Pre-feasibility Study

MANUFACTURING UNIT FOR STEEL WIRE SPRINGS

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

Table of Contents

1. DISCLAIMER 4
2. EXECUTIVE SUMMARY 5
3. INTRODUCTION TO SMEDA 6
4. PURPOSE OF THE DOCUMENT 6
5. BRIEF DESCRIPTION OF PROJECT & Services 7
5.1. Machinery and Equipment 10
5.2. Process Flow of Manufacturing Unit for Steel Wire Springs 17
5.3. Installed and Operational Capacities 19
6. CRITICAL FACTORS 21
7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT 21
8. POTENTIAL TARGET Customers/MARKETS 21
9. PROJECT COST SUMMARY 22
9.1. Initial Project Cost 22
9.1.1. Land 23
9.1.2. Building 23
9.1.3. Machinery and Equipment Requirement 24
9.1.4. Furniture & Fixtures Requirement 25
9.1.5. Office Equipment Requirement 25
9.1.6. Office Vehicle Requirement 26
9.1.7. Security against Building 26
9.1.8. Pre-Operating Cost 26
9.1.9. Working Capital Requirements 27
9.2. Breakeven Analysis 27
9.3. Revenue Generation 28
9.4. Variable Cost Estimate 29
9.5. Fixed Cost Estimate 30
9.6. Financial Feasibility Analysis 31
9.7. Financial Feasibility with 50% Debt Financing 31
9.8. Human Resource Requirement 32
10. CONTACT DETAILS 32
11. USEFUL LINKS 34
12. ANNEXURES 35
12.1. Income Statement 35
12.2. Balance Sheet 36
12.3. Cash Flow Statement 37

13. KEY ASSUMPTIONS 38
13.1. Operating Cost Assumptions 38
13.2. Revenue Assumptions 38
13.3. Financial Assumptions 38
13.4. Debt-Related Assumptions 38
13.5. Cash Flow Assumptions 39

Table of Tables

Table 1: Installed and Operational Capacity 20
Table 2: Project Cost 22
Table 3: Breakup of Space Requirement 23
Table 4: Building Renovation Cost 24
Table 5: Machinery and Equipment Requirement 24
Table 6: Furniture and Fixtures Requirement 25
Table 7: Office Equipment Requirement 25
Table 8: Office Vehicle Requirement 26
Table 9: Security against Building 26
Table 10: Pre-Operating Cost 26
Table 11: Working Capital Requirements 27
Table 12: Equipment Spare Part Inventory 27
Table 13: Breakeven Analysis 27
Table 14: Revenue Generation - Main Products 28
Table 15: Revenue Generation - Byproducts 28
Table 16: Variable Cost Estimate 29
Table 17: Packing Cost 29
Table 18: Direct Labor 29
Table 19: Machinery Maintenance Cost 30
Table 20: Variable cost Assumptions 30
Table 21: Fixed Cost Estimate 30
Table 22: Staff Salaries 30
Table 23: Fixed Cost Assumption 31
Table 24: Financial Feasibility Analysis 31
Table 25: Financial Feasibility Debt Financing 31
Table 26: Human Resource Requirement 32
Table 27: Contact Details 32
Table 28: Useful Links 34
Table 29: Operating Cost Assumptions 38
Table 30: Revenue Assumptions 38
Table 31: Financial Assumptions 38
Table 32: Debt-Related Assumptions 38
Table 33: Cash Flow Assumption 39

Table of Figures

Figure 1: Shapes and Types of Compression Springs 9
Figure 2: Parameters of Compression Spring 9
Figure 3: 2-Axes Spring Coiling Machine 11
Figure 4: 4-Axes Spring Coiling Machine 12
Figure 5: 5-Axes Spring Coiling Machine 13
Figure 6: Wire De-Coiler 14
Figure 7: Digital Vernier Caliper 14
Figure 8: Electronic Weigh Scale (500kg) 15
Figure 9: Weighing Scale (1 kg) 15
Figure 10: Plastic Blue Drum 16
Figure 11: Plastic Bucket 16
Figure 12: Hand Tools & Handling Equipment 16
Figure 13: Process Flow of Manufacturing Unit for Steel Wire Springs 17

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

Document No.	224
Prepared by	SMEDA-Punjab (OS)
Revision Date	November 2021
For information	helpdesk.punjab@smeda.org.pk

2. EXECUTIVE SUMMARY

Spring is an elastic machine element that can deflect under the application of load and when load is removed, it regains its original position. Steel alloys are the most commonly used materials for making springs. More popular steels used for this purpose include high-carbon steel (such as the one for guitar strings), oil-tempered steel, chrome silicon steel, chrome vanadium steel and stainless steel. The desirable property in the material is a high yield strength which refers to a material's ability to tolerate considerable bending or twisting and return to its original shape without distorting.

There are different types of springs, the most common types being the compression, extension and torsion springs. Each of these three types of springs have their own applications. Compression springs are open-coil helical springs that resist compressive forces applied to them. Extension springs, also known as a tension spring, are helical wound coils, wrapped tightly together to create tension. A torsion spring works by twisting its end along its axis; i.e. a flexible elastic object that stores mechanical energy when twisted.

The proposed project of "Manufacturing Unit for Steel Wire Springs" is based on the manufacturing of compression springs. Compression springs are used primarily in manufacturing applications, where a variable and opposing force is required between different components. Compression springs can be manufactured in a variety of shapes; including the standard straight coil, conical, barrel, and hourglass forms which are used in many applications.

This "Pre-feasibility Document" provides details for setting up a "Manufacturing Unit for Steel Wire Springs" (hereinafter referred to as proposed unit). The proposed project operates as a manufacturing service unit; processing the orders received from the customers. The customers provide the raw material and the desired product specifications and the unit manufactures the products accordingly. The manufacturing service charges constitute the revenues of the proposed project.

The proposed unit should be located in large cities like Karachi, Lahore, Islamabad, Peshawar, Rawalpindi, Quetta, Faisalabad, Sialkot, Hyderabad, Faisalabad, Sukkur, Gujranwala, Sheikhupura, Multan, or any other major city of Pakistan. These cities are preferred because of the presence of large industrial clusters and easy availability of raw materials. Majority of repair shops, small scale manufacturing units and automobile sector are also located in these cities.

The proposed business requires a total investment of PKR 52.75 million. This includes capital investment of PKR 45.96 million and working capital of PKR 6.79 million This project is financed through 100% equity in which case the Net Present Value (NPV) is PKR 76.14 million with an Internal Rate of Return (IRR) of 36% and a Payback period of 3.58 years. Further, this project is expected to generate Gross Annual Revenues of PKR 28.71 million during 1st year of operations, Gross Profit (GP) ratio ranging from 71% to 84% and Net Profit (NP) ratio ranging from 23% to 44% during the projection

period of 10 years. The proposed project will achieve its estimated breakeven point at capacity of 27% (29,185,433 springs) with annual revenue of PKR 15.77 million.

The proposed project will provide employment opportunities to 14 people including the owner. The legal business status of this project is proposed as “Sole Proprietorship”.

3. INTRODUCTION TO SMEDA

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

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

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

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

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

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

4. PURPOSE OF THE DOCUMENT

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

The purpose of this document is to provide information to the potential investors about establishing a business of “Manufacturing Unit for Steel Wire Springs”. The document

provides a general understanding of the business to facilitate potential investors in crucial and effective investment decisions.

The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attain greater imminence as the research that precedes such reports reveals 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 set up and its successful management.

