STEEL MASTERS LIMITED

FEASIBILITY STUDY

FOR THE EXPANSION
OF
MANUFACTURING FACILITIES

FOR

PRODUCTION OF BILLETS USING CONTINUOUS CASTING AND WIRE RODS FROM BLOCK MILLS

Prepared by:
STEEL MASTERS LIMITED
P.O.BOX 14130
Dar-ES-Salaam

September 2024

1.0 INTRODUCTION

Billets and wire rods are part of Steel products and are crucial to the development of any modern economy and is considered to be the backbone of human civilisation. A billet is a small, semi-finished piece of metal that is rectangular, circular, or square in shape. It is a semi-finished casting product that needs further processing before becoming finished goods. Wire rods are manufactured from billets. All major industrial economies are characterised by the existence of a strong steel industry and the growth of many of these economies have been largely shaped by the strength of their steel industries in their initial stages of development.

1.2 THE COMPANY

Steel Masters Limited is a private limited liability company with Certificate of Incorporation no **29153** registered on 9th January 1996 in Dar es Salaam. Steel Masters Limited is one of the leading manufacturers of steel products such as Hollow Sections, round steel tubes, Mild Steel (Ms) Plates and various wire products in Central and East Africa. The company is a joint venture and have been in a business of the steel for many years. Under the leadership of the shareholders the company will benefit from years of experience in manufacturing of these items and has become one of the major manufacturers of steel items in Tanzania.

1.3 THE INVESTMENT COST

The value of the intended investment is estimated as follows: -

CAPITAL ITEMS	TOTAL
Land & Buildings	**1,000,000**
Plant &machinery	**2,500,00**
Motor Vehicles	**500,000**
Furniture & Fittings	**-**
Pre-Operational Expenses	**-**
Others	**-**
Total initial fixed investment	**4,000,000**
Initial Working Capital	**-**
TOTAL INVESTMENT	**4,000,000**

1.4 Proposed Sources of Finance

Funds for the execution of the project will be from own source i.e., Injection of funds from the sponsors and the term loan from various banks. The company will also look for overdraft facility to finance part of its working capital. The financing pattern will be as below;

SOURCE	US$
Fixed Assets	
Equity	**3,000,000**
Short term loan	**1,000,000**
GRAND TOTAL	**4,000,000**

1.5 The Project

The shareholders of Steel masters Limited under the name of Steel masters Limited have decided to expand its production facilities to manufacture billet using continuous casting and wire rods from block mill. A billet is a section of metal used for rolling into bars, rods and sections. It can be produced with ingots or directly by continuous casting. Billets

are used as raw materials or feedstock in extrusion, forging, rolling and other metal-processing operations. Billets are sold as cut lengths or coil, and usually have an area less than 36 sq inch. Billets are also known as bar stock.

Wire rods are manufactured from billets. This is accomplished by an extrusion process, whereby the red metal bar is pressed into the orifice of a die. The metal is forced against the die by hydraulic rams and the continuous form which emerges takes the shape of the die opening. Sizes vary but are often between 5 – 9 mm in diameter. This semi-finished product consists of wire wound into coils each being secured with wire bands. These coils are usually consolidated into units of four coils bound together by metal strapping bands. Each unit is referred to as a 'unutilized bundle of wire rods'. Sometimes the coils are the same size as unutilized bundles but the wire in the bundles is continuous. Approximate weights are between 1 – 1,5 tons, and the bundles on average measure about 1m diameter, 1,25 breadths.

After being in the manufacturing of steel for more than 20 years and been able to establish market almost in every region of Tanzania, the shareholders have decided to expand its manufacturing facilities to meet the local demand of billets and wire rods and that of the neighboring countries

1.6 The Market

After being in the manufacturing of steel products for over 20 years, the company has been able to establish that there is a need to expand its manufacturing facilities to manufacture billets and wire rods. Tanzania's demand for steel stands at **440,336** tons a year, and imported steel has

the market share by **200,000** tons, equivalent to **45** %. Almost all plants in Tanzania are operating at less than **22** % of their in-built capacity as a result, the cheap imports choke the market. On those grounds, the company has decided to fulfil their medium and long-term objective of expanding its manufacturing activities here in Tanzania for local distribution and also sale outside the country. The company intends to use on its manufacturing facilities and also sell extra to the neighbouring countries such as Uganda, Kenya, Ethiopia, Burundi, Rwanda and Central Africa, which include Zambia and Malawi.

