

PROJECT REPORT

Of

HANDPUMP

PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding Handpump 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.]



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PROJECT AT GLANCE

1 Name of Proprietor/Director	XXXXXXXXXX
2 Firm Name	XXXXXXXXXX
3 Registered Address	XXXXXXXXXX
4 Nature of Activity	XXXXXXXXXX
5 Category of Applicant	XXXXXXXXXX
6 Location of Unit	XXXXXXXXXX
7 Cost of Project	23.02 Rs. In Lakhs
8 Means of Finance	
i) Own Contribution	2.30 Rs. In Lakhs
ii) Term Loan	16.29 Rs. In Lakhs
iii) Working Capital	4.43 Rs. In Lakhs
9 Debt Service Coverage Ratio	2.99
10 Break Even Point	21%
11 Power Requirement	30 KW
12 Employment	10 Persons
13 Major Raw Materials	Cast iron material, piston valve, pump rod, nut bolts, washers, rubber gaskets, pins and paint

14 Details of Cost of Project & Means of Finance

Cost of Project	Amount in Lacs
Particulars	Amount
Land and building	Owned/Leased
Plant & Machinery	17.10
Furniture & Fixture	-
Other Misc Assets	1.00
Working Capital Requirement	4.92
Total	23.02
Means of Finance	
Particulars	Amount
Own Contribution	2.30
Term Loan	16.29
Working capital Loan	4.43
Total	23.02

1. INTRODUCTION



Hand pumps are the most economical means of providing water supply in rural and out-laying urban areas. The conventional hand pumps are being used in developing countries, are made from cast iron. This requires manual efforts and work at depth of about eight meters. Also, International agencies have developed mark II deep well hand pumps. Its Indian version is called India Mark II pumps can pump water from wells as deep as 90 meters. The growth of the pump industry has been remarkable. So there is good scope for new entrants. Hand pumps are manually operated pumps; they use human power and mechanical advantage to move fluids or air from one place to another. They are widely used in every country in the world for a variety of industrial, marine, irrigation, and leisure activities. Handpumps, which have been around for centuries, can provide a cost-effective solution to allow the rural poor to gain access to clean water for drinking and other purposes. They are widely used in places where access to water is scarce and where financial resources for investment, operation, and maintenance are limited. Handpumps are capable of lifting small amounts of water from depths of up to 100 meters and allow the water source to be

sealed, reducing the risk for potential source contamination during water collection. These characteristics make the inexpensive handpump an attractive option for rural water supply. There are various types of hand pumps available such as Rotary Pump, Lever Action Pump, Piston Pump, Drum Siphon Pump, Hydraulic Hand Pump. The most common type of pumps that are in use is the positive displacement hand pumps. These pumps are armed with a reciprocating plunger or piston which are installed with non-return valves and sliders within a cylindrical tube. This piston is kept connected to the pump handle which once used results in upward and downward movements of any piston. As soon as the piston comes up it is found creating a vacuum which results in the water that gets sucked inside the cylinder and also gets drained via the outlet pipe. Direct pumps refer to as that type of pump which consists of an operating rod and works on the principle of positive displacement. The best part of these types of pumps is that they are easy to install and have a low maintenance cost. The only limitation which it has is that it can only be lifted to 15 meters. Deep well hand pumps are used at places wherever the water has to be lifted from a deep source. These pumps are used over 15 meters of depth. Deep well hand pumps include the weight of the water which is to be lifted and is too high, to aid a human in operating this pump. In such cases, some mechanical additions like a lever or flywheel are used to make the work easier. Cast Iron Hand Pump is physically worked pumps. It employs human power and mechanical favorable position to move liquids or air starting from one place onto the next. This pump is broadly utilized in each nation on the planet for an assortment of modern, marine, water systems, and relaxation exercises. There is a wide range of sorts of Cast Iron Hand Pumps accessible, primarily working on a cylinder, revolving, or diaphragm vane standard with a check valve on the passage and leaving ports to the chamber working in restricting ways.