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

5. BRIEF DESCRIPTION OF PROJECT & SERVICES

This document provides details for establishing a manufacturing unit for steel wire springs. A spring is an object that can be deformed by a force and once the force is removed, it returns to its original shape. Due to its elasticity, spring is not permanently deformed. Springs are used to absorb shocks and vibrations, apply force, control motion, etc. Steel wire is the most popular material used to manufacture different kinds of springs since it is durable and possesses a high degree of strength. Steel wire has the unique ability to be formed, shaped, post heat treated, which makes it one of the premium choices for manufacturing springs. These properties of steel wire comes from its specific composition and hardening processes applied during the manufacturing of the steel alloy. The most commonly used steel wires use high carbon steel, music wire steel, stainless steel, chrome silicon steel, oil tempered wire steel and chrome vanadium steel.

There are commonly three types of springs used in most of the applications; compression spring, extension spring and torsion spring. Compression springs are coil springs that hold mechanical energy in their compressed states. When these springs experience a compression load, they compress and become shorter, capturing and storing significant potential force. Extension springs absorb and store energy as well as create a resistance to a pulling force. These springs are normally attached at both ends to other components and when these components move apart, the spring tries to bring them back together again. Torsion springs are helical springs that exert a torque or rotary force. They offer resistance to twist or rotationally applied force. The proposed project is based on manufacturing of compression springs.

The selection of a certain type of steel wire for making springs depends on the force or torque needed by the specific application and the operational conditions.

Common compression spring materials include stainless steel, carbon steel, chrome silicon, and music wire. The proposed project uses three types of fully automatic and computerized spring coiling machines (2-Axes, 4-Axes and 5-Axes). During setting of machines, there is an average material loss of 1%, 2% and 3% for the three types of machines.

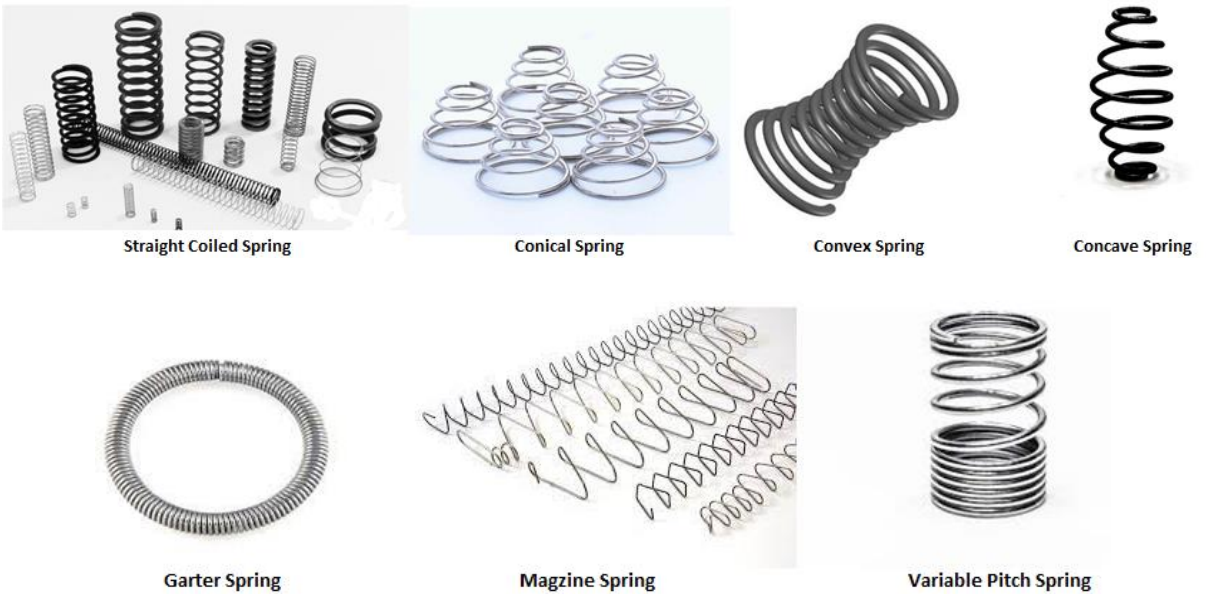
Springs can be made in a large variety of sizes, stiffness (spring rate),[1] cross-section design and shapes. The proposed project will manufacture springs of the following shapes:

- **Straight shaped compression springs** is the simplest and the most common form of compression spring.
- **Conical or tapered shaped compression springs** are shaped like cones. One end has a larger diameter than the other, and the coils throughout the spring provide a gradual taper or change in size. Common application for a conical spring is in electrical contacts, such as battery contacts and push buttons
- **Concave, or barrel-shaped compression springs** have coils with larger diameters in the middle of the spring and coils with smaller diameters on both ends. This design allows the coils to fit within each other when the spring is compressed. Most of the applications of these springs are in the automotive, furniture, and toy industries.
- **Convex or hourglass/barbell-shaped compression springs** have narrower coils in the middle of the spring than on either end. The symmetrical shape helps ensure the springs stay centered over a particular point.
- **Garter springs** are helical compression springs whose ends are connected so that spring becomes a circle and exerts an outward radial force. The primary application of garter spring is to maintain lip seal pressure on a shaft. They are commonly used in belt-driven motors, electrical connectors, oil seals, and shaft seals). They can easily handle pressure, viscosity, and temperature changes and prevent contamination from water, dust, dirt, lubrication, and chemicals.
- **Magazine compression springs**, also known as firearm springs, are oval or rectangular shaped coils placed inside the magazine or charger of a firearm. The springs are designed for single stack magazines using rectangular type springs available for popular pistol calibers. The spring's function is to push up the bullets or rounds to be placed into the chamber.
- **Variable pitch compression spring**s are the ones in which the coils are closer together in some areas and more widely spaced in other areas. The spacing between adjacent coils of wire is known as pitch, used to minimize resonant surging and vibration. They are also used in dynamic applications where the cyclic rate of load application is near the spring natural frequency.

Figure 1 shows different types of compression springs**.**

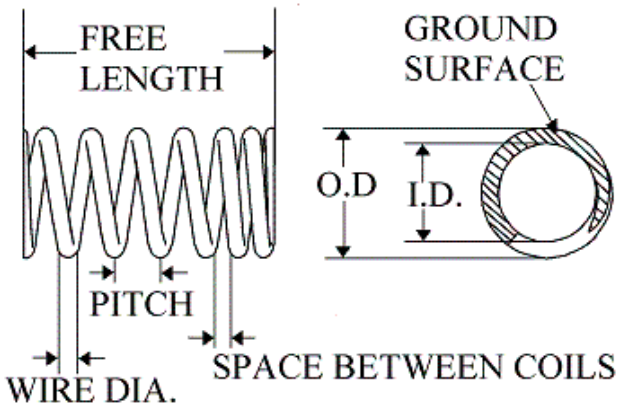
[1] Referred to as spring constant is the amount of weight needed to compress a spring by one inch.

Figure 1: Shapes and Types of Compression Springs



Compression springs may also be differentiated on being left-hand coiled or right-hand coiled; indicated by the way the coil is bent. These types of mechanical springs are highly customizable due to their multiple shapes and efficient energy storage ways. Because of the versatility behind custom compression springs, there are many variables to consider in design and its composition such as wire material and diameter, coil shape, length, tightness and direction, inner and outer diameter, number of coils, stress tolerance, spring pitch,[2] etc. Figure 2 shows design and structural parameters of a compression spring.