1.7 SPONSORS

The project is being sponsored by Messrs Steel Masters Limited. whose directors and share holdings are:

Name of Share Holder	Nationality	No of shares	% Holding
Ranjanbala Hitendra Kumar Patel	Tanzanian	145844	58.11
Shanil Hitendrakumar Patel	British	5258	2.08
Sonali Hitendra Patel	British	5258	2.08
Hitendrakumar Manibhai Patel	British	15773	6.28
Dolmite Trading limited	British	78867	31.45

1.8 PROJECTIONS

Projected Profit and Loss

On the basis of the operating assumptions and costs, the project will be profitable throughout the projected review period of 10 years.

Liquidity Projections

These projections take into account the assumed sources and applications of funds over the planned period and show the ability of the company to meet financial commitments and capital expenditure requirements.

2.0 THE PROJECT

The main objective of the company is to expand and establish a profitable, sustainable and environmentally accepted manufacturing facility for the manufacturing of billets and Wire rods of various sizes. The plant will help to meet the high demand for billets and wire rods in Tanzania and neighboring countries. The products from this expansion project will be able to supply to the Local Industries / suppliers, raw materials and hence have import substitution effect to the economy. The project will also fight off under-valued, under-declared and substandard steel imports from other countries that have flooded the market.

2.1 THE PRODUCTS

2.1.1 BILLETS

Billets are commonly used in the production of bars, rods, and tubes, which require a smaller cross-sectional area. Billets are often produced through the extrusion process, which involves forcing a metal through a die to create the desired shape. There are several types of billets used in manufacturing, including aluminum billets, steel billets, copper billets and brass billets Each type of billet has its own unique properties and is used for specific applications based on its strength, durability, and other characteristics. Billets (sometimes referred to as ingots) are not of functional usage till they are formed into more practical shapes and sizes. Although they have been put in steel furnaces, they need an operation series of molding and shaping, such as cold and hot process, milling and cutting, prior to being sold in the shops or being used for various applications.

Billets have a specific grain structure, which enables the metal to be processed more intricately. Steel billets are also known for their malleability and ductility, especially when exposed to varying temperatures during shaping and molding. Proper casting of billets is important because it determines the billet's strength and flexibility. Billets undergo a number of tests before they are sold. Billets that develop cracks and voids between heating and cooling processes are rejected, as such defects make the product useless.

Billets have limited use before they have been formed into more functional shapes and sizes. They must undergo a series of manufacturing processes before they can be used for various purposes. Final products also include bar stock and wire. Centrifugal casting is also used to produce short circular tubes as billets, usually to achieve a precise metallurgical structure.

Billets can be produced using continuous casting or hot rolling methods. Once they are in their initial form and size, they are generally shaped into the final part form and size through machining methods (e.g., CNC machining), which Excess material is removed from the workpiece. Continuous casting is a modern manufacturing process used in the metallurgy industry to produce metal shapes with a constant cross-section, such as billets, slabs, and rods. The process involves continuously pouring molten metal into a water-cooled mold, which solidifies and forms the desired shape as it passes through a series of rollers or cooling zones. Continuous casting is employed primarily in the production of steel, aluminum, and other metals and alloys. It offers several advantages over traditional ingot casting methods, making it a preferred choice for many industries.

One of the primary reasons for using continuous casting is efficiency. This process enables a continuous and uninterrupted production of metal shapes, eliminating the need for repeated stopping and starting associated with ingot casting. This results in higher production rates and reduced energy consumption per unit of metal produced. Additionally, continuous casting produces a more homogeneous and refined microstructure in the metal, leading to improved mechanical properties and product quality. The consistent cross-sectional dimensions of the cast product also make it easier to process and further reduce material waste in subsequent manufacturing steps. Overall, continuous casting helps streamline production, improve product quality, and enhance the cost-effectiveness of metal manufacturing processes.

ii) **BILLETS MANUFACTURING PROCESS**

Before being used for different purposes, Steel billets have to sustain a chain of production processes, whereas they are fresh raw materials. Billets are produced through freezing molten liquid and then exposed to intensely low temperatures in order for the metal to be shaped and strengthened in chemical formation. The physical specifications of the metal are manipulated by the temperature, which can increase its persistence and strength. The next processes will prepare the metal's curved mould design in a way that it can adapted to the assigned space furnished by other machines, which finish the final procedures.

It is important for a steel billet to be cast because it affects the quality of the steel product once undergoes the final processing steps, including the billet's flexibility and strength. Billets go through many tests prior to being sold. Billets are rejected when they develop cracks and spaces during the

cooling and heating processes. Defects make the products worthless per se.

