mm)	1	20%	0.80
Rivet (10-12 mm)	1	15%	0.85
Bolts (10-12 mm)	1	20%	0.80
Washer (10-12 mm)	1	40%	0.60
Nut (10-12 mm)	1	25%	0.75

6. CRITICAL FACTORS

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

- Technical knowhow and basic knowledge of the entrepreneur
- Availability of high-quality raw material at economical cost
- Availability of skilled workforce
- Rigorous supervision of the process at every level

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The demand for setting up the manufacturing unit for bolts, nuts, screws, rivets, and washers will be higher in large cities. Majority of manufacturing units of vehicles, machinery and equipment, electrical equipment and the businesses involved in construction sector 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, Mardan, Sukkur or any other major city.

Currently, there are many industrial units producing these nuts and bolts of various sizes; however, the demand is also increasing, considering the use of these fasteners in multiples industries. In the year 2020, Pakistan imported fasteners of USD 27.15 million under the HS code 7318. The export of Pakistan for these products in 2020 was USD 2.43 million⁵. Currently, there is a demand-supply gap of fasteners in the Pakistani market which is filled by imports. This data provides evidence about the need and requirement of this business in Pakistan.

⁵ <https://trendeconomy.com/data/h2/Pakistan/7318>

The demand and existence of market for the fasteners produced by the proposed manufacturing unit is clearly evident from high growth rates of construction, large scale manufacturing and automobile sectors. The construction industry in Pakistan is expected to expand by 3% in real terms in 2021, following a decline of 6.2% in 2019,⁶ Manufacturing sector grew by 12.73% in August of 2021 over the same month during the previous year,⁷ and automobile sector recorded a growth of 23.4%.⁸ The growth in aforementioned industries is expected to directly generate demand for the fastener products manufactured by the proposed manufacturing unit.

8. POTENTIAL TARGET CUSTOMERS / MARKETS

Following are the potential target customers of the proposed business:

- Assembling/manufacturing units of automobiles and transportation vehicles will be major customers of the products of the proposed manufacturing business.
- Industries involved in the manufacturing of electronic equipment which includes electric motors, electric fans, air conditioners and refrigerators, home appliances and other electronic goods are important customers of fastener products.
- Construction businesses involved in construction and fabrication of various steel structures need these products.
- Other heavy and light manufacturing industries, which are involved in manufacturing of steel and wooden furniture, machine tools, agricultural machines and agricultural implements are also key customers.

As various type of fasteners are used in above-mentioned sectors, the market demand is directly proportional to the growth of these industries.

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

9. PROJECT COST SUMMARY

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

⁶<https://finance.yahoo.com/news/pakistan-construction-market-trends-opportunities->

⁷<https://tradingeconomics.com/pakistan/manufacturing-production>.

⁸<https://propakistani.pk/2021/07/23/pakistans-automobile-sector>.

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 32,666,441 which comprises of capital investment of PKR 20,681,600 and working capital of PKR 11,984,840.

9.1 Initial Project Cost

The details of initial project cost calculated for the Manufacturing Unit for Bolts, Nuts, Screws, Rivets and Washers are shown in Table 12.

Table 12: Initial Project Cost Estimates

Particulars	Cost (PKR)	Reference
Land	-	9.1.1
Building Renovation Cost	210,200	9.1.2
Machinery & equipment	17,049,000	9.1.3
Furniture & fixtures	870,000	9.1.4
Office vehicles	333,300	9.1.5
Office equipment	1,308,000	9.1.6
Security against building	600,000	9.1.7
Pre-operating costs	311,100	9.1.8
Total Capital Cost – (A)	20,681,600	
Working Capital		
Equipment spare part inventory	284,150	
Raw Material Inventory	10,247,140	
Consumable inventory	253,550	
Upfront building rent	200,000	
Cash	1,000,000	
Working Capital Requirement - (B)	11,984,840	
Total Project Cost - (A+B)	32,666,441	

9.1.1 Land

The proposed Manufacturing Unit for Bolts, Nuts, Screws, Rivets and Washers 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 earlier in this report. Therefore, no land cost has been added to the project cost. Total space

requirement for the proposed project has been estimated as 3,600 sq. feet (16 marla). The breakup of the space requirement is provided in Table 13.

Table 13: Breakup of Space Requirement

Break-up of Area	% Break-up	Area (Sq. ft.)
Office Area	5%	180
Machine Area	69%	2,500
Store	11%	400
Staff Office Area	11%	400
Washrooms	3%	120
Total Area	100%	3,600

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 8 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 14 provides details of building renovation cost.

