

VOCATIONAL TRAINING REPORT

on

# **SAIL REFRACTORY UNIT**

*Submitted By*

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*for the Degree of Bachelor of Engineering*



**सेल SAIL**

**Steel Authority of India Limited  
SAIL REFRACTORY UNIT, MARODA, BHILAI  
CHHATTISGARH, 490006**

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- 3. Mr. Neeraj Prakash AGM I/c - Maintenance**
- 4. Mr. Amit Charit & Sr. Mgr - R & C Lab**
- 5. Mr. R.C Bhoi AGM - Finance**
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**Ria Umahiya**

**Sanket Gadpayle**

## **ABSTARCT**

The B.E program is well structured and integrated course of technical studies. The main objective of summer training at B.E level is to develop skill in student by supplement to the theoretical study of technical work field in general. Industrial training helps to gain real life knowledge about the industrial environment. In every professional course, training is an important factor. Professors give us theoretical knowledge of various subjects in the college but we are practically exposed of such subjects when we get training in the organization. It is only the training through which we came to know that what an industry is and how it works. We have learnt about various departmental operations being performed in the industry, which would in return help us in the future when we shall enter the practical field. Now a day globalize world, where cutthroat competition is prevailing in the market, theoretical knowledge is not sufficient.

Beside this one need to have practical knowledge, which would help individual in his/her carrier activities and it is true that "EXPERIENCE IS THE BEST TEACHER".

## Chapter: 1 Introduction



**SAIL REFRACTORY UNIT (SRU)-BHILAI** is situated at Maroda, Bhilai, Durg, Chhattisgarh, near BHILAI STEEL PLANT, amidst the serene beauty of the Nature. The SRU-BHILAI plant is about 45 km away from Raipur, the capital of Chhattisgarh.

### **HISTORY OF SRU-BHILAI PLANT:**

A public sector undertaking, under the ministry of steel was originally incorporated as a subsidiary company of Bokaro Steel Limited on 22nd July, 1974 to run Bharat Refractory Plant (BHRP) which was earlier acquired by Gov. of India in 1972 placed under the management of Bokaro Steel Limited.

This was under of erstwhile Hindustan Steel Limited and Bhilai Refractories Plant (BRP) which was under construction as a captive unit of Bhilai Steel Plant was also transferred to BRU.

In the past two decades the 19 public sector steel plant were experiencing considerable different in melting their required of Refractories for operation construction & capital repairs of the various furnaces & kilns in their plants huge quantity of Refractories are imparted for melting constructional required of Bokaro Steel Plant.

Towards the end of 1969 govt, decided to setup a Refractory plant in the public sector as a captive source to Hindustan Steel Ltd. The govt. Commissioned MECON (the central Engg.& Design Bureau of USE) to prepare the feasibility report for this plant which has submitted to the ministry in July, 1970. The feasibility report had recommended setting up of a Refractories plant of BHILAI / 60000 tonnes of basic Refractories & 10000 tonnes of silica Refractories per annum.

The location of Bhilai was preferred. The report was accepted by the govt, in December, 1970. Subsequently MECON was asked to prepare a detailed project report for the plant.

BRE or Bharat Refractories Limited (now known as SAIL Refractory Unit) is now a unit of the prestigious Steel Authority of India Limited. SAIL Refractory unit has four units with Head Office at BokaroBokaro as below:-

1. SAIL Refractory Unit -Bhilai (Bhilai, Chhattisgarh).
2. SAIL Refractory Unit - IFICO ( IFICO.Marar, Ramgarh, Jh arkhan d), .
3. SAIL Refractory Unit - Ranchi Road Refractories Plant (Ranchi Road, Jharkhand).
4. SAIL Refractory Unit -Bhandaridah(Bhandaridah, Jharkhand)

### **PRODUCTS:**

SRU-Bhilai manufacture a large no. of products (as per the customer specification), the present product are : MCH, CHM, MGT, SILICA, MgO-C bricks and masses.

### **EMPLOYEES:**

Executive	41
Non-Executive	133
<b>Total</b>	<b>174</b>

Other than permanent employees, 362 contract employees are working in SRU Bhilai

### **Actual PRODUCTION during: 2017-18:**

NAME	Per Year (MT)
BASIC	10835.059
SILICA	2349.6308
MgO-C	12736.83
Masses	3914.500
<b>Total</b>	<b>29835.2728</b>

<b>Sr.No.</b>	<b>Name of Item</b>	<b>Total Production per Month</b>	<b>Total Dispatch per Month</b>
1	CHM-BASIC BRICKS	165.990	391.230
2	MCH-BASIC BRICKS	950.885	537.165
3	MCB BSP	969.813	819.819
4	MCB 8SL		
5	MCB ASP		
6	SILICA	87.620	32.065
7	MASS	315.350	342.010
8	MGT	11.451	42.151
9	MC8-TH(BSP)		
10	DSP SILICA		
11	MCB ASP		11.567
12	MCB ISP		
13	MCB DSP		
<b>TOTAL</b>		<b>2501.109</b>	<b>2176.007</b>

**CUSTOMERS OF SRU, BHILAI:**

- SAIL, Bhilai Steel Plant, Bhilai
- SAIL, Durgapur Steel Plant, Durgapur
- SAIL, Bokaro Steel Plant, Bokaro Steel city
- SAIL, Rourkela Steel, Rourkela
- SAIL, Alloy Steel Plant, Durgapur
- Visakhapatnam Steel Plant, Visakhapatnam

## Chapter: 2

### R & C Lab

#### **RESEARCH & CONTROL LAB (R&C):**

Guided By: Mr. Amit Charit.



R&C section is a very vital section of any Refractories Plant. SRU-Bhilai Refractories Plant possesses a strong R&C section gifted with a no. of efficient employees. R&C plays a decisive role in determining the batch composition of any required product as per Customers' requirement. The batch composition should be such that the final product exhibits the required properties and perform well in during application. Therefore, R&C should be well-equipped with various testing equipment's.

Some of the testing facilities provided by R&C section of SRU-Bhilai Refractories Plant are mentioned below:



➤ EXPRESS LAB:

In Express Lab following tests are performed:

- Sieve Anal
- Moisture Content

➤ CHEMICAL SECTION:

In chemical section following tests are performed:

- Analysis of incoming raw materials
- Analysis of semi
- Viscosity

➤ CCS & PHYSICAL SECTION:

Here following tests are performed:

- AP
- BD J CCS
- RUL
- PCE
- J PJC
- THERMAL SHOCK RESISTANCE
- VISCOSITY

➤ FOR THE ABOVE TESTINGS, THE AVAILABLE INSTRUMENTS ARE:

- KidSifiteiac
- Moisture balance machine
- RTE testing machine
- C.C.S. machine (3000 KN, 1000 KN)
- P.C.E. furnace
- R.U.L. furnace
- Chamber furnace (11000 C)

Pyro metric Cone Equivalence (PCE)

Machine is for testing of melting capacity of taken specimen. Test is based on comparison. Melting point of component which is to be tested is compared by standard material with pre-determined melting point.

### Refractory under Load (RUL)

In this test load bearing capacity of material is tested and result is taken by the help of optical pyrometer.

### Cold Crushing Strength (CCS)

SAIL Refractory Unit has 2 cold crushing strength machine. One is of 60 tonnes and another is of 300 tones.

Apart from these, unit also has a well-equipped chemical laboratory for testing of chemical characteristics of materials.

The brick size for CCS test is  $100 \times 100 \times 100 \text{ mm}^3$

### MOISTURE CONTENT:

Moisture content of mix before pressing, and bricks after drying are done regularly in Moisture balance machine.

