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# Bee – Hive Metallurgical Coke

| | | |
|---|---|---|
| PRODUCT CODE | : | N.A. |
| QUALITY AND STANDARDS | : | As per demand |
| PRODUCTION CAPACITY | : | 700 MT per year/shift |
| MONTH AND YEAR OF PREPARATION | : | February, 2003 |
| PREPARED BY | : | Small Industries Service Institute Industrial Estate, Naini, Allahabad |

## Introduction

Metallurgical Cokes are hard coke used in blast furnace for producing pig iron and in cupolas for the production of grey iron castings. Integrated Steel Plants have their own Coke oven battery in the premises to produce better quality of Metallurgical coke. Cokes used in Cupola are of inferior quality in comparison to coke used in the blast furnace. Due to some inherent characteristics like hardness, porosity, and abrasive strength, (Metallurgical cokes are being used in these furnaces. Metallurgical coke is produced by Carbonisation (heating of pulverised coking coal in absence of air) of coking coal i.e. bituminous coal in coke oven battery. Due to shortage of cooking coal in our country, now a days coke is also being produced by blending of coking coal, Non–coking and some additives.

## Market Potential

There are a good number of units in small scale sector engaged in producing grey iron casting, graded cast iron castings and Malleable iron casting by melting the charge in Cupola furnace. Metallurgical coke is one of the main ingredients of the charge used for melting in cupola furnace as it acts as a reducing agent and also fuel for melting the charge hence metallurgical coke has got good market potential. In mini blast furnace and mini cupola furnace, inferior quality of metallurgical coke can also be used. Keeping in view the good concentration of foundries for casting grey iron and Malleable iron, it can be said that Metallurgical coke manufacturing unit has wide scope in the small scale sector.

## Basis and Presumptions

i. The Project is based on single shift basis of eight hrs. and 300 working days in a year.

ii. The rate of interest has been taken as 18% per annum for calculation purpose. This may vary from place to place and time to time.

iii. The wages of labour have been taken as per trend of market.

iv. The plant and machineries are indigenously available.

v. There is scope for pollution control and energy conservation for production of Metallurgical coke.

vi. Land and building is on rent.

vii. 2–3% heating losses may occur.

## TECHNICAL ASPECTS

### Process of Manufacture

i. Bituminous coal is pulverized by ball mill into fine powder.

ii. Fine coal is heated in coke oven battery at 700–900°C in absence of air. This process is called Carbonisation. Soaking at this temperature for about 7–8 hrs., it is allowed to cool in the furnace. Due to coking property of bituminous coal powdered coal converts into lump size and becomes very hard and highly porous.

iii. After cooling, the coke produced is crushed into desired size. Strength of the coke, fixed Carbon, sulphur content and ash content is determined in the testing laboratory for justifying the quality of the coke.

iv. By-products like tar may also be collected during carbonisation process.

### Quality Control and Standards

Coking coal used should have low ash content, low sulphur and should be highly coking in nature for better quality of coke. Other properties like porosity, abrasive strength and hardness must be checked in the laboratory for maintaining the quality of Metallurgical coke.

### Production Capacity (per annum)

Quantity : 700 MT

Value : Rs. 52,50,000

### Pollution Control

Pollution may be created during pulversing, crushing of coal and during carbonisation process. Hence, anti pollution measures must be adopted.

## FINANCIAL ASPECTS

### A. Fixed Capital

**(i) Land and Building**

| | | | |
|---|---|---|---|
| Total Area | : | 3000 sq. ft. | |
| Covered Area | : | 1500 sq. ft. rented per month | Rs. 5000 |

**(ii) Plant and Machinery**

| Sl. No. | Description | Nos. | Value (In Rs.) |
|---|---|---|---|
| 1. | Coke oven battery to produce 800 kg Coke per batch including accessories self fabricated | 3 | 5,50,000 |
| 2. | Coal crusher | 2 | 80,000 |
| 3. | Ball Mill (cap. 200 kg.) | 3 | 2,25,000 |
| 4. | Material handling equipments/tools etc. | LS | 50,000 |
| 5. | Testing laboratory having Muffle Furnace, chemical balance, Glass wares, Asbestos rope, chemicals etc. | LS | 1,00,000 |
| 6. | Platform type weighing balance | 1 | 20,000 |
| 7. | Office equipments | | 25,000 |
| | **Total** | | **10,50,000** |