Table 14: Renovation Cost Details

Cost Item	Unit of Measurement	Total Units	Cost per Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	76	500	37,800
Tile Floor	Sq. Feet	580	120	69,600
Labour Cost- Tile Floor	Sq. Feet	580	40	23,200
Labour Cost	Sq. Feet	7,560	10	75,600
Blinds	No.	2	2000	4,000
Total			210,200	

9.1.3 Machinery and Equipment Requirement

Table 15 provides details of office equipment required for the proposed project.

Table 15: Machinery and Equipment Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Heading Machine (4-6 mm) (250 kg/day) (1 HP Motor)	1	500,000	500,000
Heading Machine (7-9 mm) (300 kg/day) (1.5 HP Motor)	1	1,200,000	1,200,000
Heading Machine (10-12 mm) (350 kg/day) (1.5 HP Motor)	1	1,800,000	1,800,000
Thread Roll Machine (4-6 mm) (280 kg/day) (1 HP Motor)	1	200,000	200,000
Thread Roll Machine (7-9 mm) (320 kg/day) (1 HP Motor)	1	350,000	350,000
Thread Roll Machine (10-12 mm) (350 kg/day) (1 HP Motor)	1	500,000	500,000
Metal Trimming Machine (4-6 mm) (280 kg/day) (1 HP Motor)	1	200,000	200,000
Metal Trimming Machine (7-9 mm) (320 kg/day) (1 HP Motor)	1	350,000	350,000
Metal Trimming Machine (10-12 mm) (350 kg/day) (1 HP Motor)	1	500,000	500,000
Mechanical Press (2 Stroke) (Washer) (4-6 mm) (250 kg/day) (1 HP Motor)	1	350,000	350,000
Mechanical Press (2 Stroke) (Washer) (7-9 mm) (300 kg/day) (1.5 HP Motor)	1	600,000	600,000
Mechanical Press (2 Stroke) (Washer) (10-12 mm) (350 kg/day) (1.5 HP Motor)	1	900,000	900,000
Nut Former (4 Stroke) (4-6 mm) (250 kg/day) (1.5 HP Motor)	1	2,000,000	2,000,000
Nut Former (4 Stroke) (7-9 mm) (300 kg/day) (1.5 HP Motor)	1	3,000,000	3,000,000
Nut Former (4 Stroke) (10-12 mm) (350 kg/day) (2 HP Motor)	1	4,000,000	4,000,000
Weigh Scale (500 kg)	2	25,000	50,000
Wire Decoiler (For Wire Handling)	6	50,000	300,000
Hand Tools & Material Handling Equipment			249,000
Total			17,049,000

9.1.4 Furniture and Fixture Requirements

Table 16 provides details of furniture and fixtures.

Table 16: Furniture & Fixtures Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Owner Table	1	40,000	40,000
Owner Chair	1	20,000	20,000
Staff Chairs	40	10,000	400,000
Staff Work Table	12	25,000	225,000
Sofa Sets	1	35,000	35,000
Wall Racks for Equipment	6	25,000	150,000
Total			870,000

9.1.5 Vehicle Requirement

Table 17 provides details of the vehicles required along with their cost for the proposed project.

Table 17: Office Vehicle Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Motorcycle	1	80,000	80,000
Loader Rickshaw	1	250,000	250,000
Registration Fee @ 1%			3,300
Total			333,300

9.1.6 Office Equipment

Table 18 provides details of the furniture and fixture requirement of the project.

Table 18: Office Equipment Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Laptop Computer	10	80,000	800,000
Printer	1	40,000	40,000
Air Conditioners (1.5 Ton Inverter)	2	90,000	180,000
LED TV 32"	2	40,000	80,000
Water Dispenser	4	20,000	80,000
Ceiling Fan	16	5,000	80,000

Wi-Fi	2	5,000	10,000
Security Cameras - 2MP	8	2,000	16,000
Digital Video Recorder (DVR)	1	12,000	12,000
Exhaust Fans	4	2,500	10,000
Total			1,308,000

9.1.7 Security against Building Rent

Details of security against building rent for the project are provided in Table 19.

Table 19: Security against Building Rent

Cost Item	Months	Unit Cos/Month (PKR)	Total Cost (PKR)
Security against Building Rent	3	200,000	600,000
Total			600,000

9.1.8 Pre-Operating Costs

Table 20 provides details of estimated pre-operating costs.