2 PRODUCT DESCRIPTION

2.1 PRODUCT USES

These hand pumps are used for Submersible, Sewage, Metering, Maritime, Fire, Cryogenic applications.

2.2 MANUFACTURING PROCESS

This process can be broken down into the following steps-

Raw material procurement

Production Process

Assembly

Testing

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

Die casting: The casting of a cast-iron hand pump can be done manually (sand casting) or automatically (by a die casting machine).

1) Sand die casting:

Making molds and cores: The making of iron pumps requires manufacturing scaled drawing which is turned over to the pattern maker who carves and turns on a lathe a wooden model the size and shape of the main body of the finished pump. The handle and other loose parts are made separately. The main body of the pump, being hollow, is the most difficult part to make. The model is cut in half lengthwise. Dowel holes are bored so they can be put back together in perfect alignment. A second model, made to fit the bore of the pump, is known as the core. The core is used to form the cavity in the pump which is later machined to the specified dimension and tolerance to accommodate the plunger in many shallow well pumps. This cylindrical core is inserted into the mold after the wood pattern has been removed from the mold. The core is prepared in wooden molds (core boxes) and kept in an oven at a low temperature (about 400 degrees c. 752 degreeF.) to harden and dry. The core is surrounded by the hot metal during pouring, therefore, it is subjected to very high temperatures and must be made of special core sand with high silica content. Special bonding materials must be mixed with the core sand for binding purposes.

Melting the Metal: The cupola is the most widely used foundry furnace for melting iron for ordinary castings. The cupola is charged with pig iron, limestone, iron scrap (defective castings, gates, and risers), and steel scrap, the relative proportions depending upon the desired composition of the castings to be poured. This cupola is a straight shaft furnace, open at the top, lined with special fire-clay brick and charged through doors about halfway up the shell, with alternate layers of coke and iron and with a little limestone added to flux the coke ash and make the slag more fluid.

Pouring the Casting: The upper part of the mold, called the cope, must be weighted down so that the buoyant force of the metal will not lift it and allow some metal to flow between the cope and the lower part called the drag, and solidified there. The molder takes a ladle- full of metal at the proper temperature from the furnace and pours it down the gate of the mold in a steady stream, taking care not to break the stream at any time. The gate should be kept full of metal at all times to minimize the washing of sand into the mold. Pouring is continued until the level of the metal reaches the top of the riser. The metal, allowed to solidify and cool before being shaken out of the mold, now emerges as a raw casting. The gate and riser are cut off the surface of the casting, and the raw pump body is passed on for cleaning.

Cleaning the Casting: To prepare the casting for use, it is necessary to remove the gate and riser, fins, scabs, and sand. Removal of the dry sand core by rapping is usually the first operation. Gate and riser can be broken off with a hammer and chisel or cut off with a hacksaw. Removing the fine chips and lumps is done with an electrical, portable grinding wheel, and the surface sand which might have fused with the casting may be brushed off with a coarse iron brush. Casting Handle, Cap, and Other Parts are much simpler castings, the processes used are the same as for the pump body.

2) Automatic Die casting (with machines)

Hand pump parts can also be formed with the automatic die casting process. Iron will be melted in an induction furnace with the required amounts of iron metal. Contaminants are removed from the melted iron, and the iron, once melted, is then cast. Casting is the process of pouring the iron into a mold thus giving it a shape; shape of cylinder body and other parts of the pump. The melted-liquid iron will be filled with forms and will be allowed to be set into molds/slabs for solidification. Later cooling will be done. And formed parts will be ejected out. Cylinder body, rising ain, handle, top cap, base, main body or cylinder, etc parts of hand pump will be made with the die casting process.

3) Finishing

Further formed metal parts polishing and panting will be done. For painting these formed parts either liquid paint or powder coating will be used. Painting can also be done manually.