Figure 2: Parameters of Compression Spring



Compression springs can be used in a wide variety of machinery and equipment; including engines, home appliances, tools, lawn mowers, medical instruments, electronics, cell phones, pens and ball points and literally anything that requires stored energy within the spring. However, the proposed project covers the compression springs up to a maximum wire diameter of 4 mm (millimeter). Three spring coiling machines will be used to manufacture compression springs of different wire diameters

[2] Pitch is the distance between two adjacent coils, measured from the midpoint of the spring material

in the range from 0.15 mm to 4 mm. These springs will be used in ball points, pens, medical and electronic devices, automobile sector, watches, toys, mattresses, pogo sticks, shock absorbers, hydraulic valves, rifles, pistols, lawn mowers, etc.

The proposed project is totally based on customer demand. As per market norms, the customers provide raw materials to the manufacturing units of springs. They also provide the required spring specifications in term of wire diameter, spring inner and outer diameter, spring free length, number of coils in a spring, spring pitch, etc. to spring manufacturer. With this arrangement, the proposed unit does not have to invest in raw materials and finished goods inventories. This reduces the unit's working capital needs and due to this kind of its nature the business is more profitable. Since the proposed project does not have any major raw material cost, there are not any account payable cycle in days. The proposed unit works as a manufacturing service unit.

5.1. Machinery and Equipment

Machinery and equipment required for "Manufacturing Unit for Steel Wire Springs" are discussed below:

2-Axes[3] Spring Coiling Machine

2-axes spring coiling machine consists of 2 servo motors, industrial computer controller and accuracy gears which facilitate high-speed and high-precision and ensures a reliable control. One servo motor is for wire feeding axes and the other one is for outer diameter of spring, pitch of spring and for cutter control. In this machine, the customized customer order is manually programed in computer controller by the skilled labor after which the machine continuously operates independently as per the given program.

This machine has a capacity to feed wire in a diameter range of 0.15 mm to 0.8 mm. A micro pulse hand wheel (which is on the computer controller) is used for easy setup and programming of machine. This machine is specialized in both the right hand and left-hand coiling and can produce various types of springs having maximum outside diameter of 20 mm and average weight of 0.08 grams. This machine has a capacity to produce 600 springs per minute. Its power consumption is 2000 watts and it has a total weight of 300 kg. When the machine is purchased, its wire decoiler (whose electric consumption is included in the total electricity consumption of machine) and spare parts are also usually delivered along with the machine; to be used for repair or replacement which will include roller, outlet wire guide, entry wire guide, cutter, coiling point, center mandrel, pitch tool, pitch holder, etc.

Figure 3 Figure 3 shows 2-Axes spring coiling machine.

[3] The "axis" of the computerized Spring coining machine represents the coupling transmission between the supporting components, combined with the driving mode of the servo motor, to represent the number of servo motors.

Figure 3: 2-Axes Spring Coiling Machine

4-Axes Spring Coiling Machine

4-axes spring coiling machine consists of 4 servo motors, one industrial computer controller and accuracy gears which facilitate high-speed and high-precision and ensures reliable control. One servo motor is for wire feeding axes, second one is for outer diameter of spring, third one is for pitch of spring and fourth one is for cutter control. In this machine, the customized order is manually programed in computer controller by the skilled labor after which the machine continuously operates independently as per the given program. Rotating cutoff and straight cutoff capability are both standard features for more flexible application of computer control system. A digital scale is installed to indicate the exact position of mandrel[4] (up/down). Roller pressure gauge ensures repeatable feed roller pressure while material changes. Heat exchanger on the electrical cabinet keeps controllers clean and cool.

This machine has a capacity to feed wire having 0.8 mm to 3 mm diameter. A micro pulse hand wheel (which is on the computer controller) is used for easy setup and programming of machine. This machine is specialized in both the right hand and left-hand coiling processes for producing various types of springs having maximum outside diameter of 45 mm and average weight of 0.92 grams. This machine has a capacity to produce 250 springs per minute. Its power consumption is 15,000 watts and it has a total weight of 1000 kg. When the machine is purchased, its wire decoiler (whose electric consumption is included in the total electricity consumption of machine) and spare parts are also delivered along with this machine; to be used for

[4] Mandrel is a part of machine on which a shape of a spring is made.

repair or replacement which will include roller, outlet wire guide, entry wire guide, mid wire guide, cutter, coiling point, center mandrel, pitch tool, pitch tool holder. Figure 4 shows 4-Axes spring coiling machine.

Figure 4: 4-Axes Spring Coiling Machine

5-Axes Spring Coiling Machine

5-axes spring coiling machine consists of 5 servo motors, industrial computer controller and accuracy gears which facilitate high-speed and high-precision and ensures reliable control. One servo motor is for wire feeding axes, second one is for outer diameter of spring, third one is for vertical pitch of spring, fourth one is for horizontal pitch of spring and fifth one is for cutter control. In this machine, the customized order is manually programed in computer controller by the skilled labor after which the machine continuously operates independently as per the given program. Rotating cutoff and straight cutoff capability are both standard features for more flexible application of computer control system. A digital scale is installed to indicate the exact position of mandrel (up/down). While material changing, roller pressure gauge ensures repeatable feed roller pressure. Heat exchanger on the electrical cabinet keeps controllers clean and cool. State of the art touchscreen control interface is provided for easy operation. Advanced coiling point system design ensures easy right/left hand coiling conversion without coiling point slide replacement.

This machine has an operational capacity to feed wire having 3 mm to 4 mm diameter. A micro pulse hand wheel is used for easy setup and programming. This machine produces various types of springs having maximum outside diameter 70 mm and average weight of 4.95 grams. This machine has a capacity to produce 250 springs per minute. Its power consumption is 30,000 watts and it has a total weight of 2600 kg. When the machine is purchased, its wire decoiler (whose electric consumption is included in the total electricity consumption of machine) and spare parts are also

delivered along with this machine; to be used for repair or replacement which will include roller, outlet wire guide, entry wire guide, mid wire guide, rotating cutter, straight cutter, coiling point, rectangular coiling point, center mandrel, mandrel fixing block, pitch tool and pitch tool holder, Figure 5 shows 5-Axes spring coiling machine.

Figure 5: 5-Axes Spring Coiling Machine

Wire De-Coiler

Wire de-coiler is a rotatable wire handling machine, which is used for placing steel coiled wire. Steel coiled wire is placed on wire de-coiler and one end of the wire is fed to the machine's wire feed servo motor. Wire de-coiler rotates and let the steel coil wire go smoothly in the machine without much effort.

- 2-Axes wire de-coiler has a maximum load capacity of 70 kg and has a maximum table speed of 140 rpm[5] and has a total weight of 70 kg.
- 4-Axes wire de-coiler has a maximum load capacity of 200 kg and has a maximum table speed of 100 rpm and has a total weight of 155 kg.
- 5-Axes wire de-coiler has a maximum load capacity of 1000 kg and has a maximum table speed of 60 rpm and has a total weight of 400 kg.

Figure 6 shows wire de-coiler.

[5] Revolutions per minute

Figure 6: Wire De-Coiler

Digital Vernier Caliper

Digital Vernier Caliper is upgraded version of Analog Vernier Caliper, which is a widely used linear measurement instrument with a least count[6] of 0.01 mm, more accurate than Analog Vernier Caliper. It also consists of a depth bar for depth measurement. It is used for precise measurement of the diameter of wire and also for measuring the inner and outer diameter of spring and the length of the spring. In this project, three digital Vernier caliper have been proposed. Figure 7 shows digital Vernier caliper.

Figure 7: Digital Vernier Caliper

Electronic Weigh Scale (500 KGs)

This instrument is used to determine the total weight of material provided by the customer before feeding the material in the above-mentioned manufacturing machine to produce springs. It is also used to determine, at the end of process, the weight of the springs manufactured by the unit. For this project, three electronic weigh scales are suggested.