Table 20: Pre-Operating Cost Details

Costs Item	No.	Hiring Months Before in Year 0	Unit Cost (PKR)	Cost (PKR)
Production Supervisor	1	1	60,000	60,000
Labour Skilled	3	1	35,000	105,000
Procurement Officer	1	1	40,000	40,000
Security Guard	2	1	20,000	40,000
Office Boy	1	1	20,000	20,000
Utilities				46,100
Total Cost (PKR)				311,100

9.2 Breakeven Analysis

Table 21 shows calculation of break-even analysis.

Table 21: Breakeven Analysis

Description	First Year Values (PKR)	Ratios
Sales (PKR)	159,677,900	100%
Variable Cost (PKR)	141,406,888	89%

Contribution (PKR)	18,271,012	11%
Fixed Cost (PKR)	10,384,335	7%
Contribution Margin	11%	
Production in kg for the year	756,000	
Contribution Margin Per kg	48	
Breakeven		
Breakeven Revenue (PKR)		90,752,985
Breakeven Units (kg)		214,836
Breakeven Capacity		28%

9.3 Revenue Generation

Table 22 provides details for revenue generation of the Manufacturing Unit for Bolts, Nuts, Screws, Rivets and Washers during the first year of operations.

Table 22: Revenue Details – Main Products

Particular	Annual Production Capacity (kg)	Initial Year Production @ 50% per Year (A)	Price Per kg (PKR) (B)	Total Revenue Annual (PKR) (A*B) = C
Screws (4-6 mm diameter)	28,000	14,000	400	5,600,000
Screws (7-9 mm diameter)	33,600	16,800	380	7,056,000
Screws (10-12 mm diameter)	39,200	19,600	400	8,624,000
Rivets (4-6 mm diameter)	14,000	7,000	285	2,660,000
Rivets (7-9 mm diameter)	16,800	8,400	420	3,360,000
Rivets (10-12 mm diameter)	19,600	9,800	420	4,116,000
Bolts(4-6 mm diameter)	28,000	14,000	400	5,600,000
Bolts(7-9 mm diameter)	33,600	16,800	420	7,056,000
Bolts(10-12 mm diameter)	39,200	19,600	300	8,624,000
Washers (4-6 mm diameter)	70,000	35,000	440	9,975,000

Washers (7-9 mm diameter)	84,000	42,000	440	12,600,000
Washers (10-12 mm diameter)	98,000	49,000	420	15,680,000
Nuts(4-6 mm diameter)	70,000	35,000	440	14,700,000
Nuts(7-9 mm diameter)	84,000	42,000	320	18,480,000
Nuts(10-12 mm diameter)	98,000	49,000	470	23,030,000
Total	756,000	378,000		147,161,000

Table 23: Revenue Details – By-product Weight

Particular	Production (kg) (A)	Scrap % (B)	Scrap weight (kg) (A/(100%-10%))*B
Screw (4-6 mm)	14,000	10%	1,556
Rivet (4-6 mm)	7,000	5%	369
Bolts (4-6 mm)	14,000	10%	1,556
Washer (4-6 mm)	35,000	30%	15,000
Nut (4-6 mm)	35,000	15%	6,177
Screw (7-9 mm)	16,800	15%	2,965
Rivet (7-9 mm)	8,400	10%	934
Bolts (7-9 mm)	16,800	15%	2,965
Washer (7-9 mm)	42,000	35%	22,616
Nut (7-9 mm)	42,000	20%	10,500
Screw (10-12 mm)	19,600	20%	4,900
Rivet (10-12 mm)	9,800	15%	1,730
Bolts (10-12 mm)	19,600	20%	4,900
Washer (10-12 mm)	49,000	40%	32,667
Nut (10-12 mm)	49,000	25%	16,334
Total	378,000		125,169

Table 24: Total Revenue Detail-By Product

Particular	Byproduct weight (kg)	Sale Price (PKR)	Total Revenue Annual (PKR) (A*B) = C
Revenue-By product	125,169	100	12,516,900
Total Revenue			12,516,900

Table 25: Total Revenue Detail-Main Product

Particular	Total Revenue Annual (PKR)
Total Revenue from Main Products	147,161,000
Total Revenue By-product	12,516,900
Total Revenue	159,677,900

9.4 Variable Cost Estimate

Variable costs of the project have been provided in Table 26.

