PROJECT REPORT

OF

CONNECTING ROD MANUFACTURING UNIT

PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding Connecting Rod Manufacturing Unit

The objective of the pre-feasibility report is primarily to facilitate potential entrepreneurs in project identification for investment and in order to serve his objective; the document covers various aspects of the project concept development, start-up, marketing, finance and management.

[We can modify the project capacity and project cost as per your requirement. We can also prepare project report on any subject as per your requirement.]

SAMADHAN
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PROJECT AT GLANCE

1	**Name of Proprietor/Director**	XXXXXXXX
2	**Firm Name**	XXXXXXXX
3	**Registered Address**	XXXXXXXX
4	**Nature of Activity**	XXXXXXXX
5	**Category of Applicant**	XXXXXXXX
6	**Location of Unit**	XXXXXXXX
7	**Cost of Project**	21.86 Rs. In Lakhs
8	**Means of Finance**	
i)	**Own Contribution**	2.19 Rs. In Lakhs
ii)	**Term Loan**	13.05 Rs. In Lakhs
iii)	**Working Capital**	6.62 Rs. In Lakhs
9	**Debt Service Coverage Ratio**	2.84
10	**Break Even Point**	0.32
11	**Power Requiremnet**	25 KW
12	**Employment**	9 Persons
13	**Major Raw Materials**	Steel forged blanks (EN-9 Grade),Bearing Cap Bolts,Bushings,Oil & Lubricants

14 Details of Cost of Project & Means of Finance

Cost of Project **Amount in Lacs**

Particulars	Amount
Building & Civil Work	Owned/Leased
Plant & Machinery	12.50
Other Misc Assets	1.50
Furniture	0.5
Working Capital Requirement	7.36
Total	**21.86**

Means of Finance

Particulars	Amount
Own Contribution	2.19
Term Loan	13.05
Working capital Loan	6.62
Total	**21.86**

1. INTRODUCTION

The connecting rod is constructed of forged steel and has an I-beam cross-section. Connecting rods are also made of aluminum alloy. To keep the engine balanced, they are perfectly matched in sets of comparable weight. Because the reciprocating weight is smaller, the lighter the connecting rod and piston, the higher the resultant power and the lower the vibration. The connecting rod transmits the power push from the piston to the crankpin, thus it must be extremely robust, stiff, and light. The connecting rod connects the piston to the crankshaft in a piston engine. The connecting rod, working in tandem with the crank, turns the piston's reciprocating action into crankshaft rotation. The piston's compressive and tensile forces must be transmitted through the connecting rod. It permits pivoting on the crankshaft in its most basic form in an internal combustion engine. It permits pivoting on the piston end and rotation on the shaft end in its most common configuration in an internal combustion engine.

A mechanic connection employed by water mills to transform rotational action of the water wheel into reciprocating motion is the forerunner to the connecting rod. Connecting rods are most often seen in internal combustion engines and steam engines. A connecting rod for an internal combustion engine consists of the 'big end', 'rod' and 'small end' (or 'little end'). The small end attaches to the gudgeon pin (also called 'piston pin' or 'wrist pin'), which can swivel in the piston. Typically, the big end connects to the crankpin using a plain bearing to reduce friction; however some smaller engines may instead use a rolling-element bearing, in order to avoid the need for a pumped lubrication system.

Parts of connecting Rod-

- Small End- The tiny end of the connecting rod is the end of the connecting rod that is connected to the face of the piston pin.
- Big End- The large end of the connecting rod is the end of the connecting rod that is connected to the side of the crank pin.
- Bush Bearing- A bush bearing is used to secure both ends of the connecting rod. The crankpin is connected to the big end. The end is split into two halves and rests on the crank bearing shell.
- Bearing Insert- A bearing insert, which is linked to the bearing cap at the connecting rod's large end, is known as a bearing insert.
- Bolt and Nut- After the connecting rod is secured to the crank at the bottom, bolts and nuts are used to secure both sides of the large ends. As a result, the connecting rod is ready to use after assembling all of the components.
- Shank- Additionally, each bolts and nuts are used to attach the connecting rod to the bearing cap. When a section beam is used, it is referred to as a shank. The rod's portion might be rectangular, tubular, or circular in shape.
- Wrist Pin- The engine piston is linked to the connecting rod by a wrist pin, which is a hollow hardened steel tube. Gudgeon pin is another name for it. The wrist pin pivots on the engaged piston after passing through the short end of the connecting rod.
- Piston- The piston is linked to the crankshaft via a connecting rod, which is commonly referred to as the rod or Conrod. The piston's job is to act as a moveable plug in the cylinder, which creates the combustion chamber's bottom.
- Bearing Cap- Shell bearings have a wear adjustment, but it also controls the running and allows the bearing cover to be adjusted properly.