The basic principles of continuous casting involve the following steps:

- Melting: The process begins with the melting of metal in a furnace. Depending on the type of metal or alloy being cast, this can be done in electric arc furnaces, induction furnaces, or other specialized melting equipment. The molten metal is heated to the appropriate temperature for casting.
- Tundish: The molten metal is then transferred to a tundish, which acts as a reservoir that ensures a steady and controlled flow of metal into the casting mold. The tundish also helps remove impurities and gases from the molten metal.
- Mold: The heart of the continuous casting process is the casting mold. It is typically made of copper or other highly conductive materials and is water-cooled to rapidly solidify the molten metal. As the metal flows into the mold, it takes on the shape and dimensions of the desired product.
- Withdrawal: As the metal begins to solidify in the mold, it is continuously withdrawn from the bottom at a controlled rate. This pulling force is applied by a set of rollers or withdrawal equipment. The solidifying metal passes through a series of cooling zones, which further refine the microstructure and mechanical properties of the product.
- Cutting and Coiling: Once the metal has solidified to the desired length, it is cut into manageable pieces using cutting devices. These pieces can be coiled or transferred for further processing, depending on the specific application.

Continuous casting offers several advantages, including improved product quality, reduced energy consumption, and increased production efficiency. It is widely used in the manufacturing of steel, aluminum, and other metals due to its ability to produce high-quality, uniform products with minimal waste and downtime.

2.2 Wire Rods can be manufactured using block mill which provides high-class equipment suitable for highly productive output with customized customer needs. Block Mills are used to roll the reheated steel billet into wire rods or TMT bars at speeds that are not possible with conventional finishing stands. Wire Rod Block Mill comprises top crossed 45° high-speed wire-rod mills/finishing mills. The finishing mill/wire rod mill is located in a high-speed wire-rod workshop.

2.2 PRODUCTION FACILITIES

Various facilities are required in order to establish a processing plant. This will include main building with floor-roof clearance of above 4 meters for equipment installation, warehousing for raw materials and yard for finished goods storage, electrical power supply (3 phases), water supply, compressed air supply. Other facilities include a generator 300 to 600 KVA and Transformer. Other things also to be included are fleet of cars such as delivery and distribution trucks, and pick-ups.

2.3 RAW MATERIALS

The primary raw material is Steel which is made up of primarily iron. Other metals that may be present in the alloy include aluminium, manganese, titanium, tungsten, vanadium, and zirconium. Some finishing materials

are sometimes used during production Carbon Steel, Hot Rolled/Galvanized steel.

2.5 Quality Control

A variety of measures are taken to ensure that the finished products meet specifications. For example, x-ray gauges are used to regulate the thickness of the steel. The gauges work by utilizing two x rays. One ray is directed at a steel of known thickness. The other is directed at the passing steel on the production line. If there is any variance between the two rays, the gauge will automatically trigger a resizing of the rollers to compensate.

The products are also inspected for defects at the end of the process. There are several methods of testing but the most popular one is testing using a special machine. Defective pipes are returned for scrap.

The company will have follow laid down policies as dictated by the regulations of Factory Inspectorate, health and safety policies. The factory will also be built according to safety policies. In such industries it is necessary for all employees to follow laid down procedures in machinery handling, protective gear use and safety measures.

3.0 SITE LOCATION AND OWNERSHIP

The site and the location of the project will be **in Plot no 181C, Mbozi road Changombe Temeke Dar-Es-Salaam**. The site is accessible by a good tarmac road. A 3-phase power supply form TANESCO and water supply form a main pipe also services it.

4.0 MANPOWER

The total manpower for the project is expected to be ***320*** people; also, the company is expected to employ ***30*** expatriates within three years depending on the level of production capacity. The breakdown is as shown below.

PEOPLE	**NUMBER**
Managing Director	**1**
Directors	**4**
General Managers	**1**
Financial controller	**1**
Managers	**6**
Customer's service	**4**
Machinery operators	**290**
Factory supervisors	**10**
Engineers	**5**
Personal officer	**1**
Accountant	**1**
Treasurer	**1**
Clerks	**9**
Cookers	**2**
Cleaners	**8**
Security	**6**
TOTAL	**350**

5.0 IMPLEMENTATION PROGRAMME

The implementation schedule shows that the development of the project will take about 36 months. The full commissioning of the plant will be in the year 2027.