### APPARENT POROSITY:

Apparent porosity is one of the important testing parameters. Apparent porosity is the percentage relationship between volume of the open pores space and the total volume of the sample. It is given by the relation as follows:

Apparent porosity =  $(W-D) / (W-S) \times 100$

Where, W=saturated weight of the sample.

D= dry weight of the sample.

S=weight of the sample suspended in water.

### BULK DENSITY:

This is also one of the important properties of refractory material. Bulk density is the weight per unit volume of the refractory including the volume of the open pores space. This factor is responsible for the overall weight coming upon the foundation of the refractory structure. It is one of the factors which limit the size of the furnace.

Bulk density of the refractory material is given as;

Bulk density =  $D / (W-S) \text{ (gm/cc)}$ .

### PERMANENT LINEAR CHANGE (PLC):

This represents the permanent change of the refractory shapes undergone on heating, or after reheating under a given set of conditions. The specimen of size 5cm x 5cm x 2.5cm is cut by cutting off wheel from a given refractory brick, ensuring that its structure does not get damaged. The volume of the specimen is determined and placed in a furnace at a temperature of

1600°C for a period of 120 minutes. After cooling, its volume is once again measured. The change in its linear volume gives its permanent linear change of the brick.

The PLC is calculated by knowing the following formula:

Volume change (%) = (Final volume- Original volume)/ (Original volume) \*100

Linear change (%) = (Final length- Original length)/ (Original length) \*100

### PILOT PLANT:

In R & C lab, the small versions of machineries of plant are available in pilot plant where various samples are prepared for testing purposes. Here preliminary unit operations of refractory processing for R & D (Research & Development) job are also carried out extensively. The list of machineries available at pilot plant is given below

- Jaw crusher
- Roll crusher
- Vibro grinder
- Pan Mill
- Mixer
- Dry Oven
- Drilling machine
- Brick cutting machine with diamond saw.

## **Chapter: 3**

### **Maintenance**

#### **Maintenance:**

Guided By : Mr. V.Chaturvedi.

Function of maintenance department of SAIL are entrusted with the maintenance of plants to care of a regular, through supervision of the conditions and functions of all operational equipment in the right time so that the effect of deterioration can be spotted early enough before major costly breakdowns and damage to the equipment.

The justification for a maintenance organization group lies in its use to ensure availability of equipment and services for performance of their functions at optimum return on investments whether this investment be in MACHINERY, MATERIAL, PEOPLE and MONEY.

#### **TYPES OF MAINTANCE SYSTEMS:**

Any organization which is machinery, plant, equipment and facilities must have a clear-cut maintenance policy. In SAIL broadly the following methods are used for carrying out maintenance activities.

- **Breakdown Maintenance:**

This is event based and carried out when breakdown of equipment takes place bringing down production. This is firefighting and should be avoided at all cost.

- **Preventive Maintenance:**

It consists of planned and co-ordination inspection, adjustment, repair and replacements in maintaining equipment. Preventive maintenance of a machine can be carried out both during operation as well as shut down.

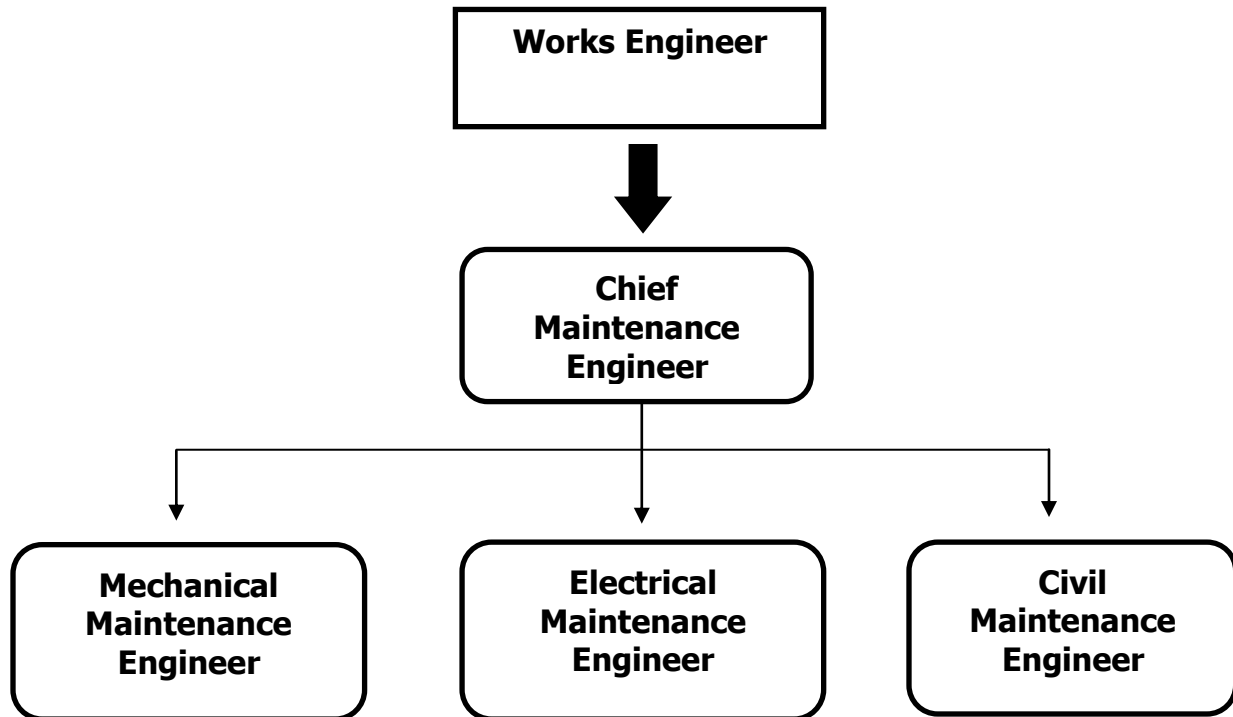
- **Planned Maintenance:**

It has to be centered on the original recommendation made and prescribed by the original equipment manufacturer. The maintenance manager has to use all his experience and expertise to super impose refinements and improvements on manufacturer recommendation.

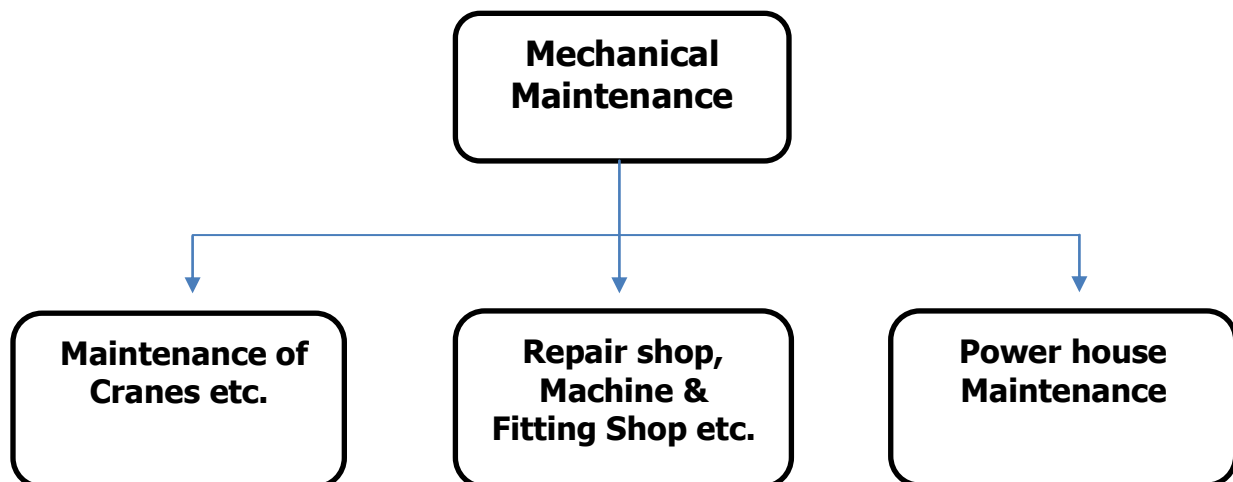
- **Predictive Maintenance:**

Most predictive maintenance are performed while the equipment is in services, thereby minimizing disruption of normal system operations.