Table 26: Variable Cost Estimate

Description of Costs	Amount (PKR)
Raw Material Cost-Screws (4-6 mm)	4,822,360
Raw Material Cost-Rivets (4-6 mm)	2,284,390
Raw Material Cost-Bolts(4-6 mm)	4,822,360
Raw Material Cost-Washers (4-6 mm)	8,250,000
Raw Material Cost-Nuts(4-6 mm)	12,764,870
Raw Material Cost-Screws (7-9 mm)	6,324,800
Raw Material Cost-Rivets (7-9 mm)	2,986,880
Raw Material Cost-Bolts(7-9 mm)	6,324,800
Raw Material Cost-Washers (7-9 mm)	10,661,640
Raw Material Cost-Nuts(7-9 mm)	16,800,000
Raw Material Cost-Screws (10-12 mm)	8,085,000
Raw Material Cost-Rivets (10-12 mm)	3,804,900
Raw Material Cost-Bolts(10-12 mm)	8,085,000
Raw Material Cost-Washers (10-12 mm)	13,475,055
Raw Material Cost-Nuts(10-12 mm)	21,560,220
Consumables Cost	3,042,600

Utilities Cost	433,705
Direct Labor	9,840,000
Machinery Maintenance Cost	1,704,900
Communications expense (phone, mail, internet, etc.)	570,000
Office vehicles running expense	1,425,000
Office expenses (stationery, entertainment, janitorial services, etc.)	1,425,000
Total	141,406,888

Table 27: Raw Material Cost -Screws, Rivets, Bolts, Washers, Nuts

Cost Item	Production (kg)	Finished Product from 1 KG Raw material (kg)	Total Raw Material Consumption (kg)	Cost per kg (PKR)	Total Cost (PKR)
Screws (4-6 mm)	14,000	0.90	15,556	310	4,822,360
Rivets (4-6 mm)	7,000	0.95	7,369	310	2,284,390
Bolts(4-6 mm)	14,000	0.90	15,556	310	4,822,360
Washers (4-6 mm)	35,000	0.70	50,000	165	8,250,000
Nuts (4-6 mm)	35,000	0.85	41,177	310	12,764,870
Screws (7-9 mm)	16,800	0.85	19,765	320	6,324,800
Rivets (7-9 mm)	8,400	0.90	9,334	320	2,986,880
Bolts(7-9 mm)	16,800	0.85	19,765	320	6,324,800
Washers (7-9 mm)	42,000	0.65	64,616	165	10,661,640
Nuts (7-9 mm)	42,000	0.80	52,500	320	16,800,000
Screws (10-12 mm)	19,600	0.80	24,500	330	8,085,000
Rivets (10-12 mm)	9,800	0.85	11,530	330	3,804,900

Bolts(10-12 mm)	19,600	0.80	24,500	330	8,085,000
Washers (10-12 mm)	49,000	0.60	81,667	165	13,475,055
Nuts (10-12 mm)	49,000	0.75	65,334	330	21,560,220
Total	378,000		503,169		131,052,275

Table 28: Consumables Cost

Cost Item	Unit of Measurement (UOM)	Consumption per year	Unit Cost (PKR)	Total Cost (PKR)
Lubrication Oil ⁹	Liter	552	250	1,269,600
Machine Dies ¹⁰	No.	198	8,000	1,584,000
Sack (Bori) (50 kg)	No.	7,560	25	189,000
Total Consumables Cost				3,042,600

Table 29: Machine Dies Consumption

Product	Useful Life (Months)	Consumption per Year	Required per Machine	Required Quantity
Screw (4-6 mm)	3	4	3	12
Rivet (4-6 mm)	6	2	3	6
Bolts (4-6 mm)	3	4	3	12
Washer (4-6 mm)	3	4	3	12
Nut (4-6 mm)	3	4	3	12
Screw (7-9 mm)	4	3	3	9
Rivet (7-9 mm)	6	2	3	6
Bolts (7-9 mm)	4	3	3	9
Washer (7-9 mm)	4	3	3	9
Nut (7-9 mm)	6	2	3	6

⁹Constant Oiling of machine is necessary for smooth and proper working of machine¹⁰ These machine dies need to be changed after every two months depending upon the use of the die.