Connecting Rod is an internal combustion engine's connecting rod is a critical component. The project focuses on material selection, design considerations, and a comparison of manufacturing processes, equipment, tools, and gauges used in the manufacture of connecting rods from a rod to a final product.

2. PRODUCT DESCRIPTION

2.1 PRODUCT USES

The connecting rod is a piece of metal that connects the piston to the crankshaft. It connects the piston and crankpin pins. The piston pin is linked to the small end of the connecting rod, whereas the crank pin is connected to the big end. The connecting rod's job is to transform the piston's linear motion into the rotational motion of the crankshaft.

2.2 RAW MATERIAL REQUIREMENT

- Steel forged blanks (EN-9 Grade)
- Bearing Cap Bolts
- Bushings
- Oil & Lubricants

2.3 MANUFACTURING PROCESS

Small end and big end bearings are the two sorts of ends. To allow it to be built on the crankpin, the large end is divided at right angles to its length (a) or at an angle (b). Two bolts and nuts secure a cap to the connecting rod's body. Bearing metal is no longer fused to the bore of a large end in modern engines; instead, separate low carbon steel bearing shells are utilised. The connecting rod manufacturing processes include the following main steps:

- Raw material procurement and quality testing is don based on the requirement for the product.
- Based on the product design and dimension, raw forged blanks are brought from the inventory to production unit and later these blanks are surfaced finished in short blasting machine.

- After this, these blanks are mounted on a lathe machine, where the finishing is done based on the product required product design.
- The next step is to mark a dimeter hole at the edge of the rod piston with the help of VMC machine.
- After this at the bearing end of the rod desired specification marking is done and later with the help of VMC machine boring operation is done at the bearing end of the rod.
- In the next step at the bearing flat surfaces, face milling is done and for mounting the bolt at the connecting rods bearing end, required dimension drilling is done.
- After this with the help of cap bolt connecting rod and bearing cap is assembled together. Later the product finishing is done based on the required dimension and with the help of hydraulic press machine, bushings are precisely mounted at the small end of the pistons.
- Oil if sprayed over the rods after the quality testing of the rods, to protect them from rusting.
- The product is finally ready and packed according to the desired quantity for sale in the market.

3. PROJECT COMPONENTS

3.1 Land /Civil Work

An area of almost 3000-5000 square feet would be required to set up Auto parts connecting Rod manufacturing plant. This space would be required for raw materials storage, production, packaging, storage of finished goods, and administrative work. We have not considered the cost of Land purchase & Building Civil work in the project. It is assumed that land & building will be on rent & approx. rental of the same will be Rs.20000-30000 per month.

3.2 Plant & Machinery

- Shot Blasting Machine- Shot blasting is a technique for cleaning, strengthening, and polishing metal. Almost every industry that employs metal, such as aerospace, automotive, construction, foundry, shipbuilding, rail, and many more, requires shot blasting.

- Lathe Machine- A lathe is a machining tool that is used primarily for **shaping metal or wood**. It works by rotating the workpiece around a stationary cutting tool.

- CNC Machine- CNC machines are utilized for a variety of machining processes in these industries, including shearing, flame or plasma cutting, punching, laser cutting, forming, and welding, among others.

- VMC Machine- VMCs may be used for a variety of tasks, including drilling, carving, engraving, tapping, countersinking, chamfering, and more.

- Drilling Machine- A drilling machine is a machine tool that is generally used to drill holes or drive screws. Drilling is done with a drilling machine, which is also a processing technique that is frequently employed in manufacturing.