## B. Working Capital (per month)

**(i) Personnel**

| Sl. No. | Designation | Salary (In Rs.) | No. | Amount (In Rs.) |
|---|---|---|---|---|
| 1. | Supervisor | 5000 | 1 | 5,000 |
| 2. | Skilled worker | 2000 | 3 | 6,000 |
| 3. | Unskilled worker/ helper | 1500 | 5 | 7,500 |
| 4. | Watchman/peon | 1200 | 1 | 1,200 |
| 5. | Typist/ store keeper | 2000 | 1 | 2,000 |
| | | **Total** | | **21,700** |
| | *Perquisites @ 15%* | | | 3,255 |
| | | **Grand Total** | | **24,955** |
| | | **Say** | | **25,000** |

| (ii) Raw Material (per month) | | | (Rs.) |
|---|---|---|---|
| 1. | Coking Coal 60 MT | @ Rs. 4200 MT | 2,52,000 |

| (iii) Utilities (per month) | | (Rs.) |
|---|---|---|
| 1. | Electricity | 10,000 |
| 2. | Steam Coal | 30,000 |
| | **Total** | **40,000** |

| iv) Misc, Expenses (per month) | | (Rs.) |
|---|---|---|
| 1. | Stationery and telephone | 2,000 |
| 2. | Repair and maintenance | 5,000 |
| 3. | Chemicals/consumables etc. | 2,000 |
| 4. | Insurance | 1,000 |
| 5. | Transportation/publicity | 3,000 |
| 6. | Other expenses | 3,000 |
| | **Total** | **16,000** |

| (v) Total Working Capital (per month) | | (Rs.) |
|---|---|---|
| 1. | Staff and Labour | 25,000 |
| 2. | Raw Materials | 2,52,000 |
| 3. | Utilities | 40,000 |
| 4. | Misc. Expenses | 16,000 |
| 5. | Rent | 5,000 |
| | **Total** | **3,38,000** |

## C. Total Capital Investment

| | | |
|---|---|---|
| 1. | Fixed capital | Rs. 10,50,000 |
| 2. | Working capital for three months | Rs. 10,14,000 |
| | **Total** | **Rs. 20,64,000** |

# FINANCIAL ANALYSIS

| (1) Cost of Production (per annum) | | (Rs.) |
|---|---|---|
| 1. | Recurring expenditure | 40,56,000 |
| 2. | Depreciation on coke oven Battery @ 20% | 1,10,000 |
| 3. | Depreciation on other plant and machinery @ 10% | 50,000 |
| 4. | Interest on total capital investment @ 18% | 3,71,520 |
| | **Total** | **45,87,520** |
| | **Say** | **45,87,500** |

**(2) Total Sale (per annum)**

700 MT Metallurgical Coke of good quality @ Rs. 7500 /MT — **Rs. 52,50,000**

**(3) Profitability**

= Profit per annum (Before Tax)

= Total sale – Cost of Production

= Rs. 52,50,000 – 45,87,500

= **Rs. 6,62,500**

**(4) % Profit on Sale**

$$= \frac{\text{Net Profit} \times 100}{\text{Total Sale}}$$

$$= \frac{6,62,500 \times 100}{52,50,000}$$

= **12%**

**(5) % Rate of Return of Capital**

$$= \frac{\text{Net profit} \times 100}{\text{Total Capital Investment}}$$

$$= \frac{6,62,500 \times 100}{20,64,000}$$

= **32%**

**(6) Break-even Point**

| Fixed Cost (per annum) | (Rs.) |
|---|---|
| 1. Interest | 3,71,520 |
| 2. Total Depreciation | 1,60,000 |
| 3. Rent | 60,000 |
| 4. 40% salary of staff and labour | 1,20,000 |
| 5. 40% of other expenses | 76,800 |
| **Total** | **7,88,320** |

**B.E.P.**

$$= \frac{\text{Fixed Cost} \times 100}{\text{Fixed Cost} + \text{Profit}}$$

$$= \frac{788320 \times 100}{788320 + 662500}$$

$$= \frac{788320 \times 100}{1450820}$$

= **54%**

## Addresses of Plant and Machinery Suppliers

*1. Coke Oven Battery*

Locally fabricated by Skilled Fabricator. If necessary guidelines may be taken from Central Fuel Research Institute, Dhanbad.

*2. Jaw Crusher, Ball Mill*

i. M/s. Batliboi and Co. (P) Ltd.
26, R.N. Mukherjee Road,
Kolkata-700001

ii. M/s. National Mechanical Works
72-A M.M. Road,
Paharganj,
New Delhi

## Addresses of Coking Coal Suppliers

M/s. Bharat Coking Coal Ltd.

Local Marketing Division.