➤ Maintenance Objectives:-

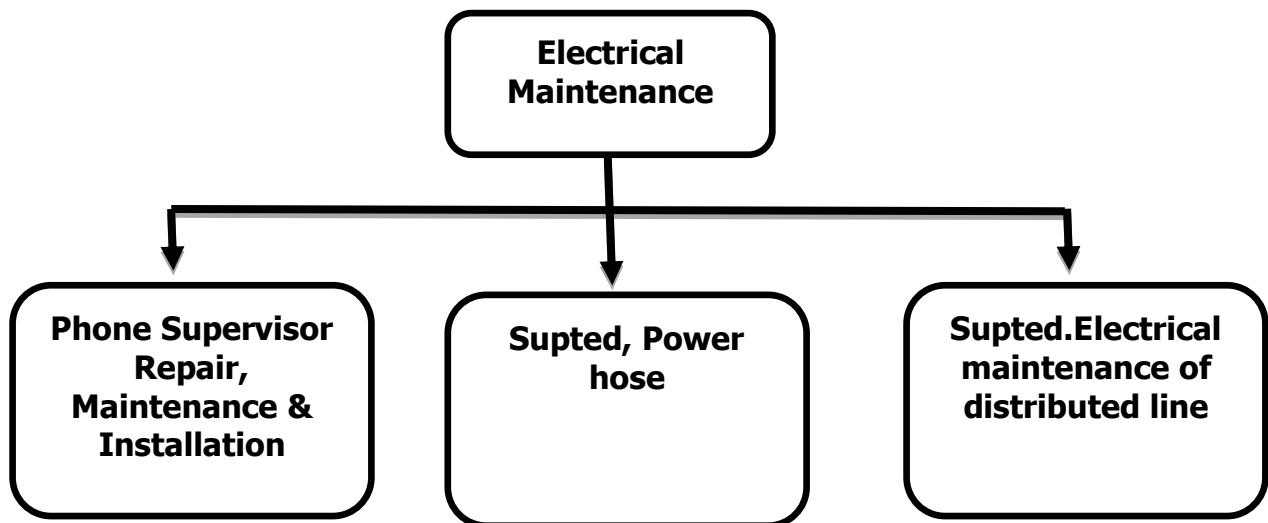


➤ Mechanical Maintenance :-

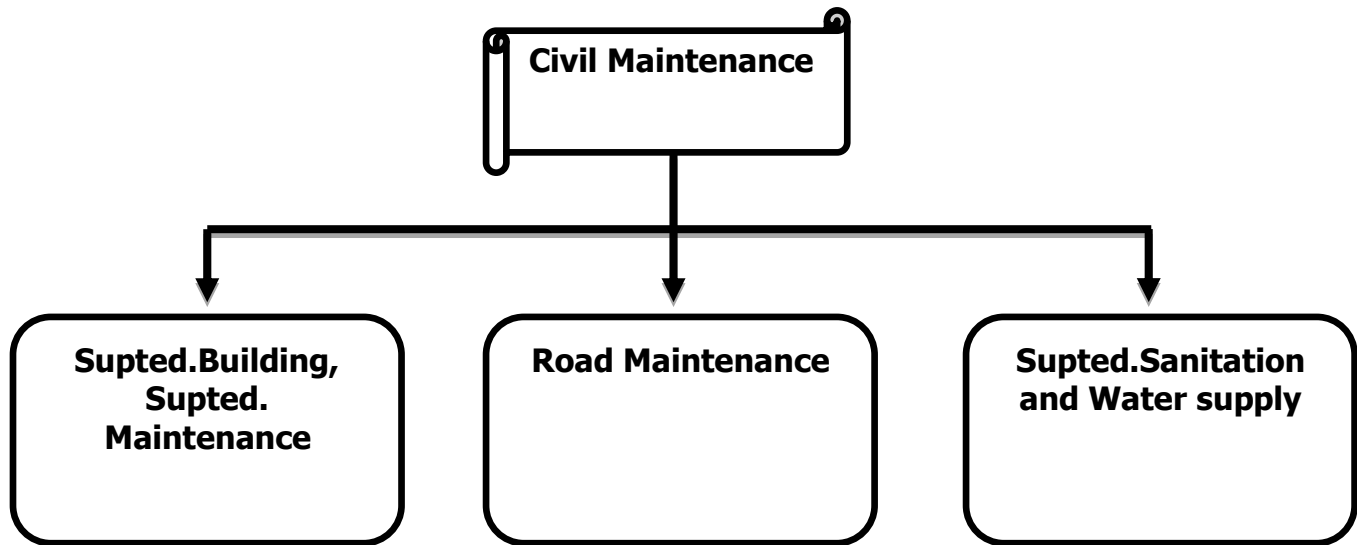




➤ **Electrical Maintenance:-**



➤ Civil Maintenance:-





## Chapter: 4 Production

### **PRODUCTION OF BASIC BRICK AT SRU- BHILAI:**

Guided By : Mr. Rajeev Verma.

#### **Basic Refractories:**

Those refractories which are attacked by acid slags (acid) are called basic refractories. This are used in areas where slags and atmosphere are basic .they are stable to alkaline Material but could react with acids. The main raw' material belongs to the RO group to which Magnesia (MgO) is very common example. Others example include Dolomite & Chromite. In the first half of the 20th century, artificial periclases (roasted magnesite) are used in the steel making process as a lining material for the furnace.

#### **TYPES:**

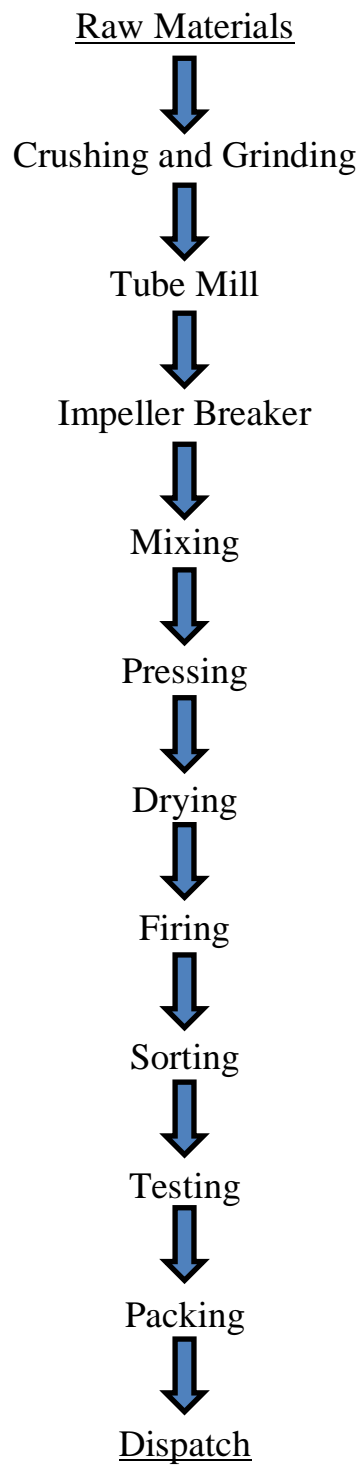
In SRU BHIL AI three types of basic bricks are manufactured i.e.