- Milling Machine- Milling machines are mostly used to shape and cut solid materials like metal, wood, plastics, and even brass. These machines vary from lathes in that the tool head spins at a fast speed, whereas the component being worked on rotates on a lathe.

- Cutter Grinding- Sharpening milling cutters and tool bits, as well as a variety of other cutting instruments, is done with a tool and cutter grinder. It's a very adaptable equipment that can grind a range of surfaces, cylindrical forms, and complicated shapes.

- Hydraulic Press- Forging, clinching, molding, blanking, punching, deep drawing, and metal shaping are all typical uses for hydraulic presses. In manufacturing, the hydraulic press is useful since it allows for the creation of more complex forms while still being material efficient.

- Dot Peen Marking Machine- Dot peening is a quick, low-stress, and extremely adaptable way to permanently brand metal. Dot peen marking machines use a solenoid-driven pin to create a sequence of dots that may be programmed to mark text and pictures, and are excellent for 2D Data Matrix barcodes.

Other Equipment's:

- Profile Dies
- Machining Tool Set
- Jigs & Fixtures
- Vernier Calliper
- Dial Bore Gauge
- Micrometre
- Bins
- Conveyor

3.3 Misc. Assets

The miscellaneous assets include Production line conveyor belt, Molds, electric drills, pillar drill, Jigs and fixtures, safety equipment, instrument chart and accessories, cleaning materials of the plants, computer, printer, furniture, and other electrical equipments.

4. LICENSE & APPROVALS

To start Connecting Rod manufacturing process the different licenses and registrations from the different authorities regarding the area and machineries must be obtained initially. These laws vary from one state to the other. Besides them, the other certificates that must be obtained are:

1. MSME UDYAM Online registration
2. The GST (Goods and Service Tax) certification.
3. NOC from Fire Board.
4. NOC from Pollution Board.
5. Trademark (choice of brand name optional).

PROJECTED BALANCE SHEET

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Liabilities					
Capital					
Opening Balance		4.04	6.66	9.83	12.41
Add:- Own Capital	2.18				
Add:- Retained Profit	4.86	6.02	7.67	8.58	10.01
Less:- Drawings	3.00	3.40	4.50	6.00	7.30
Closing Balance	**4.04**	**6.66**	**9.83**	**12.41**	**15.12**
Term Loan	11.60	8.70	5.80	2.90	- 0.00
Working Capital Limit	6.59	6.59	6.59	6.59	6.59
Sundry Creditors	2.11	3.01	3.18	3.84	4.28
Provisions & Other Liabilities	1.50	2.00	3.00	3.50	4.20
TOTAL :	**25.84**	**26.96**	**28.40**	**29.24**	**30.19**
Assets					
Fixed Assets (Gross)	14.50	14.50	14.50	14.50	14.50
Gross Depriciation	2.15	3.98	5.54	6.86	7.99
Net Fixed Assets	**12.35**	**10.52**	**8.96**	**7.64**	**6.51**
Current Assets					
Sundry Debtors	3.33	3.33	3.77	4.24	4.73
Stock in Hand	6.09	6.96	7.86	8.82	9.84
Cash and Bank	2.06	2.15	3.31	3.54	3.62
Loans & Advances/Other Current Assets	2.00	4.00	4.50	5.00	5.50
TOTAL :	**25.84**	**26.96**	**28.40**	**29.24**	**30.19**