Figure 8 shows weighing scale.

[6] The smallest value that can be measured by the measuring instrument.

Figure 8: Electronic Weigh Scale (500kg)

Weigh Scale (1 kg)

This instrument is used in the process of test run of production in order to measure the weight of tested material (which will be 1 kg) and also used to measure the total weight of the produced springs from the tested material. This instrument is also used in the process of setting the machinery to measure the total weight of the byproduct produced while setting the machinery; in accordance with each customized order. For this project, three weighing scales are suggested. Figure 9 shows weighing scale (1 kg).

Figure 9: Weighing Scale (1 kg)

Plastic Drums (500 liters)

Plastic drums are placed in front of machines and used to store the springs directly produced by machines. Figure 10 shows plastic drum.

Figure 10: Plastic Blue Drum

Plastic Buckets

Plastic buckets are used for the filling of sacks with springs. The produced springs are transferred from the plastic drum to the bucket and then into the sacks. This process it done manually. Figure 11 shows plastic bucket.

Figure 11: Plastic Bucket

Hand Tools & Handling Equipment

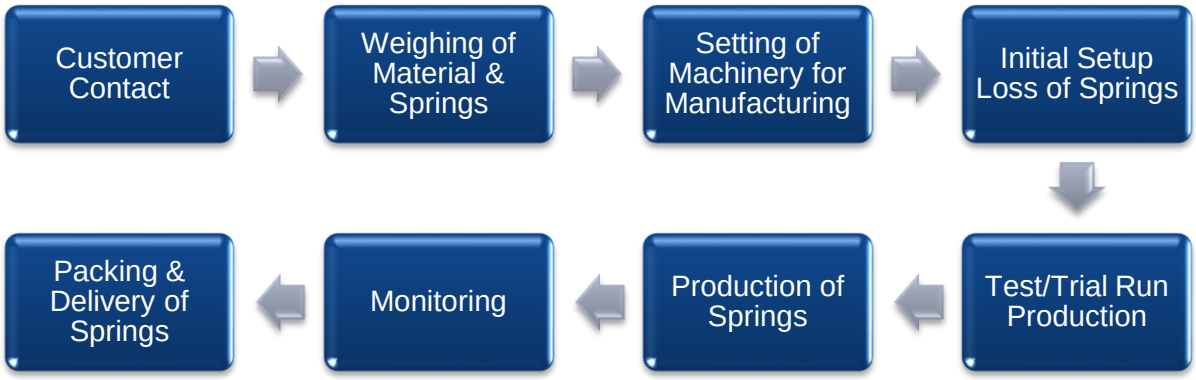
The proposed manufacturing unit also requires hand tools and material handling equipment. These tools and equipment include cutting tools, tool kits for machines and drum lifter. These tools are required for cutting the steel wires and for fixing the tools and machines used in the proposed unit. Figure 12 shows hand tools and handling equipment.

Figure 12: Hand Tools & Handling Equipment

5.2. Process Flow of Manufacturing Unit for Steel Wire Springs

The process flow of manufacturing unit for steel wire springs is given in Figure 13.

Figure 13: Process Flow of Manufacturing Unit for Steel Wire Springs



Brief description of process flow is provided below:

Customer Contact

The potential customers contact the management of the proposed unit for manufacturing springs. Customer provides information about the type of material to be used for spring manufacturing. Customer also provides detailed specifications about the final product which includes spring's inner and outer diameters, number of coils required on the spring, total length of the spring, the required pitch of spring, etc. After agreement on the specifications, the customer places order of the required quantity of springs to the spring manufacturing unit.

Weighing of Material

In this process, the raw material provided by the customer is weighed to determine the total input in the production process.

Setting of Machinery for Manufacturing Springs

After placement of customer order, skilled operator measures the customized dimensions/parameters[7] of customer's required spring with the help of Vernier caliper and sets the specific machine in accordance with the measured dimensions/ parameters. However, during the machine setting process, there is a probable loss of material (by-product) and such loss is to be weighed in order to find its total weight to sell as scrap.

Initial Setup Loss of Springs

During machine setting, the springs produced initially (not as per the customer's specifications) are considered as loss. This loss, on average, is be 1% for 0.15 mm to 0.8 mm springs, 2% for 0.8 mm to 3 mm springs and 3% for 3 mm to 4 mm springs.

[7] Wire diameter, coil shape, length, tightness and direction, inner and outer diameter, number of coils, stress tolerance, spring pitch.

Test/Trail Run of Production

After setting the machine in accordance with customer's specifications, production supervisor operates the machines (2-Axes, 4-Axes and 5-Axes machine with their wire de-coilers) for test run of production. This tests the output of the specific machine i.e., the number of springs manufactured from 1 kg of given specific steel wire. During this process, tested raw material of 1 kg and springs produced by the tested raw material is to be weighed. This step helps in estimating the total number of springs that can be produced from total kg of given specific steel wire after completing the production order of the customer. This is since the manufacturing unit charges the customer on the per-spring basis.

Production of Springs

After completing the setting and testing phase, production phase is to be started in which the specific machine is operated to produce springs until the specific steel wire placed on wire de-coiler is finished.

In this phase, the unskilled labor places the steel wire (remaining material after test run) on the wire de-coiler and feeds one end of the wire into the wire feeding axes (servo motor) of machine where the rollers of axes give optimal straight wire. After that, the wire goes to outer diameter axes of machine where the machine set the diameters of spring (outer and inner diameter). The wire then goes to the pitch axes of machine where the machine sets the length, number of coils, pitch, tightness and direction of spring as per customer specification. The produced spring is cut by the cutter axes of the machine and directly goes into the plastic drum which is placed in front of the machine.

Monitoring of Production

Unskilled labor monitors the wire de-coiler, so that material is not stuck and enters smoothly into the spring coiling machine. The skilled operator monitors the performance/operating of machines (2-Axes, 4-Axes and 5-Axes machines) by checking the dimensions/parameters of the produced springs with the help of Vernier caliper on sample basis. If there is a dimension error in sampling, the production supervisor adjusts it through computer system of the machine according to the required specifications. This monitoring is done to avoid any production breakdowns and quality issues and to ensure compliance to the product specifications provided by the customer.

Packing & Delivery

After production, the production supervisor conducts a final check of the produced springs as per the customer specifications on sample basis; following which the produced springs are packed in sacks. The springs are manually transferred from the plastic drums to the sacks with the help of buckets. The filled sack is to be weighed and then delivered to the customer through carry van. As per market norm, average credit period of 30 days is allowed to customers for payment.

5.3. Installed and Operational Capacities

The proposed unit will operate for 8 hours per day for 280 days in a year. Of the total available time in a shift, 5.75 hours will be used for machine operation and the remaining 2.25 hours will be used for machine setting and test run operations for making different types of springs. The proposed unit will have maximum capacity of producing 106,260,000 compression springs including 57,960,000 springs of 0.15-0.8 mm wire diameter, 24,150,000 springs of 0.8-3 mm wire diameter and 24,150,000 springs of 3-4 mm wire diameter in a year. It is assumed that the unit will attain 50% capacity utilization during the first year of operations; to produce 53,130,000 compressions springs; including 28,980,000 springs of 0.15-0.8 mm wire diameter, 12,075,000 springs of 0.8-3 mm wire diameter and 12,075,000 springs of 3-4 mm wire diameter. The operational capacity is assumed to increase at the rate of 5% per annum to reach a maximum of 90% in year 9. Table 1 shows details of details of maximum annual capacity and operational capacity utilized in pieces/number of compression springs during 1st year of operations.

