RCC Institute of Information Technology
Canal South Road, Beliaghata, Kolkata - 700015

A **Report** on **Industry Visit at Vizag Steel Plant**, Visakhapatnam, Sponsored by **TEQIP II**
On 4th September 2015

Motivation:

Industrial visits represent important activities in any engineering undergraduate programme that contribute to the achievement of various essential learning outcomes and programme objectives. The purpose of the Industry Visit to **Vizag Steel Plant** was to give exposure to the students on the following:

1. Applications of Industrial Drives
2. Process Control
3. Industry inclination/ industry-preparedness of the students
4. Familiarization with the working environment of core industry.

Another important but indirect purpose of the visit was to enhance relationship with the core industry, so that the chances of placement of the students with the particular industry could be increased.

Details of the Visit:

The visit to VSP, Visakhapatnam was conducted on 4th September 2015. A batch of 44 students of B.Tech. (EE), 4th year visited the plant. The students were guided by 3 faculty members of the EE Department, RCCIIT. The students along with the faculty members left for Visakhapatnam on 2nd September, 2015 from Shalimar (SHM) station by GURUDEV Express. Accommodation was booked at Hotel Vishnu Residency before the visit. The visitors reached Visakhapatnam in the noon at about 2.30 PM. They reached the hotel by Bus. A room allocation list was prepared to avoid any delay. The industry visit was conducted on 4th September. The scheduling time for the visit was 9.30 am to 05.30 pm. The visitors started back for Kolkata on 5th September and reached at around 5.00 AM on the morning next day.

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Interaction at Vizag Steel Plant:

On the day of Visit i.e. 4th September 2013, the students with the Faculties reached the Vizag Steel Plant (VSP) Training and Development Department sharp at 9:30am. After the necessary permission from the Head of the TDD, Mr. E. Srinivasa Rao they again reached the main entrance of the VSP, guided by Mr. Alok Nandy. At the main entrance, the CISF guards issued the entry pass for all the visitors. At first, the students and the teachers visited the **Coke Ovens & Coal Chemical Plant** and got familiarized with the process of converting coke from coal. Mr. Nandy nicely explained the overall process for this conversion. Coal is converted into coke by heating the prepared coal blend charge in the coke ovens in the absence of air at a temperature of 1000°C-1050°C for a period of 16/19 hours. The volatile matter of coal liberated during carbonization is collected in gas collecting mains in the form of raw coke oven gas passing through stand pipes and direct contact cooling with ammonia liquor spray. The gas cooled from 800°C to 80°C is drawn to Coal Chemical Plant by Exhauster. The residual coke is pushed out of the oven by pusher car through a guide into quenching car. The red-hot coke is taken to coke dry cooling station for cooling.

Facilities

- There are 4 batteries, each having 67 ovens.
- The volumetric capacity of each oven is 41.6 m^3.
- Dry Coal charge /Oven are 32 t.

After spending half an hour in this part of the Plant, the students and the teachers now visited the **Blast Furnace**. Three Blast Furnaces are there. The students were permitted to visit the first one, which was in operation at that time. Iron is made in the Blast Furnaces by smelting iron bearing materials with the help of coke and air. The solid charge materials like sinter, sized iron ore, coke etc. are charged in the vertical shaft of the Blast Furnace at top and hot air blast is blown through the tuyeres located near the bottom. The oxygen from the hot air

combines with the carbon of the coke and generates heat and carbon monoxide. The gases, while ascending upwards react with the descending charge materials. Eventually the charge melts and hot metal and slag are produced and tapped out. The evolved gas is also used as fuel in the plant. The Paul-Wurth, bell-less top system is installed for furnace charging.

Hot metal flowing out of VSP Blast Furnace -1 (GODAVARI)

After spending an hour or so at BF Control Room where Engineers explained to us the whole process of charging into the BF and the different sensors and monitoring done through SCADA & PLC, the students group along with our Faculties and Guide headed to the Sinter Plant. Sintering is agglomeration of fine mineral particles into a porous mass by incipient fusion caused by heat produced by combustion within the mass itself. Iron ore fines, coke breeze, limestone and dolomite along with recycled metallurgical wastes are converted into agglomerated mass at the Sinter Plant, which forms 70-80% of iron bearing charge in the Blast Furnace. The vertical speed of sintering depends on the suction that is created under the grate. At VSP, two exhausters are provided for each machine to create a suction of 1500 mm water column under the grate. Each exhauster is driven by a 5.6 MW motor capable of rotation of the fan at 1000 rpm with an output of 15,000 m^3/min

Facilities

- Two Sintering machines of Dwight Lloyd type each having 312 M^2 total grate area.

Salient Features

- On ground blending of sintering base mix.

Capacity

- Production Capacity - 5.256 MT of Gross Sinter per annum

After the Sinter Plant, the student and Faculties visited one of the dangerous yet exciting parts of the tour – STEEL MELTING SHOP (SMS) and the CONTINUOUS CASTING DEPARTMENT (CCD). Steel is made in steel melting shop in the refractory lined vessels called LD Converters by blowing oxygen through the hot metal bath. While iron making is a reduction process, steel making is an oxidation process. The oxygen reacts with the carbon in the hot metal and this reaction releases large quantities of gas rich in carbon monoxide along with huge amount of dust. The gases released from the converter are collected, cooled, cleaned and recovered for use as fuel in the steel plant. The entire molten steel at VSP is continuously cast at the radial type continuous casting machines resulting in significant energy conservation and better quality steel. 100% Continuous casting on such a large scale has been conceived for the first time in India.

Facilities

SMS-1:

- Three LD converters of 133 cum. volume each
- 6 nos. of 4 - Strand Continuous Bloom Casting machines.

SMS-2:

- Two LD Converters of 150 cum. volume each.
- 1 no. of 6- Strand Continuous Billet- cum- Round caster.
- Two LD Converters of 150 cum. volume each.
- 2 nos. of 6- Strand Continuous Billet casters.
- Hot Metal Desulphurization Plant (HMDP).
- DOG House.
- RH Degasser.

Salient Features

- 100% Continuous casting of steel
- Converters gas cooling, cleaning and recovery systems
- Computerisation of the converter process

Capacity

- SMS-1: 3.0 MT of Liquid Steel per annum & 2.820 MT of CC Blooms per annum.
- SMS-2: 2.8 MT of Liquid Steel per annum & 2.730 MT of CC Blooms/Rounds per annum.

A group photo session in front of Technical Training Institute of VSP on 4th September 2015.