Metal Melting



Die casting



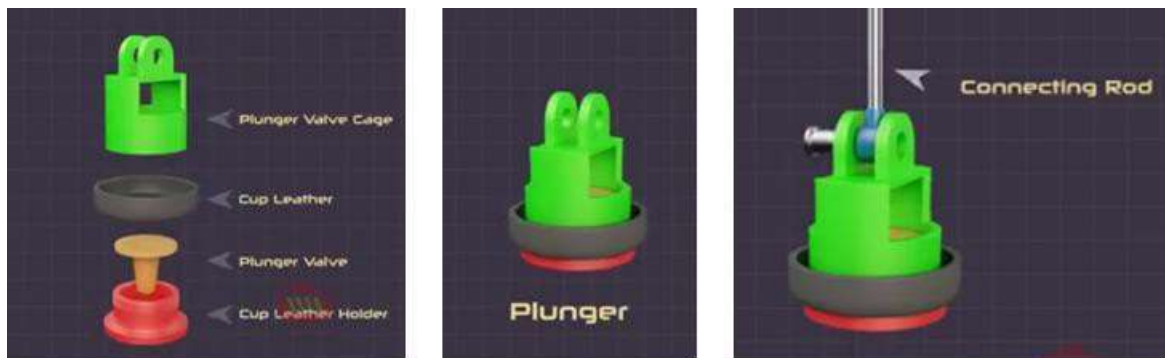
Polishing



Painting

4) Assembly

- **Piston Assembly:** A piston assembly has commonly named a plunger and is also termed as the business end of a piston pump. It is found to have housing, which carries the piston valve and the piston seals. This is further connected to the pump rod. This is the main action of the piston assembly that lifts the water out from the well. Cup leather holder. Plunger valve, cup leather, plunger valve cage will be attached tighter to form a plunger or piston. Then connecting rod will be connected to with piston assembly



Piston assembly

- **Final assembly:** The rising main and base will be connected by using a gasket, nut, and bolts. A leather valve will be attached to the base. Then Cylinder body will be placed upon the base and bolted. Instead of the leather valve, a sliding plate can also be used. The piston assembly will be placed inside the main body or cylinder. Then upper cap or top cap will be attached. The upper cap is used on the closed-top pump cylinder to seal the interior of the pump cylinder and to also define the limit of motion of the piston assembly. The cylinder barrel constitutes the main body of the pump cylinder. The piston seals press up against the inside wall of the cylinder barrel to form a seal which is responsible for creating a pressure difference between the upper and the lower part of the cylinder as the pump continues to operate. At last, the handle will be bolted with the connecting rod.

Connecting rod is a solid steel rod that is about a half-inch in diameter and is used to connect the assembly of the piston in the pump cylinder to the pump handle. The operation of the pump handle is responsible for moving the pump rod and the piston assembly upwards or downwards. If the outlet is made separately then at the end it will be attached to the cylinder. And the finished product will dispatch for testing.

Testing

Quality Control

All components shall be free from rough edges, burrs, and other surface defects. The sharp machine edges shall be filed smooth. Pump operation will be inspected.

3 PROJECT COMPONENTS

3.1 Land & Building

The land required for this manufacturing unit will be approx. around 3000 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.30,000 per month.

- Workshop Area- This area includes the setup and foundation space for all equipment's, work floor area, etc. Total workshop area is approx. 1500 Sqft.
- Inventory Area- This area includes the storage space for all the raw materials and finished goods. Total inventory area is approx. 1000 Sqft.
- Office Area – This space includes staff working region, their accommodation space. Total workshop area is approx. 300 Sqft. This may be considered above the ground floor.
- Parking Space, Electric Mounting Space, and Others. This could be approx. 200 Sqft.

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

3.2 Plant & Machinery

- **Die Casting Machine:** This machine is used for the die casting process. Die casting is a casting process in which the liquid melt is pressed into a mold under high pressure and at a high filling speed. Some Die casting machines also come with the furnace.



