

Lecture 40: Status of Steelmaking in India

Steel belongs to iron-carbon system and this system has the following unique features:

- Fe-carbon system possesses some solubility for several elements of the periodic table which results into production of diversified range of materials for application to all industries including aero- and auto industries
- Steel is recyclable and hence is a green material. Also the main element in steel is iron and iron is the fourth abundant element in the earth crust and corresponds to 5% of the weight of the earth crust.

Steel is a material which can be made available for most of the engineering applications. Steel is one of the infrastructural materials that are needed for the economic growth and hence for the industrial growth of any nation.

Why Steel consumption in India should rise?

India is a developing nation. It requires industrial growth for the prosperity. The per capita consumption of steel in India is 40 kg as compared with an average 150 kg across the globe and 250 kg in China. Low per capita consumption of steel indicates that no meaningful infrastructural development has occurred in the country as a whole. India needs large consumption of steel for the growth of the following infrastructures:

- Modernization of air ports
- Expansion of railway tracks
- Auto industry
- Road projects
- Real estates
- Safety and other development programmes of Indian railways

Growth in the above sectors will automatically raise the per capita steel consumption. It is estimated that per capita steel consumption will rise to 110 kg by the year 2020-21 and 300 kg by the year 2030-31. These projections may look to be optimistic, but one thing is certain and that is steel requirement will increase in India in the near future. To sustain the steel requirement, Indian steel industry has to grow fast.

Indian Steel Industry

Indian steel industry is organised in three sectors, namely integrated plant, mini steel plant based on EAF, and induction furnace.

Integrated steel plant sector is the biggest producer of steel. The steel production is based entirely on hot metal. The route consists of Blast furnace-converter-secondary steelmaking-continuous

casting-and rolling. Integrated steel plants are both in public and private sector. In the public sector Steel Authority of India Ltd. (SAIL) and Rashtriya Ispat Nigam Ltd. (RINL) are the main producers of steel. SAIL has plants located at Bhilai, Rourkela, Durgapur, Bokaro, Burnpur, Salem and Bhadravati. RINL has plant at Vishakhapattnem. The total capacity of steel production is 18-19 million tons per annum. In the private sector Essar, ISPAT, Jindal and TISCO are the main producers with the total capacity of 12 million tons per annum.

Mini steel plant sector mainly produces steel through electric arc furnace using scrap, pig iron and sponge iron. Several mini steel plants are dispersed in the country to produce mild steel and alloy steel both for long and flat products. This sector depends entirely on availability of scrap and sponge iron. In many of these units, mini blast furnace hot metal is also used in the charge.

Many producers have installed high frequency induction furnaces (IF) to produce mild steel and alloy and special steels. Induction furnace based steel producers have modernised by using refining equipments as well as continuous casting units. Refining by ladle arc furnace is also in use. The EAF holders have also installed induction melting furnaces. Induction furnaces consume less power, and there is no expenditure on electrode. Limitation is only that induction furnace based plants are not suitable for bulk steel production. The combined EAF + IF sector had contributed 50% in the total steel production in the year 2005-06

Steel production in India

India produced 55.4 million tonnes of finished carbon steel in 2006-07 which has marginally increased to 59.02 million tonnes in 2008-09 as per the report given by the Joint Plant Committee. Crude steel production was registered at 51.5 million tonnes during April-December 2010 in the country as per the report of the joint Plant Committee. The production is expected to be nearly 110 million tonnes by 2012-13. Steel production in India has increased by a compounded annual growth rate (CAGR) of 8.4% during the period 2005-06 to 2009-10. The crude steel performance accounted for 31% of the total crude steel production in the country during 2009-10, contributed mainly by the strong trends in the growth of the electric route of steelmaking, particularly the induction furnace route. Going forward, growth in India is projected to be higher than the world average, as per capita consumption of steel in India, at around 40 kg, is well below the world average (150kg) and that of developed countries (400 kg).

Raw materials situation in India

To meet the future demand of steel, one has to ensure the supply of basic raw materials to the steel industry. Metallurgical grade coking coal, scrap, iron ore and sponge iron are, among others the important raw materials for steel production through different routes.