- MAGNESIA- CHROME (MCH)
- CHROME-MAGNESIA (CHM)
- MAGNESITE (MGT)





## FLOW CHART OF BASIC BRICK PRODUCTION AT SRU-BHILAI



## **PRODUCTION OF SILICA BRICKS AT SRU-BHILAI:**

### **Silica Refractories:**

The silica refractories are manufactured as multiple asymmetric shapes, which are normally keyed or interlocked with each other by means of tongues and grooves.

It is the objective of the manufacturer of silica refractory bricks to select the raw materials and the firing process in such a manner that the degree of quartz transformation is suitable for the intended application of the brick. The raw material for silica brick is naturally occurring quartzite which must meet certain requirements in order to achieve optimum brick properties. If refractoriness or thermal expansions under load (creep) are the main requirements, a quartzite of high chemical purity must be selected. Raw materials for volume stable products should have good transformation properties.

Silica bricks contain a major amount of silica ( $>93$  wt%  $\text{SiO}_2$ ), with minor content of other oxides, such as lime (Cat), alumina ( $\text{Al}_2\text{O}_3$ ) and iron-oxide ( $\text{Fe}_2\text{O}_3$ ).



### **Features of silica bricks :**

The features of silica bricks include :

- Relatively low specific gravity.
- High mechanical strength at high temperature.
- No shrinkage after long term services at high temperature.
- Low thermal expansion coefficient at high temperature.
- High corrosion resistance to acidic slag and some others acidic conditions.
- High expansion at lower temperature.

### **PHYSICAL PROPERTIES OF SILICA BRICKS:**

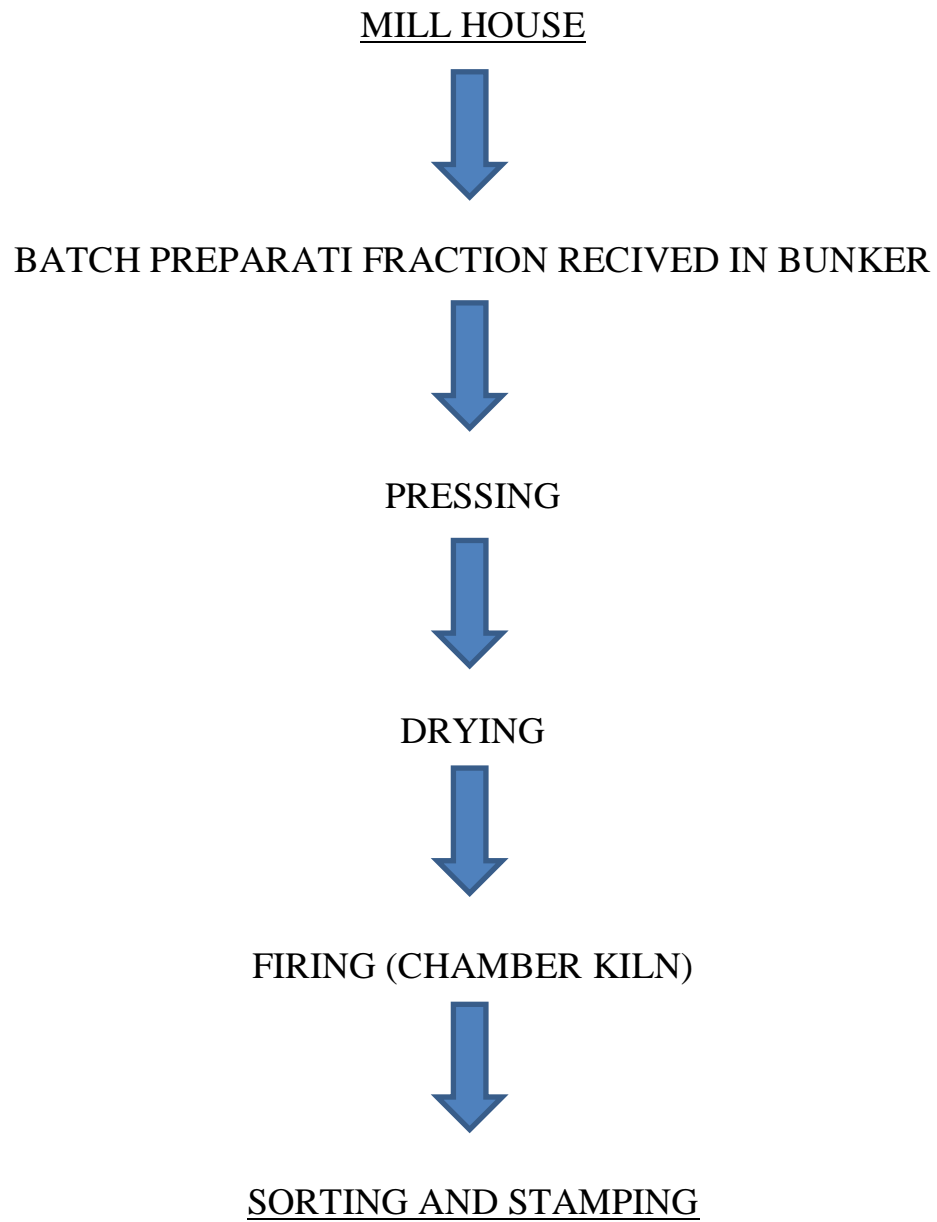
Silica bricks are yellowish in color with brown specks distributed throughout the mass. The porosity is about 22-26% and the specific gravity is 2.3 to 2.35.

In using silica bricks, great caution must be taken because the materials very sensitive to thermal shock when heated from room temperature to about 700°C, because of the expansion of the silica phases present. Above 700°C the thermal expansion coefficient decreases and there is a significant improvement in the thermal shock resistance.

### **APPLICATION OF SILICA BRICKS:**

Silica refractory is the most abundant refractory used in the construction of a coke oven batten (COB). Silica is the refractory of choice primarily because, at normal COB operating temperatures, silica refractories are subject to minimal creep. Also, since nearly all of the expansion of silica brick takes place below 650 deg C. during normal operation of a COB, the moderate temperature fluctuations of the walls have no effect on the volume stability of the refractory comprising the wall. A COB design can have well over 400 different shapes ' used in its construction. These shapes are installed with a silica mortar.