Screw (10-12 mm)	4	3	3	9
Rivet (10-12 mm)	6	2	3	6
Bolts (10-12 mm)	4	3	3	9
Washer (10-12 mm)	4	3	3	9
Nut (10-12 mm)	4	3	3	9
V Roll Thread die	4	3	3	9
Square Thread die	4	3	3	9
Buttress Thread die	4	3	3	9
Reverse buttress Thread die	4	3	3	9
Metal Trimming die Hexagonal	4	3	3	9
Metal Trimming die Square	4	3	3	9
Metal Trimming die Round	4	3	3	9
Total				198

Table 30: Machine Dies

Machine	No.of Dies	Cost Per Die (PKR)	Total Cost (PKR)
Heading Machine	78	8,000	624,000
Thread Roll Machine	36		288,000
Metal Trimming Machine	27		216,000
Mechanical Press (2 Stroke) (Washer)	30		240,000
Nut Former Machine (4 Stroke) (Nut)	27		216,000
Total	198		1,584,000

Table 31: Mobil Oil

Consumption per day (Liter)	Working days per month	Working Months	Total Consumption (Liter)
2	23	12	552

Table 32: Direct Labor

Personnel	Number of Personnel	Salary Per Month Per-Person (PKR)	Annual Salaries (PKR)
Production Supervisor	1	60,000	720,000

Labor Skilled	11	35,000	4,620,000
Labor Unskilled	15	25,000	4,500,000
Total	27		9,840,000

Table 33: Machinery Maintenance Cost

Cost Item	Machinery Cost (PKR)	Rate	Total Cost (PKR)
Machinery Maintenance Cost	17,049,000	10%	1,704,900
Total			1,704,900

Table 34: Variable Cost Assumptions

Description of Costs	Details
Communication expense	10% of Management staff expense
Office vehicles running expense	25% of Management staff expense
Office expenses (stationery, entertainment, janitorial services, etc.)	25% of Management staff expense

9.5 Fixed Cost Estimate

Table 35 shows the estimated fixed cost of the project.

Table 35: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Staff Salaries	5,700,000
Building rental expense	2,400,000
Utilities	119,500
Depreciation expense	2,102,615
Amortization of pre-operating costs	62,220
Total	10,384,335

Table 36: Management Staff Cost

Personnel	Number of Personnel	Salary Per Month Per-Person (PKR)	Annual Salaries (PKR)
Store Keeper	1	35,000	420,000

Procurement Officer	1	40,000	480,000
Sales Incharge	2	50,000	1,200,000
Finance Officer	2	40,000	960,000
Quality Controler	1	50,000	600,000
Admin Incharge	2	35,000	840,000
Security Guard	2	20,000	480,000
Driver	1	20,000	240,000
Office Boy	2	20,000	480,000
Total	14		5,700,000

Table 37: 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 38.

Table 38: Financial Feasibility Analysis

Description	Project
IRR	49%
NPV (PKR)	89,778,638
Payback Period (years)	2.64
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 39.

Table 39: Financial Feasibility Analysis with 50% Debt

Description	Project
IRR	49%
NPV (PKR)	103,420,811
Payback Period (years)	2.65
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 40.

Table 40: Human Resource

Personnel	Number of Personnel	Salary Per Month Per-Resource (PKR)	Annual Salaries (PKR)
Production Supervisor	1	60,000	720,000
Labor Skilled	11	35,000	4,620,000
Labour UnSkilled	15	25,000	4,500,000
Procurement Officer	1	40,000	480,000
Store Keeper	1	35,000	420,000
Sales Incharge	2	50,000	1,200,000
Finance Officer	2	40,000	960,000
Security Guard	2	20,000	480,000
Admin Incharge	2	35,000	840,000
Office Boy	2	20,000	480,000
Quality Controller	1	50,000	600,000
Driver	1	20,000	240,000
Total	41		15,540,000

10. CONTACT DETAILS

The contact details of all the major suppliers of machinery and equipment used in the proposed project is given in Table 41.

Table 41: Contact Details

Name of Supplier	Supplies	City	Address	Contact
Ilyas Fastener Machinery	Machinery	Gujranwala	Pindi bypass (74.85 km) Gujranwala, Punjab, Pakistan	+92 321 6100559
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, Sheikhpura, 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
Lahore Steel Wire Rope	Raw Material	Lahore	SHOP # 46, ST.# 30 OPP.SUFAID MASJID, Katcha Rahim Rd, Misri Shah, Lahore, Punjab 54900	(042) 37601619
Pakistan Wire Industries	Raw Material	Karachi	Metroville E-51 Sindh Industrial Trading Estate, Karachi, Karachi City, Sindh 74400	(021) 32577406

