

Talk on “Role of Iron ore Pellets to achieve the target of 300 million tonnes of steel by 2030”

A Technical Talk was organized by Delhi Chapter on “Role of Iron ore Pellets to achieve the target of 300 million tonnes of steel by 2030” at its premises on 29th April 2017. The Talk was delivered by Shri Deepak Bhatnagar, Member IIM and Secretary General, Pellet Manufacturers’ Association of India.

In his introductory remarks, Shri Bhatnagar emphasized that ‘*Make-in-India*’ is an age-old concept for our country. He gave insights on how ancient Indian Metal workers were very skilled, giving examples with pictures of the bronze statue of a dancing girl excavated from Mohenjo-Daro , which was made



using the ‘Lost wax ‘ process around 2500 BC . Other examples of India excelling in Iron making are the Iron Pillars of Delhi and Dhar as well as use of Iron in several archaeological structures, which have not rusted over a thousand years. He also talked about India’s legendary Wootz steel (made in India product), which was widely used by several armies for making the Sword of Damascus.

Iron Ore situation in India:

Explaining the need for utilization of low and medium grade iron ore resources, he gave an overview of India’s reserves. Total iron ore inventory in India is 28.5 billion tonnes. Out of this, proven resources are around 6 billion tonnes with high grade constituting 20%, medium grade 30%, and 50% low grade. Thus, almost 70 to 80 % of proven resources are low/medium grade which cannot be used directly in iron making process. Due to the inherent friable nature of Hematite ore, the ‘Lumps to Fines ratio’ (proportion of fines) is going up every year and is presently around 30:70.



Increasing utilization of low/ medium grade iron ore fines in iron and steel making is imperative for long term sustainability of iron ore .If we continue to exploit only high grade iron ore lumps , it will not last more than 30 years. The only answer is adoption of beneficiation and agglomeration technologies which are ideally suited for upgrading iron ore fines and their utilization.

Initiatives in India:

The Govt. of India had encouraged beneficiation and pelletisation technologies by providing financial incentives like bringing down customs duty on imported equipment from 7.5% to 2.5% and removal of export duty on pellets. Reference was given about the Budget speech by Finance Minister for the year 2011-12, and 2012-13.

Consequent to these policy initiatives, pellet production capacity increased from 22 million tonnes to the present 85 million tonnes. Similarly, beneficiation capacity has been increased to 117 million tonnes. The total investment is to the tune of Rs 45,000 crores and employment generated is around 100,000 people. The pellets industry in India: there are 43 pellet plants India, mostly situated in the states of Odisha (13) Chattisgarh /MP (12) , Jharkhand/West Bengal (7) and Karnataka (7). The capacity utilization of pellet plants is quite low, mainly due to poor domestic demand by steel industry. Even though most of the major steel units in Private sector like Tata Steel, Essar, JSW, JSPL, Bhushan steel etc are using pellets , PSU plants of SAIL and RINL have yet to start using pellets. It is heartening to note that recently PSU's have decided to use pellets in their blast furnaces .Giving statistics for 2016-17 , he informed that total pellet production was 48.5 mt. Exports significantly increased to 8.26 mt, mostly to China, Oman, Iran and others.



What are pellets?

Pellets are value added manufactured product , produced by low grade iron ore fines which are converted to spherical shaped balls of 9 to 18mm , through beneficiation and induration process with additives . The presentation covered various technologies for producing pellets. The Govt. earns revenue by way of 12% excise duty, both on concentrate and pellets.

Pellets have distinct advantages over use of sinter / iron ore like higher tumbling index, lower abrasion index, good porosity, better reducibility, higher bulk density etc which leads to higher productivity and reduced coke rate.

In blast furnaces, the biggest advantage is that waste and lean ore fines are utilized. Low grade fines with Fe from 45 to 60 % can be beneficiated and used as an input for pelletisation. Pellets can be moved over large distances, including export (as compared to sinter, which can only be used in-house).

Pelletisation process is environmentally more friendly as compared to sintering. Emissions are lower: CO₂ by 85%, SO_x by 90%, NO_x by 20% and Particulates are much lower by 30 %. A rough calculation shows that considering 85 mt of pellet production will reduce the CO₂ emissions by 44 million tonnes. Use of Pellets will therefore greatly help in achieving the targets of Paris Protocol.

It is estimated that around 200 million tonnes of low grade iron ore fines is lying in dumps near pit heads. These can be used by pellet plants after suitable beneficiation. Unfortunately, there is no Policy document in place for mandatory disposal of such fines by effective utilisation, as in the case of Fly Ash with respect to power sector.

It is essential that a suitable Mining policy needs to be formulated for long term perspective on use of non-renewable iron ore reserves so that we do not have to depend on import of iron ore after 30 to 40 years when our own high grade ores will exhaust.

How Pellets improve Blast Furnace Performance:

- more permeability in the stack region resulting in uniform pressure drop
- higher iron content per unit furnace volume due to high bulk density
- more reducible due to high micro-porosity
- high strength (250 kg/pellet)
- higher softening temperature compared to lump ore
- Increase in B.F/c productivity by 3% and decrease in coke rate by 2.5% with 10% pellets into the burden

Advantages of Pellet Utilisation:

- Utilisation of waste ores and lean ores as cheaper and abundant raw materials
- Higher tumbling index and lower abrasion index
- Good porosity
- Better reducibility
- Choice of size
- Built in flux
- Higher bulk density compared to sinter

- Improved productivity
- Reduced coal consumption

The talk also covered related topics on pellets like:

- ❖ BIS standard for use of Pellets in production of Sponge Iron
- ❖ R&D project funded by Ministry of Steel under SDF to RDCIS (SAIL), IMMT , IIT KGP , NML for development of Pilot scale Pelletisation technology for India iron ore .
- ❖ Use of slurry pipelines for underground transportation of iron ore fines
- ❖ About 'Pellet Manufacturers Association of India (PMAI): officially recognized by Steel Ministry to represent the pellets industry in India. It has 25 members and its key role is to interface between members and various departments of Govt of India as well as conduct training programmes on Pelletisation technologies.

After conclusion of the presentations, there was lively question and answer session. About 30 persons participated in the programme.

Shri G I S Chauhan, Hony Jt. Secretary, gave vote of thanks.

At the end the speaker was honoured with a memento by Chairman on behalf of the Chapter.

The programme concluded with lunch.

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