PROJECTED PROFITABILITY STATEMENT

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Capacity Utilisation %	**45%**	**50%**	**55%**	**60%**	**65%**
SALES					
Gross Sale					
CONNECTING RODS	83.36	99.92	113.17	127.23	141.92
Total	**83.36**	**99.92**	**113.17**	**127.23**	**141.92**
COST OF SALES					
Raw Material Consumed	52.65	60.26	68.21	76.75	85.68
Electricity Expenses	2.16	2.40	2.64	2.88	3.12
Depreciation	2.15	1.83	1.56	1.33	1.13
Wages & labour	7.20	8.28	9.52	10.95	12.59
Repair & maintenance	1.67	2.00	3.00	3.37	3.55
Consumables	1.67	2.50	2.26	2.54	2.84
Packaging cost	1.67	1.75	1.70	1.91	2.13
Cost of Production	69.16	79.01	88.89	99.73	111.04
Add: Opening Stock	-	3.46	3.95	4.44	4.99
Less: Closing Stock	3.46	3.95	4.44	4.99	5.55
Cost of Sales	65.70	78.52	88.40	99.19	110.47
GROSS PROFIT	**17.66**	**21.41**	**24.77**	**28.04**	**31.44**
Salary to Staff	5.40	6.21	7.14	8.21	9.44
Interest on Term Loan	1.28	1.13	0.81	0.49	0.17
Interest on working Capital	0.72	0.72	0.72	0.72	0.72
Rent	3.60	4.14	4.76	5.48	6.30
Selling & Administration Expenses	1.67	3.00	3.40	3.50	3.55
TOTAL	**12.67**	**15.20**	**16.83**	**18.40**	**20.19**
NET PROFIT	4.98	6.20	7.94	9.64	11.26
Taxation	0.12	0.19	0.27	1.05	1.25
PROFIT (After Tax)	4.86	6.02	7.67	8.58	10.01
GROSS PROFIT RATIO	21.18%	21.42%	21.89%	22.04%	22.16%
NET PROFIT RATIO	5.98%	6.21%	7.01%	7.57%	7.93%

PROJECTED CASH FLOW STATEMENT

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
SOURCES OF FUND					
Own Margin	2.18				
Net Profit	4.98	6.20	7.94	9.64	11.26
Depriciation & Exp. W/off	2.15	1.83	1.56	1.33	1.13
Increase in Cash Credit	6.59	-	-	-	-
Increase In Term Loan	13.05	-	-	-	-
Increase in Creditors	2.11	0.91	0.17	0.65	0.45
Increase in Provisions & Other liabilities	1.50	0.50	1.00	0.50	0.70
TOTAL :	**32.56**	**9.44**	**10.67**	**12.12**	**13.53**
APPLICATION OF FUND					
Increase in Fixed Assets	14.50				
Increase in Stock	6.09	0.87	0.89	0.97	1.01
Increase in Debtors	3.33	- 0.00	0.44	0.47	0.49
Repayment of Term Loan	1.45	2.90	2.90	2.90	2.90
Loans & Advances/Other Current Assets	2.00	2.00	0.50	0.50	0.50
Drawings	3.00	3.40	4.50	6.00	7.30
Taxation	0.12	0.19	0.27	1.05	1.25
TOTAL :	**30.50**	**9.35**	**9.51**	**11.89**	**13.45**
Opening Cash & Bank Balance	-	2.06	2.15	3.31	3.54
Add : Surplus	2.06	0.09	1.16	0.23	0.08
Closing Cash & Bank Balance	**2.06**	**2.15**	**3.31**	**3.54**	**3.62**

CALCULATION OF D.S.C.R

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
CASH ACCRUALS	6.89	7.80	8.71	9.40	10.57
Interest on Term Loan	1.28	1.13	0.81	0.49	0.17
Total	8.17	8.93	9.52	9.89	10.74
REPAYMENT					
Instalment of Term Loan	1.45	2.90	2.90	2.90	2.90
Interest on Term Loan	1.28	1.13	0.81	0.49	0.17
Total	2.73	4.03	3.71	3.39	3.07
DEBT SERVICE COVERAGE RATIO	**2.99**	**2.22**	**2.57**	**2.92**	**3.50**
AVERAGE D.S.C.R.					**2.84**