## Prodoction process of Silica Bricks at SRU Bhilai



### **PRODUCTION OF MgO-C BRICKS:**

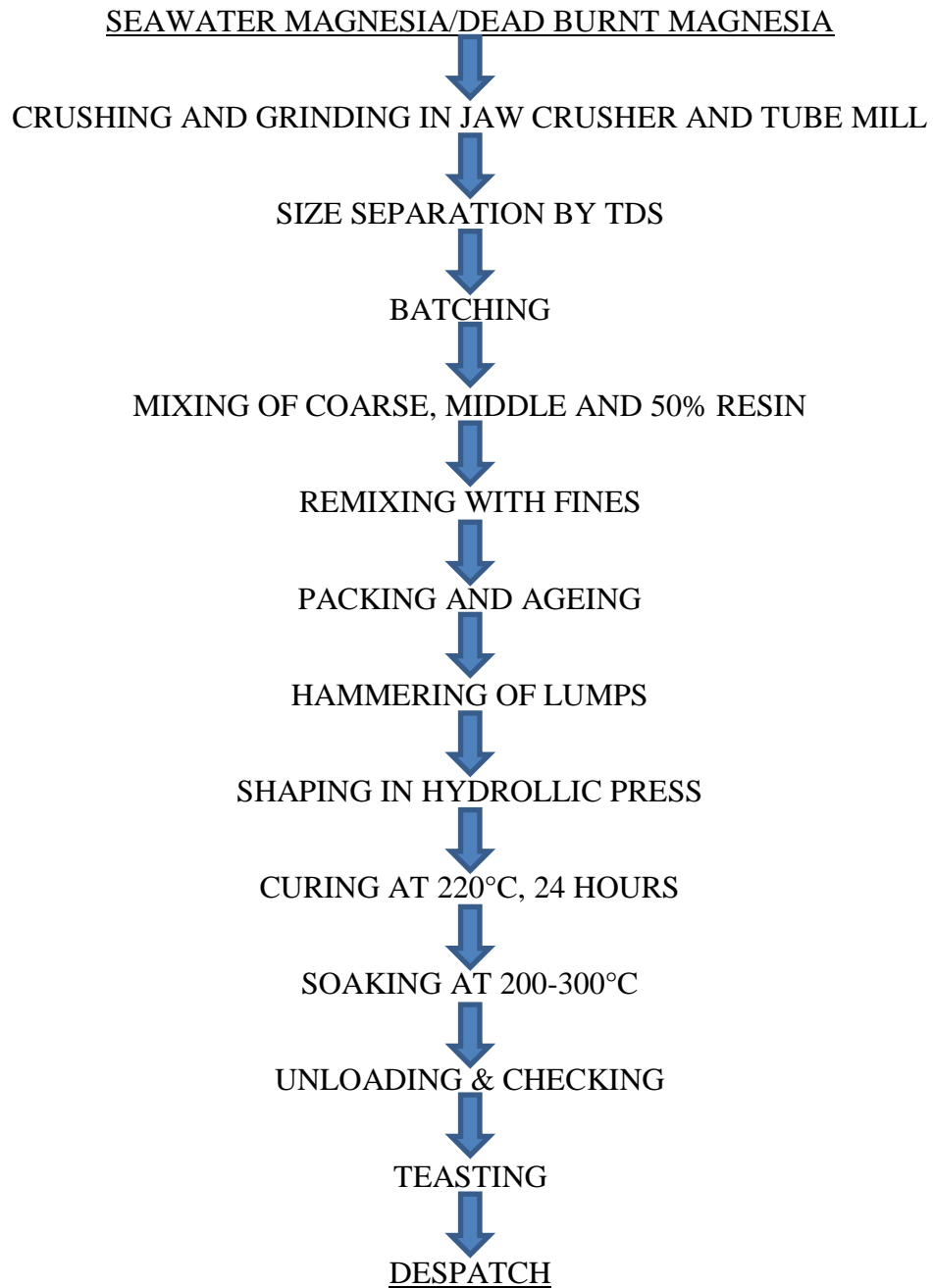
MgO-C refractory bricks are widely used in steel making application, mainly in steel ladles, LD converters, electric arc furnaces and also in secondary steel making. It is a basic refractory with superior slag /metal corrosion and penetration resistance and excellent thermal shock resistance properties at high temperatures. In steel ladle applications a carbon content of 7-12 wt. % is used. The function of the graphite(C) is to fill the porous structure, improve the slag / metal corrosion and penetration resistance due to its non-wetting character and enhancement of thermal shock resistance due to its high thermal conductivity and low thermal expansion characteristics.

### **PROPERTY OF MAG-C BRICK:**

- Cold crushing strength is high
- Thermal conductivity is high.
- Apparent porosity is less (4-6%).
- Bulk density is high (min 2.95gm/cc).
- Coke porosity will be within 10%.
- Spalling resistance is high
- Non-wettability by liquid slag
- Low corrosion rates by slag
- Low thermal expansion



## PRODUCTION PROCESS OF MAG-C BRICK



## **DEFECTS OF RAFACTORY BRICKS:**

After firing the bricks are stored. The bricks are rejected for several reasons. Several types of defect can arise in all basic, silica MgO-C bricks. The defects of fired bricks are as follows:

- **LAMINATION:** Lamination in the bricks arises during pressing. The causes of lamination are mentioned in pressing section.
- **CRACK:** The causes of cracks are discussed in pressing section. Cracks are of two types:
  - **Dry crack:** it is developed when fine cracks in green brick becomes prominent after firing.
  - **Loading crack:** it is developed due to faulty setting of bricks in the car.
- **IRON SPOT:** Raw materials containing more  $2O_3$ , more iron spots will be appeared in bricks. When it exceeds the tolerance limit, bricks are rejected.
- **CORNER BREAKAGE:** During handling & loading the corners of the bricks may be broken. It is measured by corner gauge. If it is more than tolerance limit the brick will be rejected.
- **BEND OR WAR PAGE:** This is due to improper loading of bricks on the cars fired at high temperature.
- **SPONGY:** this is due to the presence of higher percentage of coarse grain of material in the brick.
- **TAPERING:** Sometimes bricks are tapered i.e. becomes narrowed in one direction due mold defects, non-uniform pressing.
- **SEI TING MARKS:** Due to improper loading, the brick surface becomes wavy.
- **BLASTING:** Due to presence of lumps, which are expanded during firing, in the green bricks, blasting is happened.
- **DIMENSIONAL DEFECTS:** Due to mold defects, non-uniform pressing & extra amount of material the bricks become dimensionally larger than required, this is called over size. But when green bricks contains excess amount of moisture or excess clay fines & less amount of material the bricks become smaller than the actual, this is called undersize.
- **SOFT FIRED:** When bricks are not properly fired, then they are remain soft and they are sent to T K for further firing.



- **HARD FIRED:** When bricks are over fired then they are hard & they are rejected.
- **SLAG HOLE:** When bricks contain low melting material during firing low melting phase comes out and form holes in the bricks.
- **SEGREGATION:** Due to the improper mixing of different size fraction.





## Chapter: 5

### EDP

Guided By : Mr. Mayank Goyal & Mr. Umapathi.



The existing computer software of Bharat Refractory Limited (BRL), Bhilai is based on Unix/Cobol platform. The data are being stored in flat files. The system has got various limitations in terms of maintainability,, openness to the new generation computer systems such as ERP, ease of data/information retrieval and reporting. The programs have been written in the oldest programming language COBOL. The bottleneck of the system is its flat file structure, non-availability of RDBMS features and its underlying operating system which is UNIX. Hence it is proposed to migrate existing software modules such as Payroll, PPC, Sales and Distribution System, Financial and Accounting System, Material Management System in to new software platform which will be based on Oracle RDBMS and Windows based end user interface.

#### **The New application software for BRL:**

The software for BRL will be a multi module application software that helps a manufacturer to manage parts of its business. The new software solution will integrate key departments and functions of BRL Bhilai so that it can serve all those different departments' particular needs. It will also ensure better management with proper production planning and control, sales, and marketing etc. The new software system of BRL will also be capable of being interfaced with other automation software implemented/ to be implemented in SAIL like ERP.

BRL expects to accrue following benefits from the implementation of the new software applications:

- Improved decision making.
- Improved resource productivity .
- Enhanced Organizational Capabilities.
- Enhanced capacity to adopt new IT applications.
- Improvement in Materials Management lead times.
- Reduced inventory level of raw materials and finished goods.
- Improvement in time to close books.
- Improvement in materials management, productivity, maintenance of plant equipment, human resource utilization, accounting etc.

**Modules Envisaged for BRL:**

i) Production Planning and Control (PPC):

The main functions of PPC are preparation of production plans, programming of production, compiling various production and dispatch data for all shops and preparation of MIS reports and follow-up & monitoring of production performance. Manufacturing in any company has at its disposal various resources. The nature and the Constraints of these resources are determined by strategic decisions. The day to day running of manufacturing process lies with Production Planning and Control. The purpose of PPC is to ensure that manufacturing run effectively and efficiently and deliver products as required by customers.