Peshawar Steel Re Rolling Mills	Raw Material	Peshawar	Kohat Rd, Small Industries, City, Peshawar, Khyber Pakhtoonkhwa	
Abbas Khurshid Hardware	Machinery	Peshawar	Mufti Manzil, Bajori Rd, near Meezan Bank, Peshawar, 25000	0321 9009315

11. USEFUL LINKS

Table 42: Useful Links

Name of Organization	E-mail Address
Small and Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
National Business Development Program (NBDP)	www.nbdp.org.pk
Government of Pakistan	www.pakistan.gov.pk
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	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	www.industries.ajk.gov.pk
Pakistan Industrial Fasteners Manufacturers Association	https://pakistanindustrialfastenersmanufact.enic.pk
Pakistan Steel Melters Association (PSMA)	www.steelmenters.com
Pakistan Wire Industries	https://enggpst.com/pakistan-wire-industries

The Pakistan Steel Re-Rolling Mills Association

<https://psrma.com>

Pakistan Bureau of Statistics

<https://www.pbs.gov.pk>

12. ANNEXURES

12.1 Income Statement

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-Screw	21,280,000	25,764,405	30,936,024	36,887,771	43,724,305	51,563,448	60,537,780	70,796,411	82,506,971	90,812,672
Revenue-Rivet	10,136,000	12,271,993	14,735,317	17,570,228	20,826,577	24,560,485	28,835,101	33,721,449	39,299,373	43,255,510
Revenue-Bolt	21,280,000	25,764,405	30,936,024	36,887,771	43,724,305	51,563,448	60,537,780	70,796,411	82,506,971	90,812,672
Revenue-Washers	38,255,000	46,316,604	55,613,609	66,313,050	78,603,068	92,695,475	108,828,608	127,270,523	148,322,564	163,253,702
revenue-Nuts	56,210,000	68,055,321	81,715,880	97,437,107	115,495,451	136,202,135	159,907,360	187,004,995	217,937,821	239,876,895
Revenue- By Products	12,516,900	15,154,749	18,196,236	21,697,301	25,718,263	30,329,226	35,607,729	41,641,425	48,529,065	53,414,324
Total Revenue	159,677,900	193,327,477	232,133,090	276,793,228	328,091,969	386,914,218	454,254,358	531,231,214	619,102,764	681,425,776
Cost of sales										
Raw Material Cost-Screws	19,231,928	23,284,736	27,958,618	33,337,546	39,516,104	46,600,777	54,711,383	63,982,683	74,566,172	82,072,499
Raw Material Cost-Rivet	9,075,583	10,988,111	13,193,724	15,732,050	18,647,724	21,990,994	25,818,405	30,193,549	35,187,917	38,730,167
Raw Material Cost-Bolts	19,231,928	23,284,736	27,958,618	33,337,546	39,516,104	46,600,777	54,711,383	63,982,683	74,566,172	82,072,499
Raw Material Cost-Washer	32,386,538	39,211,462	47,082,271	56,140,377	66,545,061	78,475,639	92,133,888	107,746,743	125,569,322	138,209,968
Raw Material Cost-Nuts	43,039,706	52,109,607	62,569,426	74,607,088	88,434,268	104,289,269	122,440,237	143,188,756	166,873,861	183,672,496
Consumables Cost	3,042,600	3,348,888	3,686,010	4,057,068	4,465,480	4,915,005	5,409,782	5,954,366	6,553,773	7,213,519
Utilities Cost	433,705	503,386	582,119	670,971	771,127	883,907	1,010,772	1,153,347	1,313,437	1,432,128
Direct Labor	9,840,000	10,794,480	11,841,545	12,990,174	14,250,221	15,632,493	17,148,845	18,812,282	20,637,074	22,638,870
Machinery Maintenance Cost	1,704,900	1,876,527	2,065,430	2,273,350	2,502,201	2,754,089	3,031,334	3,336,488	3,672,361	4,042,046
Total cost of sales	137,986,888	165,401,933	196,937,761	233,146,170	274,648,290	322,142,950	376,416,029	438,350,899	508,940,088	560,084,193
Gross Profit	21,691,012	27,925,544	35,195,329	43,647,058	53,443,679	64,771,268	77,838,329	92,880,315	110,162,676	121,341,583
General administration & selling expenses										
Management Staff	5,700,000	6,252,900	6,859,431	7,524,796	8,254,701	9,055,407	9,933,782	10,897,359	11,954,403	13,113,980
Building rental expense	2,400,000	2,640,000	2,904,000	3,194,400	3,513,840	3,865,224	4,251,746	4,676,921	5,144,613	5,659,074
Utilities	119,500	138,700	160,393	184,875	212,471	243,546	278,501	317,786	361,896	394,599
Communications expense (phone, mail, internet, etc.)	570,000	625,290	685,943	752,480	825,470	905,541	993,378	1,089,736	1,195,440	1,311,398
Office vehicles running expense	1,425,000	1,568,450	1,726,341	1,900,126	2,091,405	2,301,940	2,533,668	2,788,724	3,069,456	3,378,448
Office expenses (stationery, entertainment, janitorial services, etc)	1,425,000	1,563,225	1,714,858	1,881,199	2,063,675	2,263,852	2,483,445	2,724,340	2,988,601	3,278,495
Depreciation expense	2,102,615	2,102,615	2,102,615	2,102,615	2,102,615	2,102,615	1,977,050	2,421,389	2,421,389	2,421,389
Amortization of pre-operating costs	62,220	62,220	62,220	62,220	62,220	-	-	-	-	-
Subtotal	13,804,335	14,953,400	16,215,801	17,602,710	19,126,398	20,738,124	22,451,572	24,916,254	27,135,797	29,557,382
Operating Income	7,886,676	12,972,145	18,979,527	26,044,348	34,317,281	44,033,144	55,386,757	67,964,062	83,026,880	91,784,201
Earnings Before Interest & Taxes	7,886,676	12,972,145	18,979,527	26,044,348	34,317,281	44,033,144	55,797,082	67,964,062	83,026,880	91,784,201
Earnings Before Tax	7,886,676	12,972,145	18,979,527	26,044,348	34,317,281	44,033,144	55,797,082	67,964,062	83,026,880	91,784,201
Tax	1,880,336	3,660,250	5,762,834	8,235,521	11,131,048	14,531,600	18,648,978	22,907,421	28,179,407	31,244,470
NET PROFIT/(LOSS) AFTER TAX	6,006,340	9,311,895	13,216,694	17,808,827	23,186,233	29,501,544	37,148,104	45,056,641	54,847,473	60,539,732