REPAYMENT SCHEDULE OF TERM LOAN							
					Interest	11.00%	
Year	**Particulars**	**Amount**	**Addition**	**Total**	**Interest**	**Repayment**	**Closing Balance**
ist	Opening Balance	-					
	1st month		13.05	13.05	-	-	13.05
	2nd month	13.05	-	13.05	0.12	-	13.05
	3rd month	13.05	-	13.05	0.12	-	13.05
	4th month	13.05		13.05	0.12	-	13.05
	5th month	13.05	-	13.05	0.12	-	13.05
	6th month	13.05	-	13.05	0.12	-	13.05
	7th month	13.05	-	13.05	0.12	0.24	12.81
	8th month	12.81	-	12.81	0.12	0.24	12.57
	9th month	12.57	-	12.57	0.12	0.24	12.33
	10th month	12.33	-	12.33	0.11	0.24	12.08
	11th month	12.08	-	12.08	0.11	0.24	11.84
		11.84	-	11.84	0.11	0.24	11.60
					1.28	1.45	
2nd	Opening Balance						
	1st month	11.60	-	11.60	0.11	0.24	11.36
	2nd month	11.36	-	11.36	0.10	0.24	11.12
	3rd month	11.12	-	11.12	0.10	0.24	10.88
	4th month	10.88	-	10.88	0.10	0.24	10.63
	5th month	10.63	-	10.63	0.10	0.24	10.39
	6th month	10.39	-	10.39	0.10	0.24	10.15
	7th month	10.15	-	10.15	0.09	0.24	9.91
	8th month	9.91	-	9.91	0.09	0.24	9.67
	9th month	9.67	-	9.67	0.09	0.24	9.42
	10th month	9.42	-	9.42	0.09	0.24	9.18
	11th month	9.18	-	9.18	0.08	0.24	8.94
	12th month	8.94	-	8.94	0.08	0.24	8.70
					1.13	**2.90**	
3rd	Opening Balance						
	1st month	8.70	-	8.70	0.08	0.24	8.46
	2nd month	8.46	-	8.46	0.08	0.24	8.22
	3rd month	8.22	-	8.22	0.08	0.24	7.97
	4th month	7.97	-	7.97	0.07	0.24	7.73
	5th month	7.73	-	7.73	0.07	0.24	7.49
	6th month	7.49	-	7.49	0.07	0.24	7.25
	7th month	7.25	-	7.25	0.07	0.24	7.01
	8th month	7.01	-	7.01	0.06	0.24	6.77
	9th month	6.77	-	6.77	0.06	0.24	6.52
	10th month	6.52	-	6.52	0.06	0.24	6.28
	11th month	6.28	-	6.28	0.06	0.24	6.04
	12th month	6.04	-	6.04	0.06	0.24	5.80
					0.81	**2.90**	

4th	1st month	5.80	-	5.80	0.05	0.24	5.56
	2nd month	5.56	-	5.56	0.05	0.24	5.32
	3rd month	5.32	-	5.32	0.05	0.24	5.08
	4th month	5.08	-	5.08	0.05	0.24	4.83
	5th month	4.83	-	4.83	0.04	0.24	4.59
	6th month	4.59	-	4.59	0.04	0.24	4.35
	7th month	4.35	-	4.35	0.04	0.24	4.11
	8th month	4.11	-	4.11	0.04	0.24	3.87
	9th month	3.87	-	3.87	0.04	0.24	3.63
	10th month	3.63	-	3.63	0.03	0.24	3.38
	11th month	3.38	-	3.38	0.03	0.24	3.14
	12th month	3.14	-	3.14	0.03	0.24	2.90
					0.49	**2.90**	
5th	Opening Balance						
	1st month	2.90	-	2.90	0.03	0.24	2.66
	2nd month	2.66	-	2.66	0.02	0.24	2.42
	3rd month	2.42	-	2.42	0.02	0.24	2.18
	4th month	2.18	-	2.18	0.02	0.24	1.93
	5th month	1.93	-	1.93	0.02	0.24	1.69
	6th month	1.69	-	1.69	0.02	0.24	1.45
	7th month	1.45	-	1.45	0.01	0.24	1.21
	8th month	1.21	-	1.21	0.01	0.24	0.97
	9th month	0.97	-	0.97	0.01	0.24	0.72
	10th month	0.72	-	0.72	0.01	0.24	0.48
	11th month	0.48	-	0.48	0.00	0.24	0.24
	12th month	0.24	-	0.24	0.00	0.24	(0.00)
					0.17	**2.90**	

DOOR TO DOOR	60	MONTHS
MORATORIUM PERIOD	6	MONTHS
REPAYMENT PERIOD	54	MONTHS

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