- **Polishing/Buffering machine:** Metal parts polishing can be done using a buffering machine.



- **Pneumatic Riveting Machine and air compressor:** For painting formed metal parts riveting and air compressor are used.



- **Pickling Plant:** The pickling process is used to remove impurities, rust, and scale from the surface of a material.



- **Heating Chamber:** After powder coating heating is usually required to finish curing the coating.



- **Laser printer machine (Optional):** To engrave company name or logo on a product laser printer or pad printer can be used.



Machine	Quantity	Price
Die casting machine	1	10,00,000
Pickling plant	1	3,50,000
Riveting Machine and air compressor	1	20,000
Buffing machine	1	10,000
Heating Chamber	1	1,80,000
Laser or pad printing machine	1	1,50,000
TOTAL		17,10,000

Note: Total Machinery cost shall be Rs 17.10 lakhs (Approx.) excluding GST and Transportation Cost.

4 LICENSE & APPROVALS

Basic registration required in this project:

- MSME Udyam registration
- GST registration
- NOC for fire safety board and from Pollution Control Board
- Trade License
- Food and Drug Administration approval
- BIS certification
- Choice of a Brand Name of the product and secure the name with Trademark if required.

Projected Profitability

<u>PROJECTED PROFITABILITY STATEMENT</u>					(in Lacs)
PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Capacity Utilisation %	30%	35%	40%	45%	50%
<u>SALES</u>					
Gross Sale					
Hand Pump	80.04	100.99	121.22	143.22	167.20
Total	80.04	100.99	121.22	143.22	167.20
<u>COST OF SALES</u>					
Raw Material Consumed	53.28	65.27	78.34	92.56	108.00
Electricity Expenses	1.73	2.02	2.30	2.59	2.88
Depreciation	2.72	2.31	1.96	1.67	1.42
Wages & labour	8.76	11.21	13.68	16.14	19.05
Repair & maintenance	0.88	1.11	1.21	1.43	1.67
Packaging	0.16	0.20	0.24	0.29	0.33
Cost of Production	67.52	82.12	97.74	114.68	133.35
Add: Opening Stock	-	2.25	2.74	3.26	3.82
Less: Closing Stock	2.25	2.74	3.26	3.82	4.45
Cost of Sales	65.27	81.63	97.22	114.11	132.73
GROSS PROFIT	14.77	19.36	24.01	29.10	34.47
	18.45%	19.17%	19.80%	20.32%	20.62%
Salary to Staff	4.44	5.68	7.39	9.46	11.16
Interest on Term Loan	1.60	1.41	1.01	0.61	0.22
Interest on working Capital	0.49	0.49	0.49	0.49	0.49
Rent	2.40	2.76	3.17	3.65	4.20
Selling & Administrative Exp.	0.80	1.01	1.21	1.43	1.67
TOTAL	9.73	11.35	13.27	15.64	17.73
NET PROFIT	5.04	8.01	10.73	13.46	16.74
	6.30%	7.93%	8.85%	9.40%	10.01%
Taxation	0.01	0.63	1.23	1.39	2.42
PROFIT (After Tax)	5.03	7.38	9.50	12.07	14.33

