PROJECT REPORT

OF

AUTO ENGINE CYLINDER FOR TWO-WHEELER PRODUCTION UNIT

PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding Auto Engine Cylinder for Two - wheeler Production 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.]

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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**	20.10 Rs. In Lakhs
8	**Means of Finance**	
i)	**Own Contribution**	2.01 Rs. In Lakhs
ii)	**Term Loan**	14.85 Rs. In Lakhs
iii)	**Working Capital**	3.24 Rs. In Lakhs
9	**Debt Service Coverage Ratio**	2.51
10	**Break Even Point**	0.21
11	**Power Requiremnet**	18 KW
12	**Employment**	7 Persons
13	**Major Raw Materials**	Grey Cast Iron,Aluminum Alloy,Compacted graphite cast iron etc

14 Details of Cost of Project & Means of Finance

Cost of Project **Amount in Lacs**

Particulars	Amount
Land	Owned/Leased
Building & Civil Work	Owned/Leased
Plant & Machinery	15.00
Other Misc Assets	1.50
Working Capital Requirement	3.60
Total	**20.10**

Means of Finance

Particulars	Amount
Own Contribution	2.01
Term Loan	14.85
Working capital Loan	3.24
Total	**20.10**

1. INTRODUCTION

The cylinder is the space through which the piston travels, propelled to the energy generated from the combustion of the air/fuel mixture in the combustion chamber.The cylinder is the power unit of the engine. This is where fuel is burned and converted into mechanical energy that powers the vehicle. The number of cylinders in a typical engine could be four, six or eight. The cylinder is made of metal and is sealed shut. It contains a piston that moves up and down, compressing the fuel, which ignites and causes combustion. There are two valves at the top of the cylinder; an inlet valve and an outlet valve. The inlet valve is where the fuel and air enter the cylinder from the carburettor or electric fuel injector, and the outlet valve is where exhaust gases escape. The exhaust gases created during combustion in the cylinder rotate an axle known as the crankshaft. These are connected to the bottom of the cylinder which in turn powers the gearbox that drives the wheels. The more cylinders there are, the more pistons are combusting the fuel, and therefore more power is generated. Cylinders can be laid out under the bonnet in a straight line, in two rows or in a flat arrangement. Grey smoke is a good indicator that your cylinders are not working efficiently and the engine is overheating. Leaks can be obvious, particularly on dry days. If there's a puddle of liquid underneath your car you might want to check its coolant levels. Cylinder pressure should be balanced to maintain efficient combustion and good engine condition.

2. PRODUCT DESCRIPTION

2.1 PRODUCT USES

A cylinder is a vital part of the engine. It's a chamber where fuel is combusted and power is generated. The cylinder consists of a piston and two valves at the top; an inlet and exhaust valves. The piston moves up and down, and its reciprocating motion generates power that moves your vehicle.

2.2 PRODUCT RAW MATERIAL

- **Grey Cast Iron:** The engine block has been manufactured using cast iron alloys, it is due to its strength and low cost and its wear resistance. But as the engine become more complicated engineers found new materials to reduce its weight as well as to increase strength and wear resistance.
- **Aluminum Alloy:** The aluminum block is much lighter. Various types of materials are combined to increase strength. In the following sections, we will look at the blocks of two-stroke engines. A commonly used alloy for engines is the aluminum alloy A356 which is an Al-Si casting alloy. It has good cast ability, which is important for shapes as complex as engine blocks, and good mechanical properties. However, the cylinders are commonly lined with cast iron liners to provide increased wear resistance.
- **Compacted graphite cast iron**: Compacted graphite cast iron has a higher tensile strength and modulus of elasticity compared with grey cast iron. It is due to the compact graphite found on the microstructure of CGI. Similar to grey cast iron it has a good damping absorption and thermal conduction, but its low inability has limited its wide usage.

2.3 MANUFACTURING PROCESS

This process can be broken down into the following steps-

- **Raw material procurement**
- **Production Process**
- **Quality control**

- **Raw Material Procurement**

The raw materials are checked strictly as per established quality standards and requirements. Individual supplier assessment and supplier rating are done depending upon the rejection levels at the incoming quality control stage. Sorting of raw material will be done as per material type or specifications. The material will be stored in; dust-free, neat, and clean environment.