6.0 PRODUCTION FORECAST

At its peak the plant will be able to produce about Billets 3000 tons and wire rods 2000 tons per month as per following breakdown;

ITEM	***Capacity per month in TONS***	***Capacity per year in TONS***
Billets	**3000**	**36,000**
Wire Rods	**2000**	**24,000**
	5000	**60,000**

7.0 THE MARKET

7.1 Demand & Supply

The new estimates of the World Steel Association, shows the global steel demand growth in 2021 will amount to 4.1% (from 1725 million tons of finished products in 2020, to 1795 million tons in 2021). Demand for steel products in emerging markets is forecasted to amount to **approximately 1.5 billion metric tons in 2021**. Emerging markets, India and China in particular, play a significant role in the global demand for steel products (*From internet*). The growth in the construction sector was attributed to growing public investments (construction of standard gauge railway, bridges, airports, and roads, expansion of ports), as well as on-going rehabilitation of meter-gauge railway (Bank of Tanzania (BoT),). Tanzania is characterized by small number of producers of steel products but it has been established that imports of steel is increasing. Major importers are local steel producers, traders, builders (contractors) and Government entities. The major sourcing countries are China, Turkey, South Africa and Ukraine. The main reasons for the increased importation are because of a high demand of high tensile strength steel.

Tanzania has low exports than imports. Local producers supply to Rwanda, Burundi, Uganda and Kenya markets. Based on the above analysis, with the intended installed capacity of **5000 metric tonnes** per month, the company will not face any marketing problems. Furthermore, the company will also benefit as there are already in the steel market, and hence will anticipate strong sales and a positive cash flow**.**

7.2 Market Environment

Given trade liberalisation, deconfinement and prices decontrol, the national market environmental is generally expected to be competitive.

For the Steel industry, analysis indicates that continued shortage of these products limits competition in the industry. The market demand for billets and wire rods products is high and increasing. Going by the Steel Manufacturers Association, almost all plants in Tanzania are operating at less than 22 per cent of their in-built capacity as a result of the cheap imports choking the market. Products from these processing industries are substantially more stable and attractive, and serve basic infrastructure industries, like water supply, sewerage disposal, telecommunication, electricity distribution, gas distribution, plant and equipment installations and irrigation.

8.0 FINANCIAL ANALYSIS

8.1 Fundamental Assumptions

The preparations of the financial projections took into account the following main assumptions;

i) The operating period under which the project will be reviewed is 10 years

ii) The operation costs have been taken to be 90% of the total revenue

iii) The Capital Cost Summary of the establishment is as below and is reproduced below for ease of reference.

The above cost estimates have already considered the cost of installing new machinery and equipment in the new building on site.

VALUE IS US $

CAPITAL ITEMS	TOTAL
Land & Buildings	**1,000,000**
Plant &machinery	**2,500,00**
Motor Vehicles	**500,000**
Furniture & Fittings	**-**
Pre-Operational Expenses	**-**
Others	**-**
Total initial fixed investment	**4,000,000**
Initial Working Capital	**-**
TOTAL INVESTMENT	**4,000,000**

8.2 Proposed Sources of Finance

The project cost of USD 4.0 million will be financed by the shareholders of the company and the sponsors will also look for the term loan from various banks both internal and abroad. The financing pattern is as shown below.

SOURCE	US$
Fixed Assets	
Equity	**3,000,000**
Term loan	**1,000,000**
GRAND TOTAL	**4,000,000**

8.3 Financial Analysis

8.3.1 Operating Costs

The operating costs have been estimated to be 90 % of the total revenue. Costs include salaries and wages and administrative overheads.

8.3.2 Projected Profitability

On the basis of the assumptions the operations of the project are profitable throughout the projected period of 10 years. Net profit rises from **USD2.59 M.** in the first year and rises to **US $ 3.26 M** in the tenth year.

8.3.3 Liquidity Projections

The projections take into account the assumed sources and applications for funds over the planned period and show the ability of the project to meet capital expenditure.

8.4 Financial Review

- The project is profitable and the liquidity position of the project is sound and that is should be able to meet its commitments easily

- The operations are financially and technically viable

9.0 Conclusion and Recommendation

The above study of the project reveals that the project is technically, commercially and economically feasible, viable and is desirable for country's economy.

In light of anticipated financial, social and development benefits the project qualifies for positive recommendation for immediate implementation. The plant will help meet the high demand for billets and wire rods in Tanzania especially to local manufactures and neighbouring countries and also help to fight off under-valued, under-declared and substandard steel imports from other parts of the world that have flooded the market. Since the promoters are confident of arranging the required funds and of establishing the project within the committed time frame the conclusion is to recommend to all concerned authorities to accord utmost support to this project so as to enable the country to realize the benefits as perceived in this report.

