

# PROJECT REPORT

## OF

# HEAT PIPE MANUFACTURING UNIT

## PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding Heat Pipe 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 A GLANCE**

- 1 Name of the Entrepreneur : xxxxxxxxxx
- 2 Constitution (legal Status) : xxxxxxxxxx
- 3 Father / Spouse Name : xxxxxxxxxxxx
- 4 Unit Address : xxxxxxxxxxxxxxxxxxxxxxxx
- District : xxxxxxxx
- Pin: xxxxxxxx State: xxxxx
- Mobile xxxxxxxx
- 5 Product and By Product : **HEAT PIPE**
- 6 Name of the project / business activity proposed : **HEAT PIPE MANUFACTURING UNIT**
- 7 Cost of Project : Rs.22.54 Lakhs
- 8 Means of Finance
- Term Loan Rs.14.04 Lakhs
- Own Capital Rs.2.25 Lakhs
- Working Capital Rs.6.25 Lakhs
- 9 Debt Service Coverage Ratio : 2.86
- 10 Pay Back Period : 5 Years
- 11 Project Implementation Period : 5-6 Months
- 12 Break Even Point : 28%
- 13 Employment : 10 Persons
- 14 Power Requirement : 15.00 KW
- 15 Major Raw materials : Copper, Angle Grinder, Wire Brushes
- 16 Estimated Annual Sales Turnover : 98.50 Lakhs
- 17 Detailed Cost of Project & Means of Finance

**COST OF PROJECT**

(Rs. In Lakhs)

Particulars	Amount
Land	Own/Rented
Plant & Machinery	14.60
Miss Assets	1.00
Furniture & Fixtures	-
Working Capital	6.94
<b>Total</b>	<b>22.54</b>

**MEANS OF FINANCE**

Particulars	Amount
Own Contribution	2.25
Working Capital(Finance)	6.25
Term Loan	14.04
<b>Total</b>	<b>22.54</b>

## 1. INTRODUCTION



Heat pipes are heat transfer devices that combine the principles of both thermal conductivity and phase transition to effectively transfer heat between two solid interfaces. They are hollow cylindrical pipes filled with a small amount of fluid that evaporates to produce heat. This heat is then rejected from another end for its application on industrial processes. For example, it is used in Air Conditioning and Refrigeration applications. Every heat pipe has three components;

- **Working Fluid** - Which transfers heat by Evaporation and Condensation.
- **Envelope** - Which provides a leak-tight pressure vessel to contain the working fluid.
- **Wick** - To return liquid from the Condenser to the Evaporator using capillary forces.

### HOW HEAT PIPES WORKS

The heat input vaporizes the liquid working fluid inside the wick in the evaporator section. The saturated vapor, carrying the latent heat of vaporization, flows towards the colder condenser section. In the condenser, the vapor condenses and gives up its latent heat. The condensed liquid returns to the evaporator through the wick structure by capillary action. The phase change processes and two-phase flow circulation continue as long as the temperature gradient between the evaporator and condenser are maintained.

## **2. USES & MARKET POTENTIAL:**

Heat Pipes have been widely employed in various applications throughout industry. Some applications of heat pipes are listed below:

- Aerospace: They enjoy the distinct advantages of low weight, essentially zero maintenance, and superior reliability over other devices, therefore heat pipes enjoy wide application in the area of spacecraft cooling and temperature stabilization.
- Heat Exchangers: Because of flexibility in design, heat pipes can easily be utilized as heat exchangers inside sorption and vapor-compression heat pumps, refrigerators, and other types of heat transfer devices.
- Electronic Components: As of the present, one of the largest applications of heat pipe technology is the cooling of electronic components such as central processing units (CPUs), circuit boards, and transistors.
- Transportation System: Several heat pipe applications are used to improve the safety and reliability of air, surface, and rail transportation systems.

The heat pipes market size is expected to grow by USD 637.35 mn and record a CAGR of 4% during 2020-2024. There has been a rise in the deployment of HVAC systems in domestic, commercial and industrial buildings which has increased the demand for heat pipes significantly. HVAC consumes about half of the total electricity used in commercial buildings which indirectly bolsters the market. Growth in the HVAC industry is anticipated to boost the growth of the market. In addition, rise in exports of electronic goods from APAC and increase in use of heat pipes in meat and poultry processing is anticipated to boost the growth of the market as well.

### **PRODUCT RAW MATERIAL**

- Copper
- Sintered metal powder
- Angle grinder, Wire Brushes, etc.
- Packaging Material (Such as Plastic Sheets, Carton Boxes, Tape, etc.)

## **MANUFACTURING PROCESS**

This process can be broken down into the following steps:

1. Raw material procurement
2. Preparing a pipe and a wick structure
3. Placing the wick structure in the pipe, vacuuming the pipe, and filling a working fluid in the pipe.
4. Heat Treatment
5. Sealing
6. Packaging

### **3. PROJECT COMPONENTS**

#### **3.1 Land & Building**

The land required for this manufacturing unit will be approx. around 1200 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.25,000 per month.

#### **3.2 Plant & Machinery**

Machine	Quantity	Price
Tube Mill	1	9,00,000
Ultrasonic Cleaning Machine	1	50,000
Automatic Pipe Cutting Machines	1	2,50,000
Heat Condenser/ Heat Exchangers	1	50,000
Automatic Pipe Packaging Machine	1	1,80,000
Testing Equipment's		30,000
<b>TOTAL</b>		<b>14,60,000</b>

**Note:** Total Machinery cost shall be including GST and Transportation Cost.

### **3.3 Power Requirement**

The borrower shall require power load of 15 KW which shall be applied with Power Corporation. However, for standby power arrangement the borrower shall also purchase DG Set.

### **3.4 Manpower Requirement**

Manpower required for this manufacturing unit is depend on the land, type of manufacturing unit etc. For this unit around 10 people will be required which includes:

3 Skilled Labour

4 Unskilled Labour

1 Helper

1 Administrative

Staff

1 Accountant

## **6. FINANCIALS**

### 6.3 Projected Profitability

<b><u>PROJECTED PROFITABILITY STATEMENT</u></b>					<b>(in Lacs)</b>
<b>PARTICULARS</b>	<b>1st year</b>	<b>2nd year</b>	<b>3rd year</b>	<b>4th year</b>	<b>5th year</b>
Capacity Utilisation %	<b>40%</b>	<b>45%</b>	<b>50%</b>	<b>55%</b>	<b>60%</b>
<b><u>SALES</u></b>					
<b>Gross Sale</b>					
Heat Pipe	98.50	121.79	142.13	164.30	188.26
<b>Total</b>	<b>98.50</b>	<b>121.79</b>	<b>142.13</b>	<b>164.30</b>	<b>188.26</b>
<b><u>COST OF SALES</u></b>					
Raw Material Consumed	67.97	80.35	93.74	108.35	124.07
Electricity Expenses	1.15	1.30	1.44	1.58	1.73
Depreciation	2.34	1.99	1.69	1.44	1.22
Wages & labour	8.40	9.66	11.01	12.66	13.93
Repair & maintenance	1.08	1.83	2.13	2.46	2.82
Packaging	2.46	3.04	3.55	4.11	4.71
<b>Cost of Production</b>	<b>83.41</b>	<b>98.17</b>	<b>113.57</b>	<b>130.60</b>	<b>148.48</b>
<b>Add: Opening Stock</b>	<b>-</b>	<b>4.17</b>	<b>4.91</b>	<b>5.68</b>	<b>6.53</b>
<b>Less: Closing Stock</b>	<b>4.17</b>	<b>4.91</b>	<b>5.68</b>	<b>6.53</b>	<b>7.42</b>
Cost of Sales	79.24	97.43	112.80	129.75	147.59
<b>GROSS PROFIT</b>	<b>19.26</b>	<b>24.36</b>	<b>29.33</b>	<b>34.55</b>	<b>40.67</b>
	<b>19.55%</b>	<b>20.00%</b>	<b>20.64%</b>	<b>21.03%</b>	<b>21.60%</b>
Salary to Staff	6.24	8.24	10.87	12.50	14.50
Interest on Term Loan	1.38	1.22	0.87	0.53	0.19
Interest on working Capital	0.69	0.69	0.69	0.69	0.69
Rent	3.00	3.15	3.31	3.47	3.65
Selling & Administrative Exp.	2.46	3.41	3.55	4.11	4.71
<b>TOTAL</b>	<b>13.77</b>	<b>16.70</b>	<b>19.29</b>	<b>21.30</b>	<b>23.73</b>
NET PROFIT	5.49	7.66	10.04	13.25	16.94
	<b>5.57%</b>	<b>6.29%</b>	<b>7.06%</b>	<b>8.06%</b>	<b>9.00%</b>
Taxation	0.10	0.55	1.01	1.33	2.48
PROFIT (After Tax)	5.39	7.11	9.03	11.92	14.46

## 6.4 Projected Balance Sheet

<b><u>PROJECTED BALANCE SHEET</u></b>					<b>(in Lacs)</b>
<b>PARTICULARS</b>	<b>1st year</b>	<b>2nd year</b>	<b>3rd year</b>	<b>4th year</b>	<b>5th year</b>
<b><u>Liabilities</u></b>					
<b>Capital</b>					
Opening balance		2.94	5.15	7.98	11.20
Add:- Own Capital	2.25				
Add:- Retained Profit	5.39	7.11	9.03	11.92	14.46
Less:- Drawings	4.70	4.90	6.20	8.70	11.00
<b>Closing Balance</b>	<b>2.94</b>	<b>5.15</b>	<b>7.98</b>	<b>11.20</b>	<b>14.66</b>
Term Loan	12.48	9.36	6.24	3.12	-
Working Capital Limit	6.25	6.25	6.25	6.25	6.25
Sundry Creditors	1.13	1.34	1.56	1.81	2.07
Provisions & Other Liability	0.20	0.24	0.29	0.35	0.41
<b>TOTAL :</b>	<b>23.01</b>	<b>22.34</b>	<b>22.32</b>	<b>22.72</b>	<b>23.40</b>
<b><u>Assets</u></b>					
<b>Fixed Assets (Gross)</b>					
	15.60	15.60	15.60	15.60	15.60
Gross Dep.	2.34	4.33	6.02	7.46	8.68
<b>Net Fixed Assets</b>	<b>13.26</b>	<b>11.27</b>	<b>9.58</b>	<b>8.14</b>	<b>6.92</b>
<b>Current Assets</b>					
Sundry Debtors	1.64	2.03	2.37	2.74	3.14
Stock in Hand	6.44	7.59	8.80	10.14	11.56
Cash and Bank	0.47	0.15	0.16	0.20	0.18
Loans & Advances /Other Current Assets	1.20	1.30	1.40	1.50	1.60
<b>TOTAL :</b>	<b>23.01</b>	<b>22.34</b>	<b>22.32</b>	<b>22.72</b>	<b>23.40</b>



## 6.5 Projected Cash Flow Statement

<b><u>PROJECTED CASH FLOW STATEMENT</u></b>					<b>(in Lacs)</b>
<b>PARTICULARS</b>	<b>1st year</b>	<b>2nd year</b>	<b>3rd year</b>	<b>4th year</b>	<b>5th year</b>
<b><u>SOURCES OF FUND</u></b>					
Own Margin	2.25				
Net Profit	5.49	7.66	10.04	13.25	16.94
Depreciation & Exp. W/off	2.34	1.99	1.69	1.44	1.22
Increase in Cash Credit	6.25	-	-	-	-
Increase In Term Loan	14.04	-	-	-	-
Increase in Creditors	1.13	0.21	0.22	0.24	0.26
Increase in Provisions & Oth labilities	0.20	0.04	0.05	0.06	0.07
	-				
<b>TOTAL :</b>	<b>31.71</b>	<b>9.90</b>	<b>12.00</b>	<b>14.99</b>	<b>18.49</b>
<b><u>APPLICATION OF FUND</u></b>					
Increase in Fixed Assets	15.60				
Increase in Stock	6.44	1.15	1.22	1.34	1.42
Increase in Debtors	1.64	0.39	0.34	0.37	0.40
Repayment of Term Loan	1.56	3.12	3.12	3.12	3.12
Loans & Advances /Other Current Assets	1.20	0.10	0.10	0.10	0.10
Drawings	4.70	4.90	6.20	8.70	11.00
Taxation	0.10	0.55	1.01	1.33	2.48
<b>TOTAL :</b>	<b>31.24</b>	<b>10.21</b>	<b>11.99</b>	<b>14.95</b>	<b>18.51</b>
Opening Cash & Bank Balance	-	0.47	0.15	0.16	0.20
Add : Surplus	0.47	(0.32)	0.01	0.03	(0.02)
Closing Cash & Bank Balance	<b>0.47</b>	<b>0.15</b>	<b>0.16</b>	<b>0.20</b>	<b>0.18</b>

## 6.6 DSCR

<b>COMPUTATION OF CLOSING STOCK &amp; WORKING CAPITAL</b>					(in Lacs)
<b>PARTICULARS</b>	<b>1st year</b>	<b>2nd year</b>	<b>3rd year</b>	<b>4th year</b>	<b>5th year</b>
<b>Finished Goods</b>					
(15 Days)	4.17	4.91	5.68	6.53	7.42
<b>Raw Material</b>					
(10 Days)	2.27	2.68	3.12	3.61	4.14
<b>Closing Stock</b>	<b>6.44</b>	<b>7.59</b>	<b>8.80</b>	<b>10.14</b>	<b>11.56</b>

<b>COMPUTATION OF WORKING CAPITAL REQUIREMENT</b>					
<b>TRADITIONAL METHOD</b>				(in Lacs)	
<b>Particulars</b>	<b>Amount</b>	<b>Own Margin</b>		<b>Bank Finance</b>	
Finished Goods & Raw Material	6.44				
Less : Creditors	1.13				
<b>Paid stock</b>	<b>5.30</b>	<b>10%</b>	<b>0.53</b>	<b>90%</b>	<b>4.77</b>
<b>Sundry Debtors</b>	<b>1.64</b>	<b>10%</b>	<b>0.16</b>	<b>90%</b>	<b>1.48</b>
	<b>6.94</b>		<b>0.69</b>		<b>6.25</b>
<b>MPBF</b>					<b>6.25</b>
<b>WORKING CAPITAL LIMIT DEMAND ( from Bank)</b>					<b>6.25</b>
<b>Working Capital Margin</b>					<b>0.69</b>

## 6.10 Working Capital Requirement

<b>COMPUTATION OF CLOSING STOCK &amp; WORKING CAPITAL</b>					(in Lacs)
<b>PARTICULARS</b>	<b>1st year</b>	<b>2nd year</b>	<b>3rd year</b>	<b>4th year</b>	<b>5th year</b>
<b>Finished Goods</b>					
(15 Days)	4.17	4.91	5.68	6.53	7.42
<b>Raw Material</b>					
(10 Days)	2.27	2.68	3.12	3.61	4.14
<b>Closing Stock</b>	<b>6.44</b>	<b>7.59</b>	<b>8.80</b>	<b>10.14</b>	<b>11.56</b>

<b>COMPUTATION OF WORKING CAPITAL REQUIREMENT</b>					
<b>TRADITIONAL METHOD</b>				(in Lacs)	
<b>Particulars</b>	<b>Amount</b>	<b>Own Margin</b>		<b>Bank Finance</b>	
Finished Goods & Raw Material	6.44				
Less : Creditors	1.13				
<b>Paid stock</b>	<b>5.30</b>	<b>10%</b>	<b>0.53</b>	<b>90%</b>	<b>4.77</b>
<b>Sundry Debtors</b>	<b>1.64</b>	<b>10%</b>	<b>0.16</b>	<b>90%</b>	<b>1.48</b>
	<b>6.94</b>		<b>0.69</b>		<b>6.25</b>
<b>MPBF</b>					<b>6.25</b>
<b>WORKING CAPITAL LIMIT DEMAND ( from Bank)</b>					<b>6.25</b>
<b>Working Capital Margin</b>					<b>0.69</b>

### 6.13 Repayment schedule

REPAYMENT SCHEDULE OF TERM LOAN							
						Interest	11.00%
Year	Particulars	Amount	Addition	Total	Interest	Repayment	Closing Balance
<b>1st</b>	Opening Balance						
	1st month	-	14.04	14.04	-	-	14.04
	2nd month	14.04	-	14.04	0.13	-	14.04
	3rd month	14.04	-	14.04	0.13	-	14.04
	4th month	14.04	-	14.04	0.13		14.04
	5th month	14.04	-	14.04	0.13		14.04
	6th month	14.04	-	14.04	0.13		14.04
	7th month	14.04	-	14.04	0.13	0.26	13.78
	8th month	13.78	-	13.78	0.13	0.26	13.52
	9th month	13.52	-	13.52	0.12	0.26	13.26
	10th month	13.26	-	13.26	0.12	0.26	13.00
	11th month	13.00	-	13.00	0.12	0.26	12.74
	12th month	12.74	-	12.74	0.12	0.26	12.48
					<b>1.38</b>	<b>1.56</b>	
<b>2nd</b>	Opening Balance						
	1st month	12.48	-	12.48	0.11	0.26	12.22
	2nd month	12.22	-	12.22	0.11	0.26	11.96
	3rd month	11.96	-	11.96	0.11	0.26	11.70
	4th month	11.70	-	11.70	0.11	0.26	11.44
	5th month	11.44	-	11.44	0.10	0.26	11.18
	6th month	11.18	-	11.18	0.10	0.26	10.92

	7th month	10.92	-	10.92	0.10	0.26	10.66
	8th month	10.66	-	10.66	0.10	0.26	10.40
	9th month	10.40	-	10.40	0.10	0.26	10.14
	10th month	10.14	-	10.14	0.09	0.26	9.88
	11th month	9.88	-	9.88	0.09	0.26	9.62
	12th month	9.62	-	9.62	0.09	0.26	9.36
					<b>1.22</b>	<b>3.12</b>	
<b>3rd</b>	Opening Balance						
	1st month	9.36	-	9.36	0.09	0.26	9.10
	2nd month	9.10	-	9.10	0.08	0.26	8.84
	3rd month	8.84	-	8.84	0.08	0.26	8.58
	4th month	8.58	-	8.58	0.08	0.26	8.32
	5th month	8.32	-	8.32	0.08	0.26	8.06
	6th month	8.06	-	8.06	0.07	0.26	7.80
	7th month	7.80	-	7.80	0.07	0.26	7.54
	8th month	7.54	-	7.54	0.07	0.26	7.28
	9th month	7.28	-	7.28	0.07	0.26	7.02
	10th month	7.02	-	7.02	0.06	0.26	6.76
	11th month	6.76	-	6.76	0.06	0.26	6.50
	12th month	6.50	-	6.50	0.06	0.26	6.24
					<b>0.87</b>	<b>3.12</b>	
<b>4th</b>	Opening Balance						
	1st month	6.24	-	6.24	0.06	0.26	5.98
	2nd month	5.98	-	5.98	0.05	0.26	5.72
	3rd month	5.72	-	5.72	0.05	0.26	5.46

	4th month	5.46	-	5.46	0.05	0.26	5.20
	5th month	5.20	-	5.20	0.05	0.26	4.94
	6th month	4.94	-	4.94	0.05	0.26	4.68
	7th month	4.68	-	4.68	0.04	0.26	4.42
	8th month	4.42	-	4.42	0.04	0.26	4.16
	9th month	4.16	-	4.16	0.04	0.26	3.90
	10th month	3.90	-	3.90	0.04	0.26	3.64
	11th month	3.64	-	3.64	0.03	0.26	3.38
	12th month	3.38	-	3.38	0.03	0.26	3.12
					<b>0.53</b>	<b>3.12</b>	
<b>5th</b>	Opening Balance						
	1st month	3.12	-	3.12	0.03	0.26	2.86
	2nd month	2.86	-	2.86	0.03	0.26	2.60
	3rd month	2.60	-	2.60	0.02	0.26	2.34
	4th month	2.34	-	2.34	0.02	0.26	2.08
	5th month	2.08	-	2.08	0.02	0.26	1.82
	6th month	1.82	-	1.82	0.02	0.26	1.56
	7th month	1.56	-	1.56	0.01	0.26	1.30
	8th month	1.30	-	1.30	0.01	0.26	1.04
	9th month	1.04	-	1.04	0.01	0.26	0.78
	10th month	0.78	-	0.78	0.01	0.26	0.52
	11th month	0.52	-	0.52	0.00	0.26	0.26
	12th month	0.26	-	0.26	0.00	0.26	-
					<b>0.19</b>	<b>3.12</b>	
	DOOR TO DOOR MORATORIUM PERIOD	60		MONTHS			
		6		MONTHS			
	REPAYMENT PERIOD	54		MONTHS			

## **9. ASSUMPTIONS**

- Production Capacity of Heat Pipe taken is 96 Pipes per day. First year, Capacity has been taken @ 40%.
- Working shift of 8 hours per day has been considered.
- Raw Material stock is for 15 days and Finished goods Closing Stock has been taken for 10 days.
- Credit period to Sundry Debtors has been given for 5 days.
- Credit period by the Sundry Creditors has been provided for 5 days.
- Depreciation and Income tax has been taken as per the Income tax Act, 1961.
- Interest on working Capital Loan and Term loan has been taken at 11%.
- Arrangement for labour wages has been made as per the prevailing market rates, which may vary from place to place and the minimum wages fixed by the concerned authorized from time to time.
- Selling Prices & Raw material costing has been increased by 5% & 5% respectively in the subsequent years.
- The rental value of the factory and other built up/covered areas has been taken as per the prevailing market rates, which may vary from place to place and time to time.
- The rates quoted in respect of machines, equipment and raw materials are those prevailing at the time of preparation of this project profile, and are likely to vary from supplier to supplier and place to place.
- This project profile is prepared for guidance; hence, entrepreneurs are advised to check all the parameters while intending to put up such unit.

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