Projected Balance Sheet

<u>PROJECTED BALANCE SHEET</u>					(in Lacs)
PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
<u>Liabilities</u>					
Capital					
Opening balance		3.63	6.56	9.87	13.34
Add:- Own Capital	2.30				
Add:- Retained Profit	5.03	7.38	9.50	12.07	14.33
Less:- Drawings	3.70	4.45	6.20	8.60	10.80
Closing Balance	3.63	6.56	9.87	13.34	16.87
Term Loan	14.48	10.86	7.24	3.62	-
Working Capital Limit	4.43	4.43	4.43	4.43	4.43
Sundry Creditors	1.24	1.52	1.83	2.16	2.52
Provisions & Other Liability	0.40	0.48	0.58	0.80	0.96
TOTAL :	24.18	23.85	23.94	24.35	24.77
<u>Assets</u>					
Fixed Assets (Gross)					
	18.10	18.10	18.10	18.10	18.10
Gross Dep.	2.72	5.02	6.98	8.65	10.07
Net Fixed Assets	15.39	13.08	11.12	9.45	8.03
Current Assets					
Sundry Debtors	2.67	3.37	4.04	4.77	5.57
Stock in Hand	3.49	4.26	5.09	5.98	6.97
Cash and Bank	0.14	0.15	0.20	0.14	0.10
Loans & Advances /Other Current Assets	2.50	3.00	3.50	4.00	4.10
TOTAL :	24.18	23.85	23.94	24.35	24.77

Projected Cash Flow Statement

<u>PROJECTED CASH FLOW STATEMENT</u>					(in Lacs)
PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
<u>SOURCES OF FUND</u>					
Own Margin	2.30				
Net Profit	5.04	8.01	10.73	13.46	16.74
Depreciation & Exp. W/off	2.72	2.31	1.96	1.67	1.42
Increase in Cash Credit	4.43	-	-	-	-
Increase In Term Loan	16.29	-	-	-	-
Increase in Creditors	1.24	0.28	0.30	0.33	0.36
Increase in Provisions & Oth liabilities	0.40	0.08	0.10	0.22	0.16
	-				
TOTAL :	32.42	10.67	13.09	15.69	18.68
<u>APPLICATION OF FUND</u>					
Increase in Fixed Assets	18.10				
Increase in Stock	3.49	0.77	0.83	0.90	0.98
Increase in Debtors	2.67	0.70	0.67	0.73	0.80
Repayment of Term Loan	1.81	3.62	3.62	3.62	3.62
Loans & Advances /Other Current Assets	2.50	0.50	0.50	0.50	0.10
Drawings	3.70	4.45	6.20	8.60	10.80
Taxation	0.01	0.63	1.23	1.39	2.42
TOTAL :	32.28	10.66	13.05	15.74	18.72
Opening Cash & Bank Balance	-	0.14	0.15	0.20	0.14
Add : Surplus	0.14	0.01	0.05	(0.05)	(0.04)
Closing Cash & Bank Balance	0.14	0.15	0.20	0.14	0.10

DSCR

<u>CALCULATION OF D.S.C.R</u>					
PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
CASH ACCRUALS	7.75	9.69	11.47	13.74	15.74
Interest on Term Loan	1.60	1.41	1.01	0.61	0.22
Total	9.35	11.10	12.48	14.35	15.96
REPAYMENT					
Instalment of Term Loan	1.81	3.62	3.62	3.62	3.62
Interest on Term Loan	1.60	1.41	1.01	0.61	0.22
Total	3.41	5.03	4.63	4.23	3.84
DEBT SERVICE COVERAGE RATIO	2.74	2.21	2.69	3.39	4.16
AVERAGE D.S.C.R.					2.99

Repayment schedule

REPAYMENT SCHEDULE OF TERM LOAN							
						Interest	11.00%
Year	Particulars	Amount	Addition	Total	Interest	Repayment	Closing Balance
1st	Opening Balance						
	1st month	-	16.29	16.29	-	-	16.29
	2nd month	16.29	-	16.29	0.15	-	16.29
	3rd month	16.29	-	16.29	0.15	-	16.29
	4th month	16.29	-	16.29	0.15		16.29
	5th month	16.29	-	16.29	0.15		16.29
	6th month	16.29	-	16.29	0.15		16.29
	7th month	16.29	-	16.29	0.15	0.30	15.99
	8th month	15.99	-	15.99	0.15	0.30	15.69
	9th month	15.69	-	15.69	0.14	0.30	15.39
	10th month	15.39	-	15.39	0.14	0.30	15.08
	11th month	15.08	-	15.08	0.14	0.30	14.78
	12th month	14.78	-	14.78	0.14	0.30	14.48
					1.60	1.81	
2nd	Opening Balance						
	1st month	14.48	-	14.48	0.13	0.30	14.18
	2nd month	14.18	-	14.18	0.13	0.30	13.88
	3rd month	13.88	-	13.88	0.13	0.30	13.58
	4th month	13.58	-	13.58	0.12	0.30	13.27
	5th month	13.27	-	13.27	0.12	0.30	12.97
	6th month	12.97	-	12.97	0.12	0.30	12.67