- The PPC module ensures that the resources are available:
  - In the appropriate quantity.
  - At the appropriate time.
  - At the appropriate level of quantity.
- The objective of the processes of PPC department are as follows:
  - Planning:
    - To formulate the production plan(Annual, Monthly, Weekly & Daily) for all the major units/ departments of BRL
    - To formulate Long Term Strategic Plan including production plan, product mix. important parameters etc.
  - Statistics :
    - To collect, compile & process operational data of all the units of the plant.(on daily, monthly and yearly basis).
    - Production Planning manages production process, including.
    - Capacity planning.
    - Master production scheduling.

- Shipping.
- Backlog Management.
- Returns Handling.

## ii) Sales and Distribution:

The Sales and Distribution Module will help to improve customer service and evaluate sales and marketing activities. The Sales Order Module maintains extensive customer information, defines pricing and tax information, generates sales orders, and manages picking, issuing, packing and shipping operations, and checks credit. The entire administrative, product, pricing and shipping information is edited during the sales order entry process.

- Sales and Distribution module manages the following:
  - Request for Quotation.
  - Pricing.
  - Sales order.
  - Packing.
  - Pre shutdown checklist.
  - Predictive maintenance.
  - Labor.
  - Material.
  - Unit/Equipment Down time.
  - Outages.

**SAIL REFRACTORY UNIT BHILAI**

**PURCHASE ORDER FOR STORE MATERIAL**

Order No:-  Date:- **27-06-2018**

Actual Order No:-  Date:-

Quotation No:-  Date:-

LOI No :-  Date:-

Enquiry No :-  Date:-

Indent No :-  Date:-

Currency:-  Value:-

Whether IPT:-  Pur Grp File:-

Party Code:-

Consign Code:-

Please do not Use " " (single quotation mark) in any field

**Terms & Condition:**

Payment Mode:-

Payment Term:-

L.D. Applicability:-

Delivery Terms:-

Origin Station

Mode of Despatch:-

Paying Agency:-

By Road

iii) Material Management:

This plays an active role in procurement, receipts, inventory management and corrective & preventive measures in respect of quality/ quantity of the raw materials. The Material management module maintains the supply chain, including

- Planning:

The objective of the process is to plan the requirement of different raw materials projected by the shops at BRL. Also forecasting of requirements is done based on the annual consumption plan/ production plan with the help of MIS reports on consumption history, available stock, indent dues, pipeline quantities also taking into account the budget status, source of supply any change in plan/ any special requirement etc. j

The raw material procurement activities start with the finalization of raw material procurement budget for the next financial year and allocation of the same to different shops/ user departments. Planning of raw materials is then done by Raw Material Department by consolidation of requirements given by different shops for different raw materials.

- Indent, Requisitions:

To generate Purchaser indents for raw material planned for procurement from captive and outside sources and generating requisition/intimation for procurement of coals, with all necessary clearances and approvals as per Company guidelines. For procurement of raw Materials from sources, requirements are worked out by PPC based on Annual Production Plan and intimations are sent to Raw Material Department. Indenting are done by RMD based on available stock, indent/order dues, pipeline quantities also taking into account defined handling losses, source of supply, budget status. For procurement from outside sources, purchase indents are generated with due administrative approval. Indents are then scrutinized by screening committees constituted by management.

- After Scrutiny and Clearance by:

- Material requirements planning.
- Shop floor management.
- Maintains Manufacturing Standard.
- Engineering and product data management information.

- Various sub functions under the PP group will include:

- Annual plan, Monthly plan & weekly production planning.
- Long term strategic planning.
- Planning and scheduling for long products.
- Macro-level production planning.
- Production reporting of all shops and other MIS reports.
- Exception monitoring & contingency plan.
- Shop yard management.
- Production statistics: Capturing, compilation, storage, retrieval and analysis of operational data Dispatch management.

iv) Maintenance Management:

Maintenance module enables a company to control and track the maintenance of all the various equipment in a Plant.

- This module handles the following:
  - Creation of Daily / Monthly maintenance activity.
  - Breakdown maintenance work.
  - Unplanned maintenance work.
  - Generation of requisition for various items.
  - Spare parts requirements.
  - Planning and scheduling.
  - Over-due bills with detailed and summary options.
  - Customer exceeding Credit limit or Credit period.
  
- Interest on bills with over-due outstanding.
- Analysis of bills paid after the due date to decide credit rating.
- Statement of book debts to provide to banks.

The screenshot shows a web-based application interface for 'SAIL REFRACTORY UNIT BHILAI'. The top navigation bar includes links for HOME, MASTER, PURCHASE, STORE, RAW MATERIAL, FINISH GOODS, WORK CONTRACT, and FINANCE. The user is logged in as 'Hello, rukhsana22' with a 'Log off' option. The main form is titled 'MATERIAL RECEIPT' and contains various input fields for receipt details, including CRR No., PO No., Transporter, WO SL No., Truck No., Mat SL No., BE No., BL No., Chalan No., Gross Chalan Qty, Net Red Qty, Supplier, Trans Name, Work Name, Ship Name, Mat Name, BE Date, BL Date, Chalan Dt., Gross Revd Qty, No OF Bag, and Total Bag Weight. There is also a table with columns: SNo, Mat Code, Mat Name, A/U, CRR No, Chalan No, Chalan Date, BE No, BE Date, BL No, BL Date, Order Qty, and Chalan Qty. Buttons for ADD, CLOSE, CANCEL, and SAVE are located at the bottom right of the form.

## ALLOCATIONS

- Budget and fixed allocation capabilities.
- Percent and variable percent.
- Weighted allocations.

## BUDGETING

- Automatic budgeting.
- Budgets from current (at actual) and previous year.
- Job cost.
- Import/export budgets.

### v) Financial Accounting:

The Financial Accounting module handles an organization's General (Ledger) Accounting, Accounts Receivables and Accounts Payables. It integrates the diverse and complex world of organizational finance.

- It handles the following:

- Financial accounting according to the statutory requirements.
- Management accounting through financial budgeting.
- Enterprise controlling to deal with consolidation of group accounts.
- Cash Flow, Fund Flow (accounts receivable & payable), Investments and Loans.
- Accounting through cost centers allows allocation of income and expenses and monitoring of profitability.
- Long-term cost can be controlled through flexible budgetary and financial controls. Budgets can be defined month-wise and year-wise for account head, account sub heads, cost centers. Budgets may be validated at the time of voucher entry.
- Management of foreign currencies.
- Tax Calculation.
- Cash Flow management by studying various analyses like Cash Flow, Fund Flow and Projected vs. Actual In-Flow and Out-flow of funds.
- Cheque Deposited and Cleared Statement along with the calculation of Overdraft Interest allows to effectively monitoring bank transactions.

The screenshot shows a web application interface for 'SAIL REFRACTORY UNIT BHILAI'. The top navigation bar includes links for HOME, MASTER, PURCHASE, STORE, RAW MATERIAL, FINISH GOODS, WORK CONTRACT, and FINANCE. The user is logged in as 'Hello, rukhsana27' with a 'Log off' option. The main form is titled 'INSPECTION' and contains the following fields:

- CRR: RCR181900393
- PO No: P021718000093
- Mat SL No: 1
- Mat Name: DBM (3-3A00)
- Revd Qty: 26.000
- Reject Qty: (empty)

There are buttons for 'SAVE', 'CANCEL', and 'ADD'. Below the form is a table with the following columns:

PO No	Mat SL No	Mat Code	Mat Name	A/U	Revd Qty	Req Qty	Accept Qty	Excess Qty	Bal Qty	Note
-------	-----------	----------	----------	-----	----------	---------	------------	------------	---------	------

The screening committee, budget is allocated and indent forwarded department for procurement.