Table 1: Installed and Operational Capacity

Product	Wire Diameter Range (mm)	Average Machine Capacity Per Minute (Number of Springs)	Average Machine Capacity Per Hour (Number of Springs)	Average Machine Capacity Per Day (Number of Spring)	Annual Working Days	Annual Production (Number of Spring) @ 100%	Intial Year Production (Number of Spring) @ 50%
2-Axes Spring Coiling Machine	0.15-0.8	600	36,000	207,000	280	57,960,000	28,980,000
4-Axes Spring Coiling Machine	0.8-3	250	15,000	86,250		24,150,000	12,075,000
5-Axes Spring Coiling Machine	3-4	250	15,000	86,250		24,150,000	12,075,000
Total						**106,260,000**	**53,130,000**

6. CRITICAL FACTORS

Before making the decision to invest in "Manufacturing Unit for Steel Wire Springs" business, one should carefully analyze the associated risk factors. The important considerations in this regard include:

- Technical knowhow and basic knowledge of the entrepreneur
- Availability of high-quality raw material
- Availability of skilled workforce
- Rigorous supervision of the process at every level
- Up-to-date knowledge of market needs and new technology
- Ability to generate work orders through industrial networking (B2B and B2C)

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The demand for setting up the manufacturing unit for steel wire springs will be higher in large cities. Majority of small-scale manufacturing units of ball points, pens, medical and electronic devices, watches, toys, mattresses, pogo sticks, rifles, weapons, lawn mowers and businesses involved in automobile sector are located in the big cities of Pakistan. Therefore, the geographical potential for investment in this business is in larger cities like Karachi, Lahore, Islamabad, Peshawar, Rawalpindi, Quetta, Faisalabad, Sialkot, Hyderabad, Faisalabad, Sukkur, Gujranwala, Sheikhupura, Multan, Lasbela, Sukkur or any other major industrial city of Pakistan. These cities are preferred because of the presence of industrial clusters and easy availability of raw material. Majority of repair shops, small scale manufacturing units and automobile sector are also located in these cities.

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 proposed manufacturing business.
- Industries involved in the small-scale manufacturing of ball points, pens, medical and electronic devices, watches, toys, mattresses, pogo sticks, rifles, weapons, lawn mowers etc. will also be important customers.
- Repair shops involved in the repair and maintenance of medical and electronic devices, watches, toys, mattresses, pogo sticks, rifles, weapons, lawn mowers etc. will also be major customers.

Currently, there are many industrial units producing these steel wire springs of various sizes. There are three major large manufacturers of steel wire springs; including Pakistan Spring & Engineering Company (Pvt.) Limited, Wahid Brothers Spring &

Engineering Works, Gandhara Spring Company. There are many small-scale manufacturers of steel wire springs. Demand for springs is increasing, considering the use of these springs in multiples industries. In the year 2020,[8] Pakistan imported fasteners of USD 3.45 million under the HS code 7320. The export of Pakistan for these products in 2020 was USD 0.05 million. Currently, there is a demand-supply gap of steel wire springs in the Pakistan market which is filled by imports.

The demand and existence of market for the steel wire springs produced by the proposed manufacturing unit is clearly evident from the growth rates of small-scale manufacturing sector and automobile sector. According to Pakistan Economic Survey 2020-21, small scale manufacturing sector recorded a growth of 8.31% and as per State Bank of Pakistan (SBP), automobile sector recorded a growth of 23.4%. The growth in aforementioned industries is expected to directly generate demand for the products produced by the proposed manufacturing unit.

9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of the Manufacturing Unit for Steel Wire Springs. 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 of this document.

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

9.1. Initial Project Cost

Table 2 provides fixed and working capital requirements for establishment and operations of the Manufacturing Unit for Steel Wire Springs.

Table 2: Project Cost

Description of Costs	Amount (PKR)	Reference
Land	-	9.1.1
Building Renovation Costs	206,050	9.1.2
Machinery & Equipment	42,405,100	9.1.3
Furniture & Fixtures	470,000	9.1.4
Office Equipment	721,000	9.1.5

[8] https://trendeconomy.com/data/h2/Pakistan/7320

Office Vehicles	1,167,250	9.1.6
Security Against Building	405,000	9.1.7
Pre-operating Costs	586,568	9.1.8
Total Capital Cost	**45,960,968**	
Working Capital Cost		
Equipment spare part inventory	5,657,000	
Upfront building rent	135,000	
Cash	1,000,000	
Total Working Capital	**6,792,000**	9.1.9
Total Project Cost	**52,752,968**	

9.1.1. Land

The manufacturing unit of steel wire springs will be established in a rented building to avoid the high cost of land. Suitable location for setting up a manufacturing unit of steel wire springs business can be easily found on rent. Therefore, no land cost has been added to the project cost. Total space requirement for the proposed unit has been estimated as 1,125 sq. feet (5 Marla). The breakup of the space requirement is provided in Table 3.

Table 3: Breakup of Space Requirement

Description	% Break-Up	Area Sq. Ft.
Executive Office	27%	300
Production Area	44%	500
Store Area	5%	55
Admin Area	13%	150
Kitchen	5%	60
Washrooms	5%	60
Total	**100%**	**1,125**

9.1.2. Building

There will be no cost of building construction since the proposed business will be started in rented premises. However, there will be a renovation cost required to make the building usable for the business. The proposed project requires electricity load of

around 50 KW for which an electricity connection under the Industrial Supply Tariff three phase will be required. Building rent of PKR 135,000 per month has been included in the operating cost. Table 4 provides details of building renovation cost.

Table 4: Building Renovation Cost

Cost Item	Unit of Measurement (UOM)	Total Units	Cost/Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	39	500	19,350
Labour Cost	Sq.Feet	3,870	10	38,700
Tile Cost	Sq.Feet	1,125	110	123,750
Labour Cost-Tile	Sq.Feet	1,125	10	11,250
Curtain	Units	2	4,000	8,000
Blinds	Units	1	5,000	5,000
Total Cost (PKR)				**206,050**

9.1.3. Machinery and Equipment Requirement

Table 5 provides details of machinery and equipment required for establishing Manufacturing Unit for Steel Wire Springs.

Table 5: Machinery and Equipment Requirement

Cost Item	Unit	Unit Cost (PKR)	Total Cost (PKR)
5-Axis Spring Coiling Machine (600 springs per min)	1	21,880,000	21,880,000
4-Axis Spring Coiling Machine (250 springs per min)	1	12,053,000	12,053,000
2-Axis Spring Coiling Machine (250 springs per min)	1	5,155,000	5,155,000
5-Axis Wire De-coiler (1000 kg) (60 rpm)	1	1,140,000	1,140,000
4-Axis Wire De-coiler (200 kg) (100 rpm)	1	580,000	580,000
2-Axis Wire De-coiler (70 kg) (140 rpm)	1	370,000	370,000
Diesel Generator (125 KW)	1	1,000,000	1,000,000
Electronic Weigh Scale (500 kgs)	3	25,000	75,000

Plastic Drum	5	4,000	20,000
Plastic Bucket	8	500	4,000
Weigh Scale (1kg)	3	1,200	3,600
Digital Vernier Caliper	3	2,500	7,500
Mechnical Tool Kit	3	5,000	15,000
Drum Lifter	3	27,000	81,000
Steel Wire Cutter	3	7,000	21,000
Total Cost			**42,405,100**

9.1.4. Furniture & Fixtures Requirement

Table 6 provides details of the furniture and fixture requirement of the project.