	7th month	12.67	-	12.67	0.12	0.30	12.37
	8th month	12.37	-	12.37	0.11	0.30	12.07
	9th month	12.07	-	12.07	0.11	0.30	11.77
	10th month	11.77	-	11.77	0.11	0.30	11.46
	11th month	11.46	-	11.46	0.11	0.30	11.16
	12th month	11.16	-	11.16	0.10	0.30	10.86
					1.41	3.62	
3rd	Opening Balance						
	1st month	10.86	-	10.86	0.10	0.30	10.56
	2nd month	10.56	-	10.56	0.10	0.30	10.26
	3rd month	10.26	-	10.26	0.09	0.30	9.96
	4th month	9.96	-	9.96	0.09	0.30	9.65
	5th month	9.65	-	9.65	0.09	0.30	9.35
	6th month	9.35	-	9.35	0.09	0.30	9.05
	7th month	9.05	-	9.05	0.08	0.30	8.75
	8th month	8.75	-	8.75	0.08	0.30	8.45
	9th month	8.45	-	8.45	0.08	0.30	8.15
	10th month	8.15	-	8.15	0.07	0.30	7.84
	11th month	7.84	-	7.84	0.07	0.30	7.54
	12th month	7.54	-	7.54	0.07	0.30	7.24
					1.01	3.62	
4th	Opening Balance						
	1st month	7.24	-	7.24	0.07	0.30	6.94
	2nd month	6.94	-	6.94	0.06	0.30	6.64
	3rd month	6.64	-	6.64	0.06	0.30	6.34

	4th month	6.34	-	6.34	0.06	0.30	6.03
	5th month	6.03	-	6.03	0.06	0.30	5.73
	6th month	5.73	-	5.73	0.05	0.30	5.43
	7th month	5.43	-	5.43	0.05	0.30	5.13
	8th month	5.13	-	5.13	0.05	0.30	4.83
	9th month	4.83	-	4.83	0.04	0.30	4.53
	10th month	4.53	-	4.53	0.04	0.30	4.22
	11th month	4.22	-	4.22	0.04	0.30	3.92
	12th month	3.92	-	3.92	0.04	0.30	3.62
					0.61	3.62	
5th	Opening Balance						
	1st month	3.62	-	3.62	0.03	0.30	3.32
	2nd month	3.32	-	3.32	0.03	0.30	3.02
	3rd month	3.02	-	3.02	0.03	0.30	2.72
	4th month	2.72	-	2.72	0.02	0.30	2.41
	5th month	2.41	-	2.41	0.02	0.30	2.11
	6th month	2.11	-	2.11	0.02	0.30	1.81
	7th month	1.81	-	1.81	0.02	0.30	1.51
	8th month	1.51	-	1.51	0.01	0.30	1.21
	9th month	1.21	-	1.21	0.01	0.30	0.91
	10th month	0.91	-	0.91	0.01	0.30	0.60
	11th month	0.60	-	0.60	0.01	0.30	0.30
	12th month	0.30	-	0.30	0.00	0.30	-
					0.22	3.62	
	DOOR TO DOOR MORATORIUM PERIOD	60		MONTHS			
		6		MONTHS			
	REPAYMENT PERIOD	54		MONTHS			

DISCLAIMER

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