BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

PRACTICE SCHOOL DIVISION

Session 2017

**PSI Assignment Handout**

##### Date :25th May 2017

**PSI Station - Bhilai Steel Plant**

**Assignment Title - Study of the Electrical system of the new Power and Blowing Station II.  
Emergency calculations for power requirements in case of power failure.**

**Assignment Duration - 2 Months**

**Project mentor (s) - Dr. Sabareesh G R, BITS Pilani Hyderabad**

**Student Team (discipline wise) - ISHAAN DEWANGAN**

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**Introduction and significance of Sector - BHILAI STEEL PLANT**

The overall learning experience will include the process of steel making. The steel plants process the raw iron ore into steel through the following process. Steelmaking is the process for producing steel from iron ore and scrap. In steelmaking, impurities such as nitrogen, silicon, phosphorus, sulfur and excess carbon are removed from the raw iron, and alloying elements such as manganese, nickel, chromium and vanadium are added to produce different grades of steel. Limiting dissolved gases such as nitrogen and oxygen, and entrained impurities (termed "inclusions") in the steel is also important to ensure the quality of the products cast from the liquid steel. Steelmaking processes has two categories: primary and secondary steelmaking. Primary steelmaking involves converting liquid iron from a blast furnace and steel scrap into steel via basic oxygen steelmaking or melting scrap steel. Secondary steelmaking involves refining of the crude steel before casting. In secondary metallurgy, alloying agents are added, dissolved gases in the steel are lowered, and inclusions are removed or altered chemically to ensure that high-quality steel is produced after casting.

**About the industry**

The Bhilai Steel Plant (BSP), situated in Bhilai, in the Indian state of Chhattisgarh, is India's first and primary maker of steel rails, and in addition a noteworthy maker of wide steel plates and other steel items. The plant likewise creates and advertises different synthetic by-items from its coke ovens and coal chemical plant. It was set up with the assistance of the USSR in 1955. The primary thought for picking Bhilai was the accessibility of iron ore at DalliRajhara, around 100 km from the site; limestone from Nandini, around 25 km from the plant, and dolomite at Hirri, around 140 km away.

Bhilai Steel Plant functions as a unit of SAIL, with corporate offices in New Delhi.Throughout the years, Bhilai Steel Plant built up an authoritative culture that strengths its sense of duty regarding values and fortifies nonstop upgrades and more elevated amounts of execution. The chief executive officer (CEO) controls operations of the plant, township and iron mines. The CEO is helped by his D.R.O.s (Direct Revealing Officers), i.e. the practical heads, official chiefs, general Administrator idea of zonal heads, and HODs who coordinate capacities with clear responsibility for accomplishing corporate vision, organization objectives and goals.

Sense of duty regarding security is another prime perspective for Bhilai Steel Plant, Safety Engineering Department under the direction of Deputy General Manager(Safety) routinely investigate, screen and guarantee execution of safe working practices in all units of the plant. Auxiliary inside wellbeing reviews are led twice per year with a view to guarantee solid and safe workplace for representatives. Important preventive activities are started in view of the review discoveries and yearly mock drill results. The security focuses are checked on through different levels at standard interim which incorporate departmental wellbeing meeting, joint wellbeing board of trustees meeting, zonal wellbeing advisory group meeting and coordination meeting led by ED(Works). Since BSP is accredited with ISO 9001:2000 Quality Management System Standard, all saleable products of Plant come under the ISO umbrella. The Plant's HR Deptt is also certified with ISO 9001:2000 QMS Standard. IS0:14001 has been awarded for Environment Management System in the Plant, Township and Dalli Mines. The Plant is accredited with SA: 8000 certification for social accountability and the OHSAS-18001 certification for Occupational Health & Safety.

Bhilai Steel plant is India's first and main producer of the steel rails. It has won the Prime Minister's trophy for the best-integrated steel plant in the country eleven times. It is the flagship plant of Steel Authority of India Limited (SAIL), contributing the largest percentage of profit.Eleven times victor of PM's Trophy for Best Integrated Steel Plant in the nation, Bhilai Steel Plant (BSP) is India's sole maker and provider of world class rails for Indian Railways including 260 meter long rails, and a noteworthy maker of substantial assortment of wide and overwhelming steel plates and structural steel. With a yearly generation limit of 3.153 MT of sale-able steel, the plant additionally works in different items, for example, wire poles and merchant items. The whole scope of TMT items (Bars and Poles) delivered by the Plant is of seismic tremor safe review and unrivaled quality. The plant likewise creates an overwhelming structure including channels and pillars.

Bhilai Steel Plant is an ideal place for any individual who needs to increase some specialized information. It is a standout amongst the most well known iron and steel plants in India and Bhilai is the main steel city in the state. The primary places inside the Steel plant are the coke oven battery, blast furnace, rail and structure mill, plate mill, wire rod mill and a great deal more.

**Functionality of the division/unit**

**(Power and Blowing Station II)**

1. Providing continuous cold blast to the new Blast Furnace -8
2. Supply of process steam to new modex units like SMS-3, BF-8, rolling mills etc.
3. To ensure the emergency power supply to all modex units in case of power failure from the grid.
4. Ensuring communication and production among the Blast Furnace and SMS 3 with latest communication systems like DCS , PLC and SCADA.

**Expected learning from orientation program conducted at relevant department**

* Students need to understand and study about the different types of electrical system and power distribution in various unit of PBS-2.
* Study of various electrical protection systems for reliability of PBS-2.

**Objective and Significance of the project :**

* To study of all electrical and mechanical system of PBS-2
* Calculation of the emergency power requirement of different units of PBS-2.
* Identification of the source of power in BSP to ensure emergency supply in case of power failure.

**Significance**

Detailed exposure of various process involved in power generation system in steel industry.

Function of boilers , DM water plant ,cooling water pump house , cooling towers , turbine, generator for power requirement in any industry .

Learning of the various control systems in power plant operations .

Role of SCADA in electrical control system and communication.

Calculation of the emergency power requirements of the new Power and Blowing Station II which is being installed in BSP to provide the cold blast requirements of the new BF -8. It has 2 blowers in operation and one in reserve.

The Turbo-blower steam requirement is met through 3 Chinese boilers with internal fuels generated from the new blast furnace and existing furnace.

Power generation from waste heat of COB-11 is also envisaged in this project and 4 MW along with process steam is being utilized in BSP.

Similarly 14 MW power will be generated from hot BF gas from BF-8.

A total of 135 TPH process steam will also ensured by PBS -2 for BF -8 , SMS -3 and other units of BSP.

Total electrical system of BSP are interlinked with PBS-2 for reliable operation of power system in case of power failure .

**Learning outcomes involve**

* Exposure to all electrical system in power industry like generator reactor HT breaker , LT breaker transformer cable sizing etc.
* Detailed study of SLD for power requirement in any industry
* Project management for execution of any project
* Commissioning methodology of electrical system
* Safety procedure in any industry for safe operation

**Required Skill set/knowledge**

1. Basic knowledge of power engineering and system

2. Aptitude and analysis capability for solving any problem

3. Basic knowledge of computer and project management

**Suggested Reading material**

1. Bhilai Steel Plant project documents .
2. Project Contractor OEM, SOP and SPM manual
3. Technical specification of each project / unit for technical details envisaged .
4. Power System Engineering, D.P. Kothari (1994)

**Expected Knowledge gain and Deliverables from the project :**

1. Electrical systems knowledge for working in any power industry
2. Power calculation of any upcoming unit for reliable operation of plant
3. Exposure to power plant operation with detailed knowledge of each equipment
4. Introduction to DCS, PLC, SCADA for future references