Table 6: Furniture and Fixtures Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Executive Table	1	40,000	40,000
Executive Chair	1	20,000	20,000
Staff Chairs	14	10,000	140,000
Staff Table	5	35,000	175,000
Visitor Chairs	6	10,000	60,000
Sofa Set	1	35,000	35,000
Total			**470,000**

9.1.5. Office Equipment Requirement

Details of office equipment required for the project is provided in Table 7.

Table 7: Office Equipment Requirement

Cost Item	Units	Unit Cost (PKR)	Total Cost (PKR)
Air Conditioners	3	90,000	270,000
Laptop	3	80,000	240,000
Desktop Computer	1	30,000	30,000
Printer	1	40,000	40,000
Water Dispenser	1	20,000	20,000

Security System (6 Cams , 2 MP)	8	2,000	16,000
DVR	1	12,000	12,000
LED/LCD TV	1	40,000	40,000
WI-FI/ Internet Connection	1	5,000	5,000
Ceiling Fan	8	5,000	40,000
Exhaust Fan	4	2,000	8,000
Total Cost			**721,000**

9.1.6. Office Vehicle Requirement

Details of office vehicle required for the project is provided in Table 8.

Table 8: Office Vehicle Requirement

Cost Item	Unit(s)	Unit Cost (PKR)	Registration	Total Cost (PKR)
Carry Van	1	1,075,000	10,750	1,085,750
Motorcycle	1	80,000	1,500	81,500
Total Cost				**1,167,250**

9.1.7. Security against Building

Details of security against building for the project are provided in Table 9.

Table 9: Security against Building

Cost Item	Months	Unit Cost (PKR)	Total Cost (PKR)
Security Against Building	3	135,000	405,000
Total (PKR)			**405,000**

9.1.8. Pre-Operating Cost

Details of pre-operating cost for the project are provided in Table 10.

Table 10: Pre-Operating Cost

Cost Item	Number / Months	Hiring before Year 0	Unit Cost (PKR)	Total Cost (PKR)
Production Supervisor	1	1	60,000	60,000
Marketing & Sales Officer	1	1	50,000	50,000
Skilled Operator	1	1	45,000	45,000

Office Boy	1	1	22,000	22,000
Security Guard	1	1	22,000	22,000
Utilities expense				153,568
Total Cost				**586,568**

9.1.9. Working Capital Requirements

Table 11 provides details of working capital requirements for the project.

Table 11: Working Capital Requirements

Cost Item	No. of Months	Unit Cost (PKR)	Amount (PKR)
Equipment spare part inventory	1	5,657,000	5,657,000
Upfront building rent	1	135,000	135,000
Cash		1,000,000	1,000,000
Total (PKR)			**6,792,000**

Table 12: Equipment Spare Part Inventory

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
5-Axis Spring Coiling Machine-Spare Parts	1	3,500,000	3,500,000
4-Axis Spring Coiling Machine-Spare Parts	1	1,590,000	1,590,000
2-Axis Spring Coiling Machine-Spare Parts	1	567,000	567,000
Total (PKR)			**5,657,000**

9.2. Breakeven Analysis

Breakeven analysis is provided in Table 13.

Table 13: Breakeven Analysis

Particulars	Amount First Year (PKR)	Ratios
Sales	28,710,809	100%
Variable Cost	9,225,371	32%
Contribution	19,485,438	68%
Fixed Cost	10,703,763	37%
Breakeven		
Breakeven (Number of Springs)		29,185,433

Breakeven Revenue (PKR)	15,771,455
Breakeven Capacity	27%

9.3. Revenue Generation

Table 14 provides details for revenue generation of the Manufacturing Unit of Steel Wire Springs during the 1st year of operations, based on 50% capacity utilization.

Table 14: Revenue Generation - Main Products

Products	Annual Production (No. of Spring) @ 100%	Intial Year Production (No. of Springs) @ 50%	Average Service Charges (PKR per Spring)	Revenue (PKR)
2-Axes Spring Coiling Machine	57,960,000	28,980,000	0.15	4,347,000
4-Axes Spring Coiling Machine	24,150,000	12,075,000	0.8	9,660,000
5-Axes Spring Coiling Machine	24,150,000	12,075,000	1.2	14,490,000
Total	**106,260,000**	**53,130,000**		**28,497,000**

Table 15: Revenue Generation - Byproducts

Products	Average No. of springs per kg	Average gram per spring	Annual kgs	By-Product in kg	Byproduct Sale Price (PKR per kg)	Revenue (PKR)
2-Axes Spring Coiling Machine	12,000	0.083	4,830	24	100	2,400
4-Axes Spring Coiling Machine	1,000	1	24,150	246		24,600
5-Axes Spring Coiling Machine	200	5	120,750	1,867		186,700
Total				**2,138**		**213,809**

9.4. Variable Cost Estimate

Variable costs of the project have been provided in detail in Table 16.

Table 16: Variable Cost Estimate

Description of Costs	Total Cost (PKR)
Direct Utilities Cost	1,425,878
Direct Labor	4,680,000
Machinery Maintenance Cost	2,120,255
Fuel Cost-Generator	114,070
Packing Cost	62,388
Communications expense (phone, mail, internet, etc.)	280,320
Office vehicles running expense	245,280
Office expenses (stationery, entertainment, janitorial services, etc.)	210,240
Bad debt expense	86,940
Total Variable Cost (PKR)	**9,225,371**

Table 17: Packing Cost

Cost Item	Filling Capacity of Sack (kg)	Consumption per Month	Unit Cost (PKR)	Total Cost (PKR)
PP Woven Sacks (Bori 50 kg)	48	3,119	20	62,388
Total Cost (PKR)				**62,388**

Table 18: Direct Labor

Post	No.of Employees	Monthly Salary (PKR)	Annual Salary (PKR)
Production Supervisor	1	60,000	720,000
Mechanical Technision	1	50,000	600,000
Quality Controller	1	40,000	480,000
Skilled Operator	3	45,000	1,620,000
Unskilled Labor	3	35,000	1,260,000
Total Direct Labor Cost (PKR)			**4,680,000**

Table 19: Machinery Maintenance Cost

Cost Item	Machinery Cost (PKR)	Rate	Total Cost (PKR)
Maintenance Cost	42,405,100	5%	2,120,255
Total (PKR)			**2,120,255**

Table 20: Variable cost Assumptions

Description of Costs	Rate	Rationale
Communications expense (phone, mail, internet, etc.)	8%	of management expense
Office vehicles running expense	7%	of management expense
Office expenses (stationery, entertainment, janitorial services, etc.)	6%	of management expense
Bad debt expense	2%	of revenue

9.5. Fixed Cost Estimate

Details of fixed cost for the project are provided in Table 21.

Table 21: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Staff salaries	3,504,000
Building rental expense	1,620,000
Indirect Utilities	416,935
Promotional expense	430,662
Depreciation expense	4,614,853
Amortization of pre-operating costs	117,314
Total Fixed Cost	**10,703,763**

Table 22: Staff Salaries

Post	No.of Employees	Monthly Salary (PKR)	Annual Salary (PKR)
Admin & Accounts Officer	1	80,000	960,000
Marketing & Sales Officer	1	50,000	600,000
Store Incharge	1	30,000	360,000
Office Boy	2	22,000	528,000

Security Guard	2	22,000	528,000
Driver	1	22,000	264,000
Sweeper	1	22,000	264,000
Total Cost (PKR)			**3,504,000**

Table 23: Fixed Cost Assumption

Description of Costs	Rate	Rationale
Promotional expense	1.5%	of revenue
Depreciation		
Building	10%	of Building Renovation Cost
Machinery and Equipment	10%	of Cost
Office Equipment/Office Vehicle/Furniture and 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 24.