- **Production Process**

✓ **Steps involved in the manufacturing of cylinder block:**

- **Preparation of pattern:** The term green denotes the present of moisture in the sand mold. A combination of silica sand, clay, and water are poured in to the one half of the aluminum block pattern with wood or metal frame. The mold is then compacted by applying pressure or vibrating on the metal frame
- **Preparation of Mold (Negative impression of the product):** The core has been painted to seal the gas formed during the casting process within the core. And the pink colure ends are not painted to let the gas escape to the outside. Aluminum reinforcing rods are used to give more strength to the core. These rods get melted due to the molten metal poured during casting
- **Injection of molten liquid into the mold cavity (Sand casting):** The sand-casting processors the widely used in engine block casting is green sand mold casting. The term green denotes the present of moisture in the sand mold. A combination of silica sand, clay, and water are poured in to the one half of the aluminum block pattern with wood or metal frame The sand molds used to cast engine metal can be used only once. Zircon sand, glue and a hardener are mixed and shaped into sections. This is then solidified with gas. The sections are glued together to form the entire mold in which the engine block is cast.
- **Removal of mold from casting:** The molten metal is poured in to the mold through the smaller front center hole which fills the mold from bottom back up to the top through the risers, which can be seen as 8 large holes. When the casting is cooling down the molten metal in the riser is drawn back down in to the casting. The risers act a main part in the casting process by supplying required molten metal during shrinkage.
- **Machining for desired dimension**: The rough aluminum block casting is shown above after the removal of the sand mold. The sand is removed by applying vibrating on the casting. The casting has to be machined to get correct dimensions and smooth surfaces of the engine cylinder.

- **Quality Control:** The quality of the sand used widely affects the surface finish of the engine block. The sand should contain these features to get the required finish.

(a) Strength of the sand has to be high to maintain a rigid shape.

(b) Permeability is the size of the sand grains. Higher permeability can reduce the porosity of the mold, but a lower permeability would let to have a good surface finish.

(c) The thermal stability of the mold should be high to resist the damages such as cracking due to the molten metal.

✓ **Possible Defects:**

If the permeability of the sand used for casting is high, the strength and the surface finish of the mold will be reduced.

- ❖ If the thermal stability of the sand is low, the mold may crack due to the molten metal.
- ❖ If the compression of the sand is low the casting would not be able to shrink and will end up with cracking.
- ❖ If the risers get solidified before the other parts of the casting, it would give a engine block with less strength.

3. PROJECT COMPONENTS

3.1 Land & Building

The land required for this manufacturing unit will be approx. around 2000 square feet. Land Purchase and Building Civil Work Cost have not been considered as part of the cost of project. It is expected that the premises will be on rental and approximate rentals assumed of the same will be Rs.12,000 per month.

Land and building requirement may vary depending on the size of project.

3.2 Plant & Machinery

This is a semi-automatic type of plant and the production capacity is set to be 72 pieces of auto engine cylinder for two-wheeler per day.

Machines-

- **Metal melting rotary furnace:**

It is very flexible and universal equipment used for recycling many non-ferrous metals. Offered range generates high pollution both as flue gases fugitive emissions. This furnace can be scalable for installing higher capacities, recovers all lead in one production cycle and can be fired with various fuels. Figure 2 has shown about the electric furnace for melting of cast iron.

Figure 2: Furnace for melting of cast iron

- **Mold for auto engine cylinder:** The molten metal is poured in the mold cavity to obtain the desired cylinder shape. There is one of the intermediate equipment to collect molten metal and pour the molten metal in into the mold cavity. Figure 3 has shown about an arbitrary silicon mold for casting iron furniture.

Figure 3: Mold for auto engine cylinder

- **Machining of auto engine cylinder:** The boring machine is used for finishing the in-cylinder surface. The solution produces excellent roundness and cylindricity, allowing for a smooth finishing operation.

- **Flexible Grinder:** This is use to machine the outer surface of the cylinder.

4. LICENSE & APPROVALS

Basic registration required in this project:

- Company registration
- GST registration
- Trade license
- Factory license.
- MSME Udyam registration
- BIS certification
- NOC from the Pollution Department

PROJECTED BALANCE SHEET **(in Lacs)**

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Liabilities					
Capital					
Opening balance		3.65	6.16	9.05	12.46
Add:- Own Capital	2.01				
Add:- Retained Profit	3.64	4.81	6.39	8.71	11.15
Less:- Drawings	2.00	2.30	3.50	5.30	7.20
Closing Balance	**3.65**	**6.16**	**9.05**	**12.46**	**16.41**
Term Loan	13.20	9.90	6.60	3.30	-
Working Capital Limit	3.24	3.24	3.24	3.24	3.24
Sundry Creditors	1.44	1.76	2.11	2.49	2.91
Provisions & Other Liability	0.40	0.48	0.58	0.80	0.96
TOTAL :	**21.93**	**21.54**	**21.58**	**22.30**	**23.52**
Assets					
Fixed Assets (Gross)	16.50	16.50	16.50	16.50	16.50
Gross Dep.	2.48	4.58	6.37	7.89	9.18
Net Fixed Assets	**14.03**	**11.92**	**10.13**	**8.61**	**7.32**
Current Assets					
Sundry Debtors	1.92	2.40	2.88	3.40	3.97
Stock in Hand	3.11	3.79	4.52	5.31	6.16
Cash and Bank	0.87	0.93	1.24	1.77	2.27
Loans & Advances /Other Current Assets	2.00	2.50	2.80	3.20	3.80
TOTAL :	**21.93**	**21.54**	**21.58**	**22.30**	**23.52**

