

Pelletisation Plants : Need of The Hour

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Introduction

Ever since the cost of calibrated ore has shot up, Sponge Iron Industry has started looking for various alternatives to sustain market conditions. Utilisation of low-grade iron ore & generated iron ore fines through Pelletisation route are considered as some of the efficient alternatives. Pellets are superior feed material compared to calibrated ore and the following analysis will provide you in-depth understanding of the benefits and challenges in the use of Pelletization technology.

Advantages

Pellets have following advantages over calibrated ore:

- a) Utilization of waste ore & lean ore as cheaper & abundant raw material.
- b) Higher tumbling index and low abrasion index
- c) Good porosity
- d) Better reducibility
- e) Choice of size
- f) Built-in flux
- g) Higher bulk density compared to sinter
- h) Improved productivity
- i) Reduced coal consumption
- j) Use of magnetite ore in DRI Kiln

The irresistible profitability of Pelletization can be established by simply converting the above mentioned advantages into monetary benefits.

Approach for adopting suitable technology at a smaller scale

For projects above 2 million tons / year capacity, proven technology for hematite ore pelletisation is readily available from western world and few plants are already operating successfully in India.

For smaller plants many Indian entrepreneurs have been looking at Chinese suppliers and evaluating various technologies available in China, where hundreds of similar plants are operating, however, under very different circumstances. This is also the primary reason that Pelletization Plants could not come up as envisaged. Further analysis of the same here will explain the challenges posed for these smaller projects in the Indian context and the solutions to address the same.

Indian scenario

Our situation is quite different from that of the Chinese

pelletisation industry and the Chinese technology and design institutes are still in the process of establishing the know how for pelletizing hematite ore. In China, the feed material to almost all plants is magnetite ore concentrate fines available from mining companies and Pelletization of magnetite ore is easier for various reasons. Also, almost all the Chinese pellet plants are located in the blast furnace area, and they use blast furnace gas as main fuel.

Current scenario

The demand and supply has changed the scenario of availability of quality ore fines. Three to four years back generated quality ore fines of above 63% Fe grade were considered / identified as typical feed material for pellet plants. In last 4 years, the demand of the fines from overseas has been so high that both price and availability of this quality have become questionable.

Raw materials for small scale pellet project Iron Ore

Most entrepreneurs today looking at setting up small & medium size plants have realized that Pelletisation projects have to be planned on low-grade iron ore below 58% Fe. This can only be achieved only after beneficiating low grade ore, and that has made beneficiation process an important issue.

So far we do not have any mining company or any other agency producing iron ore concentrate like China, and this poses some very critical questions.

Who should perform the beneficiation process? Shall we wait for the availability of concentrate from outside agency or add beneficiation process as part of Pelletisation project?

Other challenges posed are additional investment and infrastructure i.e. availability of water and disposal of slimes.

Need for beneficiation process

Most of the small plants will be procuring and transporting low-grade ore fines to their project site and paying an additional price on transportation. So, it is important to recover maximum concentrate, reduce Fe % in tailings as much as possible and use minimum water.

Selection of beneficiation process

Beneficiation process is always designed for a particular quality of feed and that too after conducting extensive laboratory tests.

Since low grade ore/fines are to be procured from

mines/market, there is little control on sustained quality, which is an important factor in designing an efficient & cost effective beneficiation plant.

Can there be process to accept wide variation in quality of fine? **Yes.**

Can there be a flexible beneficiation system which can accept the feed of both quality ore and low grade ore? **Yes.**

Although the answers to the above questions are a 'Yes', the technology used in iron ore beneficiation / process has to be different from those being presently followed in India.

Disposal of slimes

Disposal of tailings is another major constraint and hurdle in finalizing the projects. So industry **has** to find more efficient and cost effective methods to utilize tailings rather than dumping.

Fuels

Since most of the pellet projects under consideration are going to be independent units or part of DRI plants, the selection of economical and efficient energy source is an important issue i.e. Oil, Gas, Imported low ash Coal, Indigenous low ash Coal, Producer Gas etc. The economics of use of these fuels is very much dependent on the process technology used and the location of the plant.

Selection of pellet quality

Major elements of comparison between the China and India lies in that India's requirement of pellets is mostly for sponge iron application that too in rotary DRI kilns. Therefore the quality of pellets for use in rotary DRI kiln need not be the same as blast furnaces requirement.

To get the maximum benefits, both on investment and productivity, we must accept the change for good.

Thus, we find that our problems are complex and quite different from our Chinese counterparts, and we cannot expect to copy the end to end solution from Chinese companies. Many entrepreneurs have lost valuable time in trying to find cheaper solutions or drawing designs and equipment by themselves.

Technology selection for pelletisation

There are several process technologies and systems available for iron ore pelletisation. The selection of right technology for a particular situation can make lot of difference in every respect. To quote few are:

- Vertical Shaft Kilns of capacity 33,000 – 600,000 TPA.
- Vertical Shaft Kilns inclined & circular cross section for capacity 200,000 – 700,000 TPA.
- Travel Grate, Rotary Kiln & Circular Cooler for capacity 200,000 – 5,000,000 TPA
- Integrated Pellet + DRI Plant for capacity 60, 000 –

270,000 TPA

(e) Steel Belt Sintering technology for capacity 80,000 - 2 Million TPA

(f) Long Straight Moving Grate for capacity - in practice preferred for 2 Million TPA and above.

(g) Batch processing Kilns for very small capacity

Most energy efficient technologies

Now improved process technique is available where the heat requirement is as low as 120 – 130 K Cal. /Kg.

It is also possible to make an integrated pellet and DRI plant where the project cost and energy consumption is reduced drastically.

Conclusion

Based on the above details you should be convinced that the selection of right process technology is an important issue and has to be flexible enough to adopt to the situation

These are the challenging issues before entrepreneur & technology suppliers. Entrepreneurs should accept the facts, evaluate their situation and carefully take decision to face competition.

We have conducted first hand study of technologies adopted by China and analysed the best combinations from both worlds to build the most efficient and productive Pelletization technologies that can be customised to the Indian industry.

Beekay Engineering can provide you concept to commissioning solutions in setting up pelletisation plants that will help you establish long term leadership in the industry.



Forthcoming Events

- **MIDDLE EAST FOUNDRY CONGRESS 2007**
4-5 September,
Expo Centre, Sharjah, UAE.
- **WIRE TUBE 2007**
16-18 October,
Bangkok, Thailand.
- **EXTRUSION SUMMIT 2007**
26-27 October,
World Trade Centre, Mumbai.
- **Metalex 2007**
15-18 November,
Bangkok, Thailand