- This software system helps in:
  - Provide for online forecasting of requirement for identified items taking into account Annual Production Plan, Inventory, Shops requirement, consumption trends etc.
  - Provision also made for automatic generation of annual indents for items.
  - Instant monitoring of allocated budget at shop.
  - Provision for adjustment of budget from one indent to another.
  - Purchase orders.
  - Bill Of Materials.
  - Goods receipts.
  - The objective is receipt and unloading of coal and different raw materials from different captive and outside sources, receive by rail/road.
  - Inspection.
  - Inventory management (stores management).
  - Supply Chain Management.

**GOODS ACCEPTANCE AND RECEIPT NOTE**

GARN NO: XXXXXXXXXX

CRR No: RCRR1819000411

MAT SLN: 1

**DETAILS**

P.O. No: P021819000011

AMD No: 0

SUPL Name: SS011, SAIL BHILAI STEEL

PLANT: 100000998

MAT Code: BOILER COAL

Transporter: W171800009

W/O: 1

Work SI No: 1

ADD
CLOSE
SAVE

**AS PER ORDER**

Unit Price: 6850.0000

Discount: 0.000

Packing: 0.000

SGST: 0.000

CGST: 0.000

IGST: 0.000

CESS: 0.000

Analytical Charge P/U: 0.000

Freight: 0.000

Late Delivery %: 0.00

Local Freight: 0.00

Penalty P/U Mat: 0.00 ☐ Percentage

Penalty For Tans: 0.00

Remarks For Penalty:-

Any Comments For GARN:-

**AS PER CHALAN**

Unit Price: 6850.0000

Discount: 0.000 PER UNIT

Packing: 0.000 PER UNIT

SGST: 0.000

CGST: 0.000

IGST: 0.000

CESS: 0.000

Analytical Charge P/U: 0.000

Freight: 0.000 PER UNIT

Late Delivery (Rs.): 0.00

**OTHER CHARGE**

Remarks For Modify:-

Date: 27-06-2018

CRR No	PO No	AMD	MAT	MAT	A/U	QTY	CHLN	CHLN	RCVD	REI	Accept	Excess	BAL	Unit	Discount	PAF	Freight	SGST	CGST	IGST	CESS	ANAL	Loc
No	No	No	SLN	Code	Name	QTY	No	QTY	QTY	QTY	QTY	QTY	QTY	Rate	%	%	%	%	%	%	%	Charge	Freight
RCRR1819000411	P021819000011	0	1	100000998	BOILER COAL	16.680	142000119	16.680	16.680	0.000	16.680	0.000	18441.910										

#### vi) Payroll:

This module calculates wages, salaries, bonuses and deductions for the employees of the company. It keeps records of employment for both business and individual tax purposes. It will also provide a year-to-date statement to track annual earnings.

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vii) Personnel Management:

Personnel Management system provides with an Information System, which can be used to track an employee's progress at the workplace. All of the personal information that seems important for the healthy function of the company can be added in the Personnel System to the Organization's needs. This module necessary information about the corporate regulations, the employee's personal details, qualification details, leave details and promotion details etc.

- Information can be analyzed through statements like Operating results, Operating Statement, Ratio Analysis, Sources and Applications of funds. Balance Sheet etc.
- Graphical and tabular representation of data for previous and current year, and for account heads and account groups.
- Consolidation of Accounts for all offices. Consolidated Receivables. Payables, Profit & Loss Statement, Balance Sheet, Trial Balance, etc. can be generated at a glance.
- Provision for Printing of vouchers, money receipts, Cheques etc.
- Income Tax formalities like preparation of Interest Statement, Loan Statement,
- Account Confirmation, Loan Confirmation and other expenses are readily available.
- Cash & Bank day Books.
- Ledgers - General & Subsidiary.
- Trial Balance for General & Subsidiary Ledgers.
- Profit & Loss Statement.
- Balance Sheet.
- Schedules to Balance Sheet.:

INVOICING OF FINISH GOODS									
Invoice No		Buyer Name	SAIL/BHILAI STEEL PLANT						
S.O. No	S051718000020	Transp. Name							
Transporter	Select	Work Name							
WO SI No		RR No							
Truck No		RR Date	N/A						
Form to Receive	N/A	Purity %	0.00	Rly. Inv No	N/A	Date	N/A		
DA No		TC No	N/A	Rly. Frt/ Unit.	0.00	Rly. Frt Amt.	0.00		
Mill Code	N/A	Route Card No	N/A	D1		D2			
Rcd Voucher No	N/A	Bal. Amount		D3		D4			
Rcd Voucher Date									
Notification									
Line No	Select	Vocab No							
Ammed No		Date							
Item Code									
Despatch Qty.									
Total Pcs/Bags		Lot No							
<div> <div>NEW</div> <div>CANCEL</div> <div>ADD</div> <div>SAVE</div> </div>									
Sl No	Item Code	Item Name	A / U	Item Qty (Pcs)	Unit Weight(Kg)	Item Qty (M)	Packing Details	Total Base Value	
Disc Val	0.00						Taxable Value	0.00	
Freight	0.00						SGST	0.00	
P&F Val	0.00						CGST	0.00	
T.Tax Val	0.00						IGST	0.00	
TCS Val	0.00						Cess	0.00	
							Net Payable	0.00	

## Account Receivables & Payables

The sales invoice, purchase invoice, debit notes and credit notes are maintained in the system. Flexible payment systems allow the company to have complex analysis available for receivables and payables.



- The major features are:
  - Bill wise adjustment of payment received from customers and payments made to vendors can be done online.
  - On Account payments can also be done.
  - Outstanding analysis for flexible periods.

viii) Human Resource Development:

This module manages the following:

- Employee Training needs.
- Career management.
- Succession planning.



## **Chapter: 6**

### **Finance & Account**

#### **FINANCE & ACCOUNTS:**

Guided by: Mr. R. C. Bhoi.

Finance department is the nervous system of any plant/ organization. The entire activity of the plant is controlled by this dept. The fundamental activities of Finance are:

- MANAGEMENT OF FUND.
- ACCOUNTING ASPECT OF FUND. These two are virtually different. F&A department must have palpable idea of these two.

#### **VARIOUS ASPECTS OF F&A DEPARTMENT:**

##### ➤ **FIXED EXPENCES:**

There are certain expenses of any organization that are fixed. F&A dept. has to pay the fixed expenses irrespective of the production of the plant (i.e. whether the plant runs effectively or not, this amount of money must be paid at any cost). A few fixed expenses are:-

- Electricity bill
- Tax to the Govt.
- Telephone bill
- Salary & revenue to the employees.

##### ➤ **VARIABLE EXPENCES:**

There exists certain expense that varies with productivity & production capacity. These are directly related to the production. As for example, if, due to some undue reasons, production is less, the raw material consumption is also less. Therefore, less amount of money is required for purchasing the raw material.

##### ➤ **OTHER EXPENSES:**

- Accretion to stock,
- Consumption of raw materials,
- Power & fuel,
- Repairing & maintenance,
- Consumption of stores & spares.

##### ➤ **PLANT AND OTHER EXPENSES:**

- Land,
- Roads
- Bridges& culverts,

- Buildings,
- Plant& machineries,
- Fumitory & fitting,
- Vehicles,
- Water supply & sewerages,
- Railways siding
- Computer installation
- Electric supply.

➤ **SOCIAL EXPENSES:**

- Land,
- Roads,
- Bridges& culverts,
- Buildings,
- Fumiture& fitting,
- Vehicles,
- Water supply & sewerages,
- Electric supply.

➤ **CAPITAL REQUIREMENT:**

- Equity share,
- Borrowing,
- Trade creditors.

For fixed capital (required for construction of buildings, small plants) the F&A dept. takes term loan.