Metallurgical grade coking coal

Blast furnace-BOF route will continue to play a significant role to meet the increased demand of steel. This route is dependent entirely on the availability of hot metal through blast furnace. Blast

furnace cannot work without coke and coke is produced by carbonization of metallurgical grade coking coal. Shortage of metallurgical grade coking coal reserves within the country is of serious concern. For the long time India is dependent on the imported high grade, low ash coking coal from Australia amounting to 30 to 50% of its total requirement. In the future import of coking coal may become expensive. Thus, integrated steel plants producers must search ways and means to operate the blast furnace with the bare minimum coke consumption (the bare minimum coke is that which is just required to maintain the permeability of the bed in the blast furnace). Other technologies like pulverised coal and tar injection in the blast furnace must also be explored. Additionally, smelting reduction processes like COREX, ROMELT must also be developed to supplement the hot metal.

Iron ore

The situation with respect to iron ore is good as long as appropriate export policies are put in place. With the growth of steel production to 110 million tons per annum by 2019-20, iron ore requirement would be around 200 million tons. Iron ore reserves may not create much problem to sustain the steel production at least for the next two or three decades.

Scrap

Scrap is an important raw material for the growth of EAF and IF. The shortage of scrap necessitates the search for alternative raw materials. In this connection sponge iron (also known as directly reduced iron or DRI) has proved to be a promising alternative to scrap. In fact there are electric furnaces which are operating with large percent of sponge iron in the feed. Sponge iron is produced by reducing iron ore either by using coal or natural gas. Under Indian conditions coal based sponge iron processes are more attractive as compared with gas based ones. Several coal based sponge iron plants are operating in the states of Chattisgarh, Orissa, West Bengal and Jharkhand due to availability of high grade iron ore in these states.

DRI plants are installing various capacity induction furnaces to produce mild steels for long product applications. Secondary producers of steel are located in all parts of India to meet the local specialised demand of steel. Their share in India's total steel production may reach up to 50%

Outlook

The outlook for Indian steel industry is very bright. India's lower wages and favourable energy prices will continue to promise steel production at lower cost as compared with western part of the world. In the future, Indian steel industry has to grow either by adding capacity in the existing steel plants or by installing new integrated steel plants. Following information is reproduced from the internet search: Category: Steel companies in India-Wikipedia:

Bhushan Steel limited will be setting up an integrated steel plant in west Bengal with facilities including slab plant, coke ovens and captive power plant. They have also proposed to set up a 6

million tonne per annum integrated steel plant as an expansion of its existing plant being set up at Meramandali (Distt dhenkanal) in Orissa.

Bokaro steel plant is undergoing a mass modernisation drive after which its output capacity is expected to cross 10 million tonnes

Jindal Vijayanagar steel (JVSL) will be adding 3.2 million tons per annum to achieve 11 million tonnes per annum by 2011.

POSCO signed a memorandum of understanding with the government of Orrisa to set up a 12 million tonnes per annum green field steel plant near paradip, Jagatsinghpur district, Orrisa.

Tata steel has set an ambitious target to achieve a capacity of 100 million tonnes by 2015 through a series of Greenfield projects in India and outside which includes 6 million tonnes plant in Orissa, 12 million tonnes in Jharkhand, 5 million tonnes in Chattisgarh, 5 million tonnes capacity expansion at Jamshedpur and in few other countries like Iran, Vietnam and Bangladash

Vizag steel plant is the only Indian shore based steel plant and is poised to become up to 20 million tonnes in a single campus. Recently it has gone expansion from 3.1 million tonnes to 6.3 million tonnes.

Another public sector company, NMDC is to set up a 3 million ton per annum integrated plant at Nagarnar, Chhattisgarh. The plant is likely to be commissioned in 2014.

In addition to the above the steel plants at Bhilai, Rourkela, Durgapur and others are in the process of modernisation and capacity addition.

India is poised to be world's 2nd largest producer of steel before 2016. Indian's steel production will be nearly 124 million tonnes by 2012 and that the country could achieve an annual capacity of around 275 million tonnes by 2019-20

Refernce: Category: Steel companies in India-Wilkepedia, Internet

Chandra Bhushan: Challenge of new balance Internet

Joint Plant Committee report as available on the internet