STEEL MASTERS LIMITED
INVESTMENT COST

US$

CAPITAL ITEMS	TOTAL
Land & Buildings	**1,000,000**
Plant &machinery	**2,500,00**
Motor Vehicles	**500,000**
Furniture & Fittings	**-**
Pre-Operational Expenses	**-**
Others	**-**
Total initial fixed investment	**4,000,000**
Initial Working Capital	**-**
TOTAL INVESTMENT	**4,000,000**

STEEL MASTERS LIMITED
PROJECT FINANCING

SOURCE	US$
Fixed Assets	
Equity	**3,000,000**
Short term loan	**1,000,000**
GRAND TOTAL	**4,000,000**

STEEL MASTERS LIMITED
DEPRECIATION SCHEDULE

USD

		Rate	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Land & Buildings	1,000,000	4%	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Plant & Machinery	2,500,000	12.5 %	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	-	-
Vehicles	500,000	25%	125,000	125,000	125,000	125,000	-	-	-	-	-	
Total			477,000	477,000	477,000	477,000	352,000	352,000	352,000	352,000	40,000	40,000

STEEL MASTERS LIMITED
SALES REVENUE

USD

YEAR	1	2	3	4	5	6	7	8	9	10
	70	80	100	100	100	100	100	100	100	100
CAPACITY PER ANNUM IN Tons	42,000	48,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
SALES REVENUE	32,307,690	36,923,076	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846
TOTAL SALES REVENUE	32,307,690	36,923,076	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846

STEEL MASTERS LIMITED
PROFIT & LOSS FORCAST

US$

	1	2	3	4	5	6	7	8	9	10
	70	**80**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
TURNOVER Sale of steel products	32,307,690	36,923,076	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846	46,153,846
Operating costs	29,076921	33,230,768	41,538,461	41,538,461	41,538,461	41,538,461	41,538,461	41,538,461	41,538,461	41,538,461
Contribution Margin	3,230,769	3,692,308	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385
GROSS PROFIT	3,230,769	3,692,308	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385
OTHER COSTS Depreciation	477,000	477,000	477,000	477,000	352,000	352,000	352,000	352,000	40,000	40,000
Profit before tax	**3,707,769**	**4,169,308**	**4,663,085**	**4,663,085**	4,967,385	4,967,385	4,967,385	4,967,385	4,655,385	4,655,385
OPERATING PROFIT	**3,707,769**	**4,169,308**	**4,663,085**	**4,663,085**	4,967,385	4,967,385	4,967,385	4,967,385	4,655,385	4,655,385
Taxation 30%	1,112,331	1,250,792	1,398,926	1,398,926	1,490,216	1,490,216	1,490,216	1,490,216	1,396,616	1,396,616
NET PROFIT	**2,595,438**	**2,918,516**	**3,264,159**	3,264,159	3,477,169	3,477,169	3,477,169	3,477,169	3,258,769	3,258,769
CUMULATIVE	**2,595,438**	**5,513,954**	**8,778,113**	**12,042,272**	**15,519,441**	**18,996,610**	**22,473,779**	**25,950,948**	**29,909,717**	**32,468,486**

STEEL MASTERS LIMITED
PROJECTED CASHFLOWS

USD

Sources		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Profit before interest and depreciation		3,230,769	3,692,308	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385	4,615,385
Loan	1,000,000	-	-	-	-	-	-	-	-	-	-
Equity	3,000,000	-	-	-	-	-	-	-	-	-	-
Total sources	**4,000,000**	**3,230,769**	**3,692,308**	**4,615,385**	**4,615,385**	**4,615,385**	**4,615,385**	**4,615,385**	**4,615,385**	**4,615,385**	**4,615,385**
Applications											
Capital expenditure	**4,000,000**			-	-	-	-	-	-	-	-
Tax	-	1,112,331	1,250,792	1,398,926	1,398,926	1,490,216	1,490,216	1,490,216	1,490,216	1,396,616	1,396,616
Sub-Total	**4,000,000**	1,112,331	1,250,792	1,398,926	1,398,926	1,490,216	1,490,216	1,490,216	1,490,216	1,396,616	1,396,616
Total Applications	**4,000,000**	**1,112,331**	**1,250,792**	**1,398,926**	**1,398,926**	**1,490,216**	**1,490,216**	**1,490,216**	**1,490,216**	**1,396,616**	**1,396,616**
Net -working capital	**-**	**2,118,438**	**2,441,516**	**3,225459**	**3,225459**	**3,125,169**	**3,125,169**	**3,125,169**	**3,125,169**	**3,218,769**	**3,218,769**