12.2 Balance Sheet

Balance Sheet											Rs. in actuals
	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	13,470,317	16,631,355	19,316,011	21,418,197	22,731,336	22,909,778	47,550,899	82,098,915	127,645,972	181,818,303
Accounts receivable	-	2,280,000	2,760,472	3,314,574	3,952,261	4,684,747	5,524,655	6,486,191	7,585,330	8,840,033	7,122,725
Equipment spare part inventory	284,150	342,675	413,253	498,368	601,014	724,801	874,084	1,054,114	1,271,223	1,533,049	-
Raw Material Inventory	10,247,140	13,655,481	18,047,090	23,685,411	30,901,334	40,109,947	51,831,340	66,716,461	85,579,199	103,676,384	-
Consumable inventory	253,550	307,167	372,123	450,815	546,148	661,640	801,555	971,058	1,176,404	1,425,175	-
Pre-paid building rent	200,000	220,000	242,000	266,200	292,820	322,102	354,312	389,743	428,718	471,590	-
Total Current Assets	11,984,840	30,275,640	38,466,294	47,531,379	57,711,775	69,234,573	82,295,725	123,168,466	178,139,788	243,592,203	188,941,028
Fixed assets											
Building/Infrastructure	210,200	189,180	168,160	147,140	126,120	105,100	84,080	63,060	42,040	21,020	-
Machinery & equipment	17,049,000	15,344,100	13,639,200	11,934,300	10,229,400	8,524,500	6,819,600	5,114,700	3,409,800	1,704,900	-
Furniture & fixtures	870,000	739,500	609,000	478,500	348,000	217,500	87,000	1,649,181	1,401,804	1,154,427	907,050
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	1,308,000	1,111,800	915,600	719,400	523,200	327,000	130,800	2,479,459	2,107,540	1,735,621	1,363,702
Security against building	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000
Total Fixed Assets	20,370,500	18,267,885	16,165,270	14,062,655	11,960,040	9,857,425	7,754,810	10,414,217	7,992,828	5,571,440	3,150,051
Intangible assets											
Pre-operation costs	311,100	248,880	186,660	124,440	62,220	-	-	-	-	-	-
Total Intangible Assets	311,100	248,880	186,660	124,440	62,220	-	-	-	-	-	-
TOTAL ASSETS	32,666,441	48,792,405	54,818,224	61,718,474	69,734,035	79,091,998	90,050,535	133,582,683	186,132,616	249,163,642	192,091,080
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable	-	13,122,794	15,994,251	19,364,921	23,319,624	27,958,456	33,399,771	39,783,815	47,277,108	55,460,661	48,636,503
Total Current Liabilities	-	13,122,794	15,994,251	19,364,921	23,319,624	27,958,456	33,399,771	39,783,815	47,277,108	55,460,661	48,636,503
Shareholders' equity											
Paid-up capital	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441	32,666,441
Retained earnings	-	3,003,170	6,157,532	9,687,113	13,747,970	18,467,101	23,984,323	61,132,427	106,189,068	161,036,540	110,788,136
Total Equity	32,666,441	35,669,611	38,823,973	42,353,554	46,414,411	51,133,542	56,650,764	93,798,868	138,855,508	193,702,981	143,454,577
TOTAL CAPITAL AND LIABILITIES	32,666,441	48,792,405	54,818,224	61,718,474	69,734,035	79,091,998	90,050,535	133,582,683	186,132,616	249,163,642	192,091,080

