

# Pelletization: Need of the hour

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## History of pellet making

Iron ore pelletizing was firmly established in late 40s in USA, as a process of agglomerating iron ore concentrate produced by beneficiating low grade magnetitic iron ore. To liberate the gangue ( $\text{SiO}_2 + \text{Al}_2\text{O}_3$ ), the run-of-mine ore had to be ground to minus 200 mesh. The process of beneficiation was aimed at upgrading the low grade iron ore from a nominal 30% head Fe to above 64% by magnetic separation.

Pellet plants had an added advantage that they could be stand alone units established close to the mines and pellets could be transported to the steel plants, whereas, sinter plants needed to be necessarily set up within steel plant premises as sinter could not be transported over long distances without deterioration.

The first stage in the production of pellets is the formation of green balls. Finely ground iron ore is mixed with a binder (usually Bentonite) as also other additives such as Coal, Limestone and/or Dolomite in a mixer. The mixed material is then fed to either pelletizing discs or drums for green balling. The green balls thus formed are then dried, preheated and fired (indurated) and cooled in an indurating furnace to attain the necessary mechanical strength. The heat hardened pellets are an ideal feed for iron making either in the blast furnaces or DR furnaces.

## Current scenario

Many of the mine owners in India have been exporting iron ore directly without any value addition for decades. Most of them have a small to medium sized iron ore mines, producing anywhere between 0.3 and 2.0 MTPY of iron ore fines. It has now become possible for these mine owners and other sponge iron manufacturers to set up small/medium capacity pellet plants, with the advent of many technology providers entering the Indian market.

Sponge Iron Industry has witnessed a remarkable growth in the last few years in India. Growth beyond expectation is not without its associated problems. Sponge Iron and steel making Industry has started looking for various alternatives to sustain the market requirements. Utilization of low-grade iron ore by beneficiation and pelletization for further processing in DRI is considered as the most viable and cost effective substitution for high grade Iron ore lumps.

There has been a steep rise in the demand for graded iron ore by large number of upcoming sponge iron plants. Consequently the price of graded iron ore has risen from Rs. 2000 to Rs. 3000 per tonne. This gap is proposed to be filled up by the utilization of iron ore fines of minus 5 mm size, which otherwise do not find a

market and are being sold at a price of Rs. 550 to Rs.900 per tonne. This has led Indian think tank to propose conversion of the depleting natural resource into a value added product. The outcome is cost effective utilization of iron ore fines to produce pellets for sponge iron production. In addition to this, there is also a renewed interest lately in the export market for pellets.

For Pellet plants of over 3 MTPY design capacity, a proven straight grate technology is readily available in Europe and USA. Several such plants are successfully operating in India. All these plants are with the technical knowhow from Dravo/Lurgi (Aker Solutions). However, pellet plants of capacity less than 3 MTPY are yet to get a foot hold in India as a viable venture.

### **Kinds of iron ore in India**

For prospective pellet plants of small and medium capacity to be set up in India, the options are rather limited. Many Indian entrepreneurs have been studying the alternate grate-kiln technology offered by Chinese suppliers. Although a number of such plants are operating in China, it must be noted that they are proven only for magnetite or a blend of magnetite and hematite.

The situation prevailing in India is quