

PROJECT PROFILE ON

SINTERED METAL BUSH

PRODUCTCODE	:	NA
QUALITYANDSTANDARDS	:	AS PER BIS
MONTHANDYEAR OFPREPARATION	:	MARCH-2021
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1. INTRODUCTION

Sintering is the process in which the green compact metal powder is subjected to heat at a temperature below the melting point of the solid metal. It is one of the two operations of powder metallurgical technology through which an ordinary shape to a complicated one can be manufactured at reasonable cost. The other operation is compacting or pressing which consists of subjecting the suitably prepared powder mixture at normal or elevated temperature to considerable pressure. The resulting powder compact is known as briquette and is said to be the form known as green.

In this process, metal powder at a required ratio is blended, then pressed to desired level at a high pressure with precision tools and finally bonded or fused at elevated temperature in a furnace under a protective atmosphere as a high quality finished part, with mechanical properties more or less equal to parts manufactured under conventional method. This profile deals with the manufacturing of sintered bronze bush bearing which can be useful for any prospective entrepreneur.

2. MARKET POTENTIAL

Porous metal bearings were manufactured using Powder metallurgy techniques as early as 1909. But the growth rate of powder metallurgy has increased very rapidly from 1950s. Self lubricated bearings (bronze) are used in the industries of automobile, textile, agricultural and home appliances manufacturing and to a small extent in aircraft industry. Self lubricated bronze bearings are used to a great extent in small motors of fractional HP capacities. As the application of sintered metal bushes is increasing in many areas, particularly in automobile sectors and home appliances such as washing machines, refrigerators, electric clocks manufacturing industry, the demand is also steadily increasing for this item.

3. BASIS AND PRESUMPTIONS

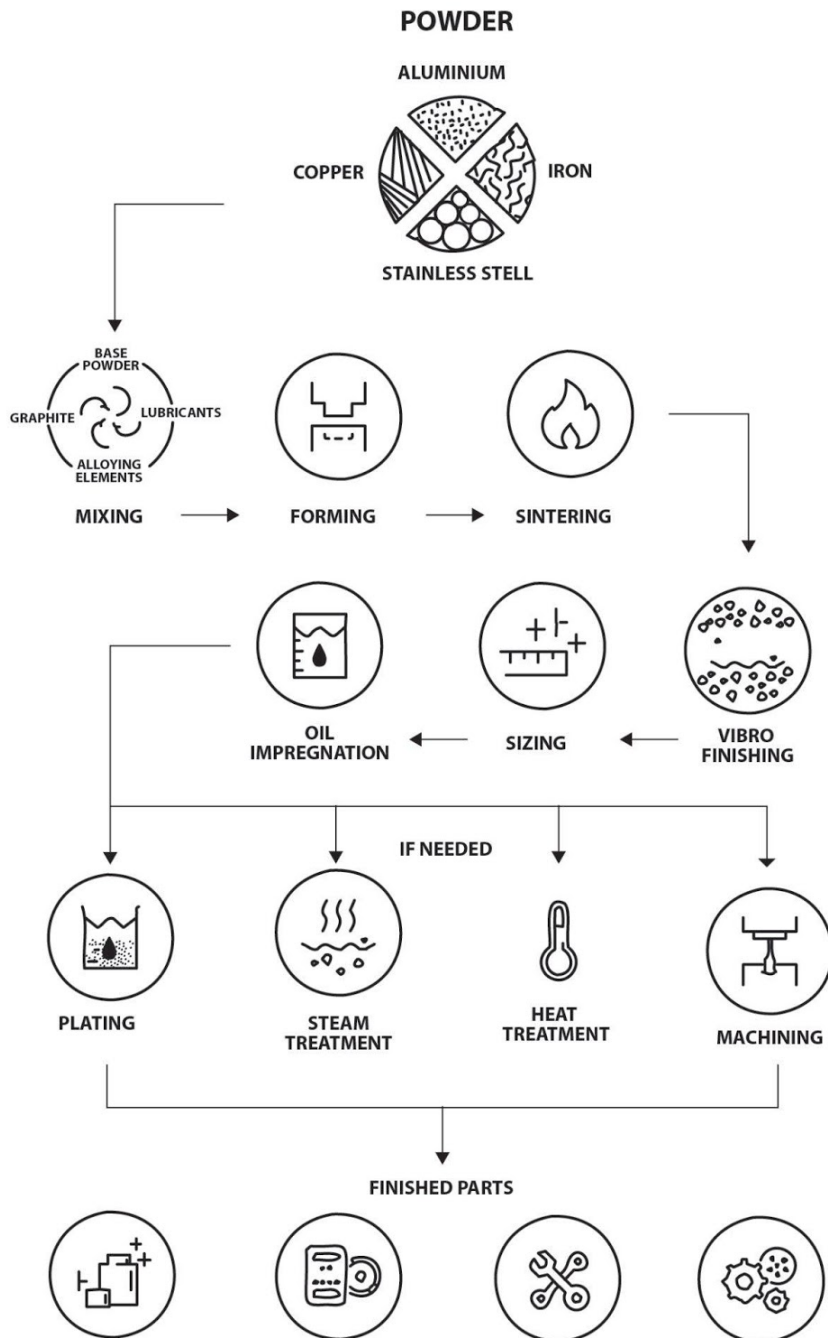
- a. The scheme is worked out on a single shift basis of 8 hours in a day for 25 working days in a month.

- b. At 75% capacity utilization of installed capacity of plant and machinery to achieve the production target 90000 no. of bronze bushes per annum.

- c. Interest rates and land prices are as per the prevailing market prices. Salary and utility charges are as per local rates.

4. TECHNICAL ASPECTS

a) Process of Manufacture :-



The basic steps in the production of Porous self-lubricating metal bushes are:

1. Blending and mixing of metal powder
2. Pressing–Die compaction (green briquettes)
3. Pre-sintering and sintering
4. Repressing
5. Sizing
6. Oil impregnation

The metal powder of copper, tin and graphite is mixed in a pre-determined ratio and blended in a ball mill by using organic lubricants by few percentage in weight for easing the moulding operation. The blended metal powder mix is compacted by subjecting to die compaction press briquetting. Before sintering the green briquettes at 800°C in a mesh belt conveyor of continuous furnace, pre sintering is carried out in the low temperature zone of the furnace at 440-450°C. The pre-sintering operation allows this powdered particles to liquidify and completely diffused into copper. The entire sintering operation is done in a furnace under a protective atmosphere creating a high quality finished product, otherwise the bonding between particles will be affected by surface films such as oxides. For applications that require higher density or close dimensional tolerances, sintering is followed by a cold working operation known as Coining or repressing.

In some cases resintering after repressing will increase mechanical properties. Despite increase in strength, resintering may result in large grain size and loss of dimensions due to shrinkage and to rectify this, sizing is done. Special sizing process similar to powder process and sizing dies gives the final dimensions. Finally, oil impregnation is done to fill the porous in the sintered parts by dipping them into hot non- gumming petroleum oil for 10–15 minutes at 110°C, complete impregnation which is done primarily to improve anti-friction properties. The final product, self lubricating bushes are checked as per IS 3980 and packed for dispatching.

b)Quality Control and Standards

As per IS 3980 - 1982 - Porous Metal Powder Oil - Impregnated Bearings

c) Production Capacity

90,000 nos. of bronze bush for pumps of size O.D. 43 mm × I.D. 38

Value:1,57,50,000 (157.5 Lakhs)

d)Pollution Control

Sintering furnace should be provided with the fume outlet chimney of suitable height and the floor should be well ventilated and provided with exhaust fans.

e)Energy Conservation

Power factor should be monitored, at least once in a month it should be measured. If required additional capacitors can be installed to improve power factor. When any equipment is not in use it should be disconnected from the supply. Insulation should be provided where ever heat loss will occur.

5.FINANCIAL ASPECTS

A. Fixed Capital

(i)	Land and Building	Amount (in Rs)
1.	Land 500 sq.mts @ Rs.550 per sq.mtr.	2,75,000
2.	Office / Store and Working Shed with an approximate area of 2000 sq.ft @ Rs.400 per sq. ft	8,00,000
	Total	10,75,000

(ii)	Machinery and Equipments			
	Description	Qty	Rate (in Rs)	Amount (in Rs)
1	Sintering Machine 8.2kW with other accessories	1	24,30,000	24,30,000
2	Mechanical Power Press 20T Capacity	1	4,56,000	4,56,000
3	Repressing Power Press 10T Capacity	1	3,12,000	3,12,000
4	Briquetting Press 1T Capacity	1	1,50,000	1,50,000
5	Air Compressor with 3 HP Motor	1	24,000	24,000
6	Ball Mill 500 kg Capacity	1	84,000	84,000
7	Oil Quenching Tank 4' x 2' x 2'	2	9,600	19,200
8	M.S.Water Tank	1	12,000	12,000
9	Mould and other tools	1	30,000	30,000
10	Heater 1.5 KW	1	4,800	4,800
11	Industrial Exhaust Fan	1	12,000	12,000
12	Chemical testing equipment and chemicals	1	36,000	36,000
13	Hardness testing machine	1	48,000	48,000
14	Measuring tools	1	42,000	42,000
15	Power factor meter	1	6,000	6,000
16	Tong tester	1	21,600	21,600
17	Universal testing	1	4,50,000	4,50,000
18	Office equipment/ Furniture	1	1,20,000	1,20,000
19	Pre-operative expenses	1	60,000	60,000
20	Material handling equipments	1	12,000	12,000
21	Installation and Electrification	1	3,71,316	3,71,316
			Total	47,00,916

B. Working Capital

(i)	Raw Materials			
	Description	Qty	Rate (in Rs)	Amount (in Rs)
1	Atomized tin powder (kg)	36	1,500	54,000
2	Electrolytic grade copper powder (kg)	404	650	2,62,600
3	Graphite powder (kg)	7.5	160	1,200
4	High grade non gumming petrol oil (in lts)	12	96	1,152
				3,18,952
(ii)	Salaries and Wages			
	Description	Qty	Rate (in Rs)	Amount (in Rs)
1	Works Manager	1	25,000	25,000
2	Supervisor	1	20,000	20,000
3	Skilled Worker	5	15,000	75,000
4	Unskilled Workers	5	15,000	75,000
5	Lab Technician	1	20,000	20,000
6	Accountant / Store In-charge	1	20,000	20,000
7	Clerk / Typist	1	20,000	20,000
8	Watchman	1	16,000	15,000
	Total			2,70,000
				Add Perquisites @ 15% of Salary
				3,10,500
			Say	3,11,000

(iii)	Utilities (per month)			
	Description	Qty	Rate (in Rs)	Amount (in Rs)
1	Fuel Combusted Hydro carbon gas cylinder	15	825	12,375
2	Power 1250 kW units @ Rs.4 per unit	1250	7	8,125
3	Water 10kl @ Rs.200 per klts	10	300	3,000
				23,500

(iv)	Other Contingent Expenses	
	Description	Amount (in Rs)
1	Advertisement and Publicity	6,000
2	Consumables	12,000
3	Insurance	18,000
4	Postage, Stationery & Telephone	3,600
5	Repairs and Maintenance	3,600
6	Sales Expenses	2,400
7	Transport	24,000
8	Miscellaneous	6,000
		75,600
(v)	Working Capital per month (i) + (ii) + (iii) +(iv)	7,29,052
(iv)	Working Capital for 3 months	21,87,156

C. Total Capital Investment

1	Fixed Capital	57,75,916
2	Working Capital for 3 months	21,87,156
3	Total Capital Investment	79,63,072

6.FINANCIAL ANALYSIS

A. Cost of Production (per annum)

1	Depreciation on building 5%	40,000
2	Depreciation on furnace @ 20%	4,86,000
3	Depreciation on machinery and equipment @ 10%	1,67,760
4	Depreciation on moulds and fixtures @25%	7,500
5	Depreciation on office equipment @20%	24,000
6	Recurring Expenditure	87,48,624
7	Interest on Capital investment	10,35,199
	Total	1,05,09,083

B. Sales (per annum)

By sale of 90,000 Nos of bronze bush for pumps of size D 43 mm x ID 38 mm x height 40 mm @ Rs.175/ piece	1,57,50,000
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C. Profit (per annum)

Sales	1,57,50,000
Cost of Production	10509083
Profit (Sales - Cost of Production)	52,40,917

D. Break Even Point

(i)	Fixed Cost (per annum)	
1	Depreciation	7,25,260
2	Insurance	2,16,000
3	Interest on Investment	10,35,199
4	40% of Salary and Wages	1,24,400
5	40% of Other Expenses & utilities excluding insurance	3,89,280
		24,90,139
(ii)	Profit (per annum)	52,40,917

(iii)

Break Even Point= $\frac{\text{Fixed Cost(per annum)} \times 100}{\text{Fixed Costper annum} + \text{Profit (per annum)}}$

$$\text{Break Even Point} = \frac{24,90,139 \times 100}{(24,90,139 + 52,40,917)}$$

$$\text{Break Even Point} = 32.21\%$$

Addresses of Machinery and Equipment Suppliers

1. M/s. Benco Hydraulics Ltd. 7/2, Nungambakkam High Road, Chennai 34.
2. M/s. Heaters India, 252, SIDCO Industrial Estate, Ambattur, Chennai-98.
3. M/s. Industrial Pyrotech Engineers 20 Bashym, Ist Street, Chennai-23
4. M/s. MurugappaMorzan Thermal 28, Rajaji Road, 5th Floor, Chennai.

5. M/s. Thermotherm Engineers 455, 12th Cross, 4th Phase, Penya, Bangalore-58.
6. M/s. Ruia Resistance Wires Pvt. Ltd. HariNivas, Riya House, Malviya Road, Vile Parle (E), Mumbai - 57.

Addresses of Raw Material Suppliers

1. M/s. Bhandari Metallurgical Corporation Ltd. 829, Mount Road, Chennai.
2. M/s. Bombay Metal Depot Anugraha, 19 NH Road, Chennai - 34.
3. M/s. Padmavathy Metal and Alloy Pvt. Ltd., 447/2, Puonthamalli High Road, Chennai - 106.