Table 24: Financial Feasibility Analysis

Description	Project
IRR	36%
NPV (PKR)	76,136,386
Payback Period (years)	3.58
Projection Years	10
Discount Rate used for NPV	15%

9.7. Financial Feasibility with 50% Debt Financing

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 25.

Table 25: Financial Feasibility Debt Financing

Description	Project
IRR	37%

NPV (PKR)	91,892,611
Payback Period (years)	3.44
Projection Years	10
Discount Rate used for NPV	13%

9.8. Human Resource Requirement

For the 1st year of operations, the human resource requirements are projected in Table 26.

Table 26: Human Resource Requirement

Post	No.of Employees	Monthly Salary (PKR)	Annual Salary (PKR)
Admin & Accounts Officer	1	80,000	960,000
Production Supervisor	1	60,000	720,000
Marketing & Sales Officer	1	50,000	600,000
Mechanical Technician	1	40,000	480,000
Quality Controller	1	50,000	600,000
Store Incharge	1	30,000	360,000
Skilled Operator	3	45,000	1,620,000
Unskilled Labor	3	35,000	1,260,000
Office Boy	2	22,000	528,000
Security Guard	2	22,000	528,000
Driver	1	22,000	264,000
Sweeper	1	22,000	264,000
Total	**14**		**8,184,000**

10. CONTACT DETAILS

Details of suppliers of machinery and equipment for the proposed business are provided in Table 27.

Table 27: Contact Details

Name of Supplier/Manufacturer	City	Address	Contacts Number
Pakistan Spring & Engineering Company (Pvt.) Limited	Sheikhupura	Plot 278, 3 Maulana Shaukat Ali Rd, Kot Lakhpat, Lahore, Punjab 54700	(042) 35943556

Nizami Wire Industries (Pvt) Ltd	Lahore	Rehman Street No. 2, Nishtar Road, Lahore, Pakistan	+924237650891
United Wire Industries (Pvt) Ltd	Sheikhupura	19/20 KM Lahore Sheikhupura Road، Lahore, 54000	(042) 37636886
AJ Steel Wire Factory	Karachi	W2C5+34G, Sindh Industrial Trading Estate, Karachi, Karachi City, Sindh	
Wahid Brothers Spring & Engineering Works – Pakistan	Sheikhupura	16.5 -Km, Lahore - Sheikhupura Road , Taiba Industrial Estate Road.- Javed Nager، near SMC Aluminium Factory, Sheikhupura, 39250	0300 9406451
Gandhara Spring Co.	Lahore	15 km Grand Trunk Rd, near attock petrol pump, Salamatpura Daroghawala, Lahore, Punjab 54000	0300 8403295
Quality Auto & Spring Manufacture	Lahore	McLeod Rd, Garhi Shahu, Lahore, Punjab 54000	(042) 37249533
Popular Spring Industries	Gujranwala	118/C, S.I.E No. 2, Khiali Bypass, Gujranwala, Pakistan.	(055) 4287090
Spring Ink (Pvt.) Ltd	Karachi	Ahmed Terrace, Shop no 1 Moore Street, Pakistan Chowk, New Chali, Karachi, Karachi City, Sindh	(021) 32600788
Shehzad Steel Spring Manufacturer (Karachi)	Karachi	W22X+462, Block 5 Liaquatabad Town, Karachi, Karachi City, Sindh	
Spring Carnival	Peshawar	2G5H+PC7, Defence Officers Colony Peshawar Cantonment, Peshawar, Khyber Pakhtunkhwa	

Multan Steel Spring Company	Multan	3F7V+FMW, Gopalpur, Multan, Punjab	0300 0720972

11. USEFUL LINKS

Table 28: Useful Links

Name of Organization	Website
Small and Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
National Business Development Program (NBDP)	www.nbdp.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 Balochistan	www.balochistan.gov.pk
Government of Khyber Pakhtunkhwa	www.kp.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 Baluchistan	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 Association of Automotive Parts & Accessories Manufacturers	https://www.pama.org.pk/
Pakistan Wire Industries	https://enggpost.com/pakistan-wire-industries
Pakistan Bureau of Statistics	https://www.pbs.gov.pk

12. ANNEXURES

12.1. Income Statement

Calculations

Income Statement **SMEDA**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue										
Revenue- Compression spring (0.15mm-0.8mm)	4,347,000	5,263,058	6,319,497	7,535,298	8,931,840	10,533,191	12,366,435	14,462,030	16,854,220	18,550,878
Revenue- Compression spring (0.8mm-3mm)	9,660,000	11,695,684	14,043,327	16,745,107	19,848,533	23,407,092	27,480,966	32,137,845	37,453,822	41,224,174
Revenue- Compression spring (3mm-4mm)	14,490,000	17,543,526	21,064,990	25,117,660	29,772,800	35,110,638	41,221,449	48,206,767	56,180,733	61,836,261
Revenue- By Products	213,809	258,866	310,827	370,627	439,316	518,080	608,248	711,321	828,982	912,433
Total Revenue	**28,710,809**	**34,761,134**	**41,738,641**	**49,768,692**	**58,992,489**	**69,569,000**	**81,677,098**	**95,517,963**	**111,317,758**	**122,523,745**
Cost of sales										
Direct Utilities Cost	1,425,878	1,554,730	1,695,226	1,848,418	2,015,453	2,197,583	2,396,171	2,612,705	2,848,806	3,106,243
Direct Labor	4,680,000	5,133,960	5,631,954	6,178,254	6,777,544	7,434,966	8,156,158	8,947,305	9,815,194	10,767,267
Machinery Maintenance Cost	2,120,255	2,333,694	2,568,619	2,827,194	3,111,798	3,425,052	3,769,841	4,149,338	4,567,038	5,026,786
Fuel Cost-Generator	114,070	135,618	161,236	191,694	227,905	270,956	322,139	382,991	455,338	541,351
Packing Cost	62,388	68,668	75,580	83,189	91,563	100,781	110,926	122,092	134,383	147,911
Total cost of sales	8,402,591	9,226,670	10,132,616	11,128,747	12,224,263	13,429,337	14,755,234	16,214,431	17,820,758	19,589,559
Gross Profit	20,308,218	25,534,464	31,606,025	38,639,945	46,768,227	56,139,663	66,921,864	79,303,532	93,496,999	102,934,187
General administration & selling expenses										
Management Staff	3,504,000	3,843,888	4,216,745	4,625,769	5,074,469	5,566,693	6,106,662	6,699,008	7,348,812	8,061,646
Building rental expense	1,620,000	1,782,000	1,960,200	2,156,220	2,371,842	2,609,026	2,869,929	3,156,922	3,472,614	3,819,875
Indirect Utilities	416,935	454,612	495,694	540,488	589,330	642,586	700,654	763,970	833,008	908,284
Communications expense (phone, mail, interne	280,320	307,511	337,340	370,062	405,958	445,335	488,533	535,921	587,905	644,932
Office vehicles running expense	245,280	269,972	297,149	327,062	359,986	396,224	436,111	480,013	528,334	581,520
Office expenses (stationery, entertainment etc.)	210,240	230,633	253,005	277,546	304,468	334,002	366,400	401,940	440,929	483,699
Promotional expense	430,662	521,417	626,080	746,530	884,887	1,043,535	1,225,156	1,432,769	1,669,766	1,837,856
Depreciation expense	4,614,853	4,614,853	4,614,853	4,614,853	4,614,853	4,614,853	4,496,940	4,866,530	4,866,530	4,866,530
Amortization of pre-operating costs	117,314	117,314	117,314	117,314	117,314	-	-	-	-	-
Bad debt expense	86,940	105,261	126,390	150,706	178,637	210,664	247,329	289,241	337,084	371,018
Subtotal	11,526,543	12,247,460	13,044,768	13,926,549	14,901,743	15,862,918	16,937,714	18,626,313	20,084,981	21,575,359
Operating Income	8,781,675	13,287,003	18,561,258	24,713,395	31,866,484	40,276,746	49,984,150	60,677,219	73,412,018	81,358,828
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	180,250	-	-	
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	291,813	-	-	
Earnings Before Interest & Taxes	8,781,675	13,287,003	18,561,258	24,713,395	31,866,484	40,276,746	50,456,213	60,677,219	73,412,018	81,358,828
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	8,781,675	13,287,003	18,561,258	24,713,395	31,866,484	40,276,746	50,456,213	60,677,219	73,412,018	81,358,828
Tax	2,193,586	3,770,451	5,616,440	7,769,688	10,273,269	13,216,860	16,779,674	20,357,026	24,814,206	27,595,589
NET PROFIT/(LOSS) AFTER TAX	**6,588,089**	**9,516,553**	**12,944,818**	**16,943,708**	**21,593,215**	**27,059,885**	**33,676,539**	**40,320,193**	**48,597,812**	**53,763,239**