12.3 Cash Flow Statement

Cash Flow Statement											Rs. in actuals
	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	-	6,006,340	9,311,895	13,216,694	17,808,827	23,186,233	29,501,544	37,148,104	45,056,641	54,847,473	60,539,732
Add: depreciation expense	-	2,102,615	2,102,615	2,102,615	2,102,615	2,102,615	2,102,615	1,977,050	2,421,389	2,421,389	2,421,389
amortization expense	-	62,220	62,220	62,220	62,220	62,220	-	-	-	-	-
Equipment inventory	(284,150)	(58,525)	(70,579)	(85,115)	(102,646)	(123,787)	(149,283)	(180,030)	(217,109)	(261,826)	1,533,049
Raw material inventory	(10,247,140)	(3,408,341)	(4,391,609)	(5,638,321)	(7,215,924)	(9,208,612)	(11,721,393)	(14,885,121)	(18,862,737)	(18,097,186)	103,676,384
Pre-paid building rent	(200,000)	(20,000)	(22,000)	(24,200)	(26,620)	(29,282)	(32,210)	(35,431)	(38,974)	(42,872)	471,590
Consumable inventory	(253,550)	(53,617)	(64,956)	(78,692)	(95,333)	(115,492)	(139,915)	(169,503)	(205,347)	(248,771)	1,425,175
Accounts payable	-	13,122,794	2,871,457	3,370,670	3,954,704	4,638,831	5,441,316	6,384,044	7,493,293	8,183,553	(6,824,158)
Cash provided by operations	(10,984,840)	15,473,487	9,318,571	12,371,769	15,850,156	19,780,240	24,162,765	29,277,577	34,548,016	45,547,057	164,960,467
Financing activities											
Issuance of shares	32,666,441	-	-	-	-	-	-	-	-	-	-
Cash provided by / (used for) financing	32,666,441	-	-	-	-	-	-	-	-	-	-
Investing activities											
Capital expenditure	(20,681,600)	-	-	-	-	-	-	(4,636,457)	-	-	-
Cash (used for) / provided by investing	(20,681,600)	-	-	-	-	-	-	(4,636,457)	-	-	-
NET CASH	1,000,000	15,473,487	9,318,571	12,371,769	15,850,156	19,780,240	24,162,765	24,641,121	34,548,016	45,547,057	164,960,467

13. KEY ASSUMPTIONS

13.1 Operating Cost Assumptions

Table 43: Operating Cost Assumptions

Description	Details
Operating costs growth rate	10.1%
Communication expenses	10% of management staff expenses
Office Vehicle running expenses	25% of management staff expenses
Office expenses (stationery, janitorial, etc.)	25% of management staff expenses

13.2 Revenue Assumptions

Table 44: Revenue Assumptions

Description	Details
Sale price growth rate	11.2%
Capacity utilization	50%
Capacity utilization growth rate	5%
Maximum capacity	90%

13.3 Financial Assumptions

Table 45: Financial Assumptions

Description	Details
Project life (Years)	10
Debt: Equity	0:100
Discount Rate with Equity	15%
Discount Rate with Debt: Equity (50:50)	13%

13.4 Debt Related Assumptions

Table 46: 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%)	11.3%
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13.5 Cash Flow Assumptions

Table 47: Cash Flow Assumptions

Description	Day
Account Payable Days	30
Account Receivable Days	30

Small and Medium Enterprises Development Authority

HEAD OFFICE

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