PROJECTED PROFITABILITY STATEMENT **(in Lacs)**

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Capacity Utilisation %	**30%**	**35%**	**40%**	**45%**	**50%**
SALES					
Gross Sale					
AUTO ENGINE CYLINDER FOR TWO	82.27	102.85	123.45	145.91	170.24
Total	**82.27**	**102.85**	**123.45**	**145.91**	**170.24**
COST OF SALES					
Raw Material Consumed	61.56	75.45	90.55	106.92	124.74
Electricity Expenses	0.91	1.06	1.21	1.36	1.51
Depreciation	2.48	2.10	1.79	1.52	1.29
Wages & labour	5.28	6.23	7.16	7.95	8.35
Repair & maintenance	0.82	1.03	1.23	1.46	1.70
Packaging	0.82	1.03	1.23	1.46	1.70
Cost of Production	71.87	86.90	103.18	120.67	139.30
Add: Opening Stock	-	1.68	2.03	2.41	2.82
Less: Closing Stock	1.68	2.03	2.41	2.82	3.25
Cost of Sales	70.19	86.55	102.80	120.26	138.86
GROSS PROFIT	**12.08**	**16.30**	**20.65**	**25.64**	**31.38**
	14.69%	**15.85%**	**16.73%**	**17.57%**	**18.43%**
Salary to Staff	3.48	4.70	6.15	7.14	8.14
Interest on Term Loan	1.46	1.29	0.92	0.56	0.20
Interest on working Capital	0.36	0.36	0.36	0.36	0.36
Rent	1.44	1.94	2.62	3.41	4.33
Selling & Administrative Exp.	1.65	3.09	3.70	4.38	5.11
TOTAL	**8.38**	**11.37**	**13.76**	**15.84**	**18.13**
NET PROFIT	3.70	4.93	6.89	9.80	13.25
Taxation	0.06	0.12	0.50	1.08	2.10
PROFIT (After Tax)	3.64	4.81	6.39	8.71	11.15
	4.50%	**4.80%**	**5.58%**	**6.72%**	**7.78%**

PROJECTED CASH FLOW STATEMENT					(in Lacs)
PARTICULARS	**1st year**	**2nd year**	**3rd year**	**4th year**	**5th year**
SOURCES OF FUND					
Own Margin	2.01				
Net Profit	3.70	4.93	6.89	9.80	13.25
Depreciation & Exp. W/off	2.48	2.10	1.79	1.52	1.29
Increase in Cash Credit	3.24	-	-	-	-
Increase In Term Loan	14.85	-	-	-	-
Increase in Creditors	1.44	0.32	0.35	0.38	0.42
Increase in Provisions & Other labilities	0.40	0.08	0.10	0.22	0.16
	-				
TOTAL:	**28.11**	**7.44**	**9.13**	**11.93**	**15.11**
APPLICATION OF FUND					
Increase in Fixed Assets	16.50				
Increase in Stock	3.11	0.67	0.73	0.79	0.85
Increase in Debtors	1.92	0.48	0.48	0.52	0.57
Repayment of Term Loan	1.65	3.30	3.30	3.30	3.30
Loans & Advances /Other Current Assets	2.00	0.50	0.30	0.40	0.60
Drawings	2.00	2.30	3.50	5.30	7.20
Taxation	0.06	0.12	0.50	1.08	2.10
TOTAL:	**27.24**	**7.38**	**8.82**	**11.40**	**14.62**
Opening Cash & Bank Balance	-	0.87	0.93	1.24	1.77
Add: Surplus	0.87	0.06	0.31	0.53	0.50
Closing Cash & Bank Balance	**0.87**	**0.93**	**1.24**	**1.77**	**2.27**

CALCULATION OF D.S.C.R

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
CASH ACCRUALS	6.12	6.92	8.18	10.23	12.44
Interest on Term Loan	1.46	1.29	0.92	0.56	0.20
Total	7.58	8.20	9.10	10.79	12.64
REPAYMENT					
Instalment of Term Loan	1.65	3.30	3.30	3.30	3.30
Interest on Term Loan	1.46	1.29	0.92	0.56	0.20
Total	3.11	4.59	4.22	3.86	3.50
DEBT SERVICE COVERAGE RATIO	**2.44**	**1.79**	**2.15**	**2.80**	**3.61**
AVERAGE D.S.C.R.					**2.51**