➤ **WORKING CAPITAL:**

**Source: Trade credits, equity share, borrowing.**

It is the amount of money required to run the business on day to day basis. It can be expressed as:

**Working capital = All current assets - All current liabilities.**

**Current Assets:** stocks, store & spare, cash & balance.

Logo: SAIL

Navigation: HOME MASTER PURCHASE STORE RAW MATERIAL FINISH GOODS WORK CONTRACT FINANCE

Header: SAIL REFRACTORY UNIT BHILAI

Form Title: BILL PASS

Fields:

- Voucher No. [ ]
- Section Sl. No. [ ]
- Journal No. [ ]
- Voucher Type [Select]
- Invoice Status [Select]
- Net Amount [0]
- Date [ ]
- Narration [ ]
- Party [ ]
- Inv. No. [ ]
- GARN No. [ ]
- PO/WO No. [ ]
- Bill Tracking Id [ ]

Buttons: ADD Track Id, SAVE, CANCEL, PREVIEW

GARN/MB No.	A/c Head	A/c Description	Debit Amount	Credit Amount
			Debit 0.00	Credit 0.00

Note: If Once Generated It can't be changed

## Chapter: 7 Purchase & Stores

### PURCHASE AND STORE:

Guided by: Mr. Shrikant Shrivastava.

#### ➤ **For purchase of materials:**

- Specifications, given by the INDENTOR, should be standard specifications conforming to IPSS, PS, ISS or DIN. Manufacturing drawing should be enclosed with the indents.
- Check-list as per the prescribed perform should be signed by the HOD. The purchase of items on proprietary basis should be kept at minimum possible level, should be restored to when other technically acceptable substitutes are not available.
- The indenter should ensure the check-list / inspection for the specific packing instruction.
- To optimize the utilization of internal facilities each plant / unit has to prepare and get approval by the competent authority an annual plan for "MAKE" items in increasing numbers on cost-effective basis.

#### ➤ **Estimated value:**

- Responsibility of the INDENTOR to prepare judicious estimate of the current value of the indent with the help of engineering services and other centralized agencies.
- For frequently purchased items (at least twice during last 3 years) the estimate should be based on last purchased price.
- For slow moving / new items, scientific/ technical estimate shall be prepared taking into consideration the cost of raw materials, casting, machining, treatment/testing, labour overhead expenses, transportation and applicable statutory duties and levies etc.
- For the procurement of proprietary items suppliers price list / rates along with the applicable discounts shall be obtained for the preparing the estimate.
- For job contracts, fresh estimates shall be prepared for each indent and only the last order value shall not be considered as basis\* Job elements, Mobile equipment, supplies to be made, detailed estimated labor cost.

➤ **Mode of tendering:**

- The recommended modes of tendering for placement of orders are as follows:- a) Limited tender enquiry (LTE) b) Single tender enquiry (STE) c) Global tender enquiry (GTE)
- Apart from the above methods of tendering, the following methods of placement of direct orders may be considered:- a) Repeat Orders b)
- Plant/ unit/ rate contract
- In addition to the above there may be occasions when the plant may have to resort to emergency purchase contract.
- Approval of the competent authority shall be obtained for issuance of NIT in each of the above case.

➤ **Methods of calling tenders:**

**SRU- Bhilai** follows a long purchasing any material as per guidelines of PCP-09 (Purchase/Contract Procedure for SAIL). The procedure is discussed below. As per requirement the user department makes a MPR (material purchase requisition) which is sent to store custody. The store custody makes a statement which includes some previous data of purchasing of material such as material consumption pattern details of last procurement purchase order etc. the MPR is sent to Finance department followed by purchase department. Then purchase department calls for tender to the corresponding parties.

And tender committee is formed for purchase above Rs.20,000. Materials can be purchased by proforma invoice, banking or by credit. Order is given to that party who gave the lowest rate (LI) in purchase cases.

As per purchase order or specification the store receipt and indenter checks the materials supplied to the party. Store receipt also maintains daily receipt note store receipt then sends these materials to the store custody of issue and subsequent use.

- Single part tendering
- 2/3 part tendering
- Pre-qualification bid followed by single/ 2 part/ 3 part tendering.

Single part tendering should be adopted only when all technical and commercial terms as a well-known defined/ stipulated in the tender documents and not negotiable. In case the technical specification and commercial terms are not firm/ deterministic/ frozen, the indenter/ MM department/ contract cell will specify in the indent for inviting 2 /3 part quotations.

The time period should depend on the nature of items to be procured; the nature of work involved the contract delivery or completion period etc.

**STORE:**

Central storage having a floor area of 1800 m<sup>2</sup> is provided for storing heavy equipment including consumable items and stationeries.

It is provided with railways siding facilities central storage is divided into two section central store is having floor area of 1080 m<sup>2</sup> floor area is exclusively utilized for the Accommodation of store personnel. Steel racks have been provided for the storage of materials. Heavy equipment is stored in section of store which is having floor area of 720 m<sup>2</sup>.

## **Chapter: 8**

### **Personal & Administrative**

#### **PERSONNEL & ADMINISTRATION:**

Guided by: Mr. D.K Jadhav.

#### ➤ **PERSONNEL DEPARTMENT:**

It is a very important department for any organization.

Personnel dept. can be divided into the following:

- Industrial relation:

It deals with - union, canteen, attendance of employees, strikes, labor, grievances etc.

- Training & development

The sources of the capital requirement are as follows. It deals with vocational training of students, implementation of new concept and machine.

- Establishment

It has two parts:

- Executive
- Non-Executive

It deals with - P.F, gratuity, finance settlement, retirements, maintenance of personnel files.

#### ➤ **ADMINISTRATIVE:**

This department deals with facilities & basic requirements of employees i.e. ID card, room allotment, name plate, furniture, internet etc.

## SUGGESTIONS

Our suggestions for making the work at SRU-Bhilai easier and time consuming for the faster working are:

➤ R & C Lab:

- To store the final results of the raw material for the corresponding elements there should be a software like DATA MANAGMNET that can store the data easily instead of using the excel and other manually written files.
- To do the compression of the bricks digital weights should be used instead of the manual worker for the process and also to increase the accuracy of the brick strength.

➤ Production:

- All the approved brock and the rejected bricks should be tested by the help of machines so that the work load of the labors would be reduced.
- The record of the production done monthly need to be managed by the computer softwares instead of the manual hand written notes.

➤ Electronic Data Processing:

- Software such as LDM Management needed to be added to the website to make the valuation of the company expenditures are managed exactly and well maintained way.
- The Inspection module need to be added for the employees so that as entering the CRR NO. the employee can get the detailed view of the project including all the element compositions present in the working.

➤ Finance And Accounts:

- ASSED REGESTER should be used to store the depreciation value for each year to be maintained and to make a secure backup for the data.

➤ Purchase And Store:

- The webpage for talking the orders should have more classification so that the buyer can give a detailed view about the his/her requirements.

## CONCLUSION

Last but not least,

We would like to thank all the HOD's and employees of SAIL REFRACTORY UNIT, MARODA, BHILAI, CHHATTISGARH for your co-operation, your valuable suggestions and information which helps us to understand the working and preparation of the project.

We hereby conclude that this vocational training report on "SRU- BHILAI" is based on detailed study of each & every department on SRU by us.

Though this training report is very short and simple, it is much point based & informative. It gives us an overall idea about the fundamental operations in an industry.

The ultimate objective of this training report, which is basically based on enhancing our awareness in the mentioned subject, is fulfilled to the best of our limited knowledge.

Although any suggestions, comments & criticism of the readers are always welcome, we would deeply acknowledge any errors, which may be occurred, may be excused.

Thanking you.