12.2. Balance Sheet

Calculations **SMEDA**

Balance Sheet

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
Current assets											
Cash & Bank	1,000,000	8,005,774	15,143,236	22,365,950	29,872,368	37,797,117	46,168,394	51,183,070	60,949,949	71,634,554	82,135,044
Accounts receivable	-	465,750	563,899	677,089	807,353	956,983	1,128,556	1,324,975	1,549,503	1,805,809	1,455,004
Equipment spare part inventory	5,657,000	6,198,186	6,791,146	7,440,832	8,152,672	8,932,611	9,787,164	10,723,470	11,749,348	12,873,369	14,104,921
Pre-paid building rent	135,000	148,500	163,350	179,685	197,654	217,419	239,161	263,077	289,384	318,323	-
Total Current Assets	6,792,000	14,818,211	22,661,631	30,663,557	39,030,047	47,904,129	57,323,275	63,494,591	74,538,184	86,632,056	97,694,969
Fixed assets											
Land	-	-	-	-	-	-	-	-	-	-	-
Building Infrastructure Renovation	206,050	185,445	164,840	144,235	123,630	103,025	82,420	61,815	41,210	20,605	-
Machinery & equipment	42,405,100	38,164,590	33,924,080	29,683,570	25,443,060	21,202,550	16,962,040	12,721,530	8,481,020	4,240,510	-
Furniture & fixtures	470,000	399,500	329,000	258,500	188,000	117,500	47,000	890,937	757,296	623,656	490,015
Office vehicles	1,167,250	992,163	817,075	641,988	466,900	291,813	116,725	1,778,425	1,511,661	1,244,897	978,134
Office equipment	721,000	612,850	504,700	396,550	288,400	180,250	72,100	1,366,735	1,161,725	956,715	751,704
Security against building	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000
Total Fixed Assets	45,374,400	40,759,548	36,144,695	31,529,843	26,914,990	22,300,138	17,685,285	17,224,442	12,357,913	7,491,383	2,624,853
Intangible assets											
Pre-operation costs	586,568	469,254	351,941	234,627	117,314	-	-	-	-	-	-
Total Intangible Assets	586,568	469,254	351,941	234,627	117,314	-	-	-	-	-	-
TOTAL ASSETS	**52,752,968**	**56,047,012**	**59,158,267**	**62,428,026**	**66,062,351**	**70,204,267**	**75,008,560**	**80,719,033**	**86,896,097**	**94,123,439**	**100,319,823**
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable		-	-	-	-	-	-	-	-	-	-
Total Current Liabilities	-	-	-	-	-	-	-	-	-	-	-
Other liabilities											
Shareholders' equity											
Paid-up capital	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968	52,752,968
Retained earnings		3,294,045	6,405,299	9,675,059	13,309,383	17,451,299	22,255,592	27,966,066	34,143,129	41,370,471	47,566,855
Total Equity	52,752,968	56,047,012	59,158,267	62,428,026	66,062,351	70,204,267	75,008,560	80,719,033	86,896,097	94,123,439	100,319,823
TOTAL CAPITAL AND LIABILITIES	**52,752,968**	**56,047,012**	**59,158,267**	**62,428,026**	**66,062,351**	**70,204,267**	**75,008,560**	**80,719,033**	**86,896,097**	**94,123,439**	**100,319,823**

12.3. Cash Flow Statement

Calculations **SMEDA**

Cash Flow Statement

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating activities											
Net profit		6,588,089	9,516,553	12,944,818	16,943,708	21,593,215	27,059,885	33,676,539	40,320,193	48,597,812	53,763,239
Add: depreciation expense		4,614,853	4,614,853	4,614,853	4,614,853	4,614,853	4,614,853	4,496,940	4,866,530	4,866,530	4,866,530
amortization of pre-operating costs		117,314	117,314	117,314	117,314	117,314	-	-	-	-	-
Accounts receivable		(465,750)	(98,149)	(113,190)	(130,264)	(149,629)	(171,573)	(196,419)	(224,528)	(256,306)	350,805
Equipment inventory	(5,657,000)	(541,186)	(592,960)	(649,686)	(711,840)	(779,939)	(854,553)	(936,305)	(1,025,879)	(1,124,021)	(1,231,552)
Pre-paid building rent	(135,000)	(13,500)	(14,850)	(16,335)	(17,969)	(19,765)	(21,742)	(23,916)	(26,308)	(28,938)	318,323
Cash provided by operations	(5,792,000)	10,299,819	13,542,760	16,897,773	20,815,801	25,376,047	30,626,870	37,016,839	43,910,008	52,055,077	58,067,344
Financing activities											
Issuance of shares	52,752,968	-	-	-	-	-	-	-	-	-	-
Cash provided by / (used for) financing activities	52,752,968	-	-	-	-	-	-	-	-	-	-
Investing activities											
Capital expenditure	(45,960,968)	-	-	-	-	-	-	(4,036,097)	-	-	-
Cash (used for) / provided by investing activities	(45,960,968)	-	-	-	-	-	-	(4,036,097)	-	-	-
NET CASH	1,000,000	10,299,819	13,542,760	16,897,773	20,815,801	25,376,047	30,626,870	32,980,742	43,910,008	52,055,077	58,067,344

13. KEY ASSUMPTIONS

13.1. Operating Cost Assumptions

Table 29: Operating Cost Assumptions

Description	Details
Furniture and fixture depreciation	15%
Vehicle depreciation	15%
Office equipment depreciation	15%
Inflation rate	10.1%
Wage growth rate	9.7%
Gas price growth rate	9.0%
Electricity price growth rate	9.0%
Office equipment price growth rate	9.6%
Office vehicle price growth rate	6.2%

13.2. Revenue Assumptions

Table 30: Revenue Assumptions

Description	Details
Sale price growth rate	10.1%
Initial capacity utilization	50%
Capacity growth rate	5%
Maximum capacity utilization	90%

13.3. Financial Assumptions

Table 31: Financial Assumptions

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

13.4. Debt-Related Assumptions

Table 32: Debt-Related Assumptions

Description of Cost	Details
Project Life (Years)	10
Debt: Equity	50:50

Discount Rate	13%
Debt Tenure	5 years
Grace Period	1 Year
Interest Rate (KIBOR+3%)	11.3%

13.5. Cash Flow Assumptions

Table 33: Cash Flow Assumption

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

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