REPAYMENT SCHEDULE OF TERM LOAN							
					Interest		11.00%
Year	**Particulars**	**Amount**	**Addition**	**Total**	**Interest**	**Repayment**	**Closing Balance**
1st	Opening Balance						
	1st month	-	14.85	14.85	-	-	14.85
	2nd month	14.85	-	14.85	0.14	-	14.85
	3rd month	14.85	-	14.85	0.14	-	14.85
	4th month	14.85	-	14.85	0.14		14.85
	5th month	14.85	-	14.85	0.14		14.85
	6th month	14.85	-	14.85	0.14		14.85
	7th month	14.85	-	14.85	0.14	0.28	14.58
	8th month	14.58	-	14.58	0.13	0.28	14.30
	9th month	14.30	-	14.30	0.13	0.28	14.03
	10th month	14.03	-	14.03	0.13	0.28	13.75
	11th month	13.75	-	13.75	0.13	0.28	13.48
	12th month	13.48	-	13.48	0.12	0.28	13.20
					1.46	**1.65**	
2nd	Opening Balance						
	1st month	13.20	-	13.20	0.12	0.28	12.93
	2nd month	12.93	-	12.93	0.12	0.28	12.65
	3rd month	12.65	-	12.65	0.12	0.28	12.38
	4th month	12.38	-	12.38	0.11	0.28	12.10
	5th month	12.10	-	12.10	0.11	0.28	11.83
	6th month	11.83	-	11.83	0.11	0.28	11.55
	7th month	11.55	-	11.55	0.11	0.28	11.28
	8th month	11.28	-	11.28	0.10	0.28	11.00
	9th month	11.00	-	11.00	0.10	0.28	10.73
	10th month	10.73	-	10.73	0.10	0.28	10.45
	11th month	10.45	-	10.45	0.10	0.28	10.18
	12th month	10.18	-	10.18	0.09	0.28	9.90
					1.29	**3.30**	
3rd	Opening Balance						
	1st month	9.90	-	9.90	0.09	0.28	9.62
	2nd month	9.62	-	9.62	0.09	0.28	9.35
	3rd month	9.35	-	9.35	0.09	0.28	9.07
	4th month	9.07	-	9.07	0.08	0.28	8.80
	5th month	8.80	-	8.80	0.08	0.28	8.52
	6th month	8.52	-	8.52	0.08	0.28	8.25
	7th month	8.25	-	8.25	0.08	0.28	7.97
	8th month	7.97	-	7.97	0.07	0.28	7.70
	9th month	7.70	-	7.70	0.07	0.28	7.42
	10th month	7.42	-	7.42	0.07	0.28	7.15
	11th month	7.15	-	7.15	0.07	0.28	6.87
	12th month	6.87	-	6.87	0.06	0.28	6.60

					0.92	**3.30**	
4th	Opening Balance						
	1st month	6.60	-	6.60	0.06	0.28	6.32
	2nd month	6.32	-	6.32	0.06	0.28	6.05
	3rd month	6.05	-	6.05	0.06	0.28	5.77
	4th month	5.77	-	5.77	0.05	0.28	5.50
	5th month	5.50	-	5.50	0.05	0.28	5.22
	6th month	5.22	-	5.22	0.05	0.28	4.95
	7th month	4.95	-	4.95	0.05	0.28	4.67
	8th month	4.67	-	4.67	0.04	0.28	4.40
	9th month	4.40	-	4.40	0.04	0.28	4.12
	10th month	4.12	-	4.12	0.04	0.28	3.85
	11th month	3.85	-	3.85	0.04	0.28	3.57
	12th month	3.57	-	3.57	0.03	0.28	3.30
					0.56	**3.30**	
5th	Opening Balance						
	1st month	3.30	-	3.30	0.03	0.28	3.02
	2nd month	3.02	-	3.02	0.03	0.28	2.75
	3rd month	2.75	-	2.75	0.03	0.28	2.47
	4th month	2.47	-	2.47	0.02	0.28	2.20
	5th month	2.20	-	2.20	0.02	0.28	1.92
	6th month	1.92	-	1.92	0.02	0.28	1.65
	7th month	1.65	-	1.65	0.02	0.28	1.37
	8th month	1.37	-	1.37	0.01	0.28	1.10
	9th month	1.10	-	1.10	0.01	0.28	0.82
	10th month	0.82	-	0.82	0.01	0.28	0.55
	11th month	0.55	-	0.55	0.01	0.28	0.27
	12th month	0.27	-	0.27	0.00	0.27	-
					0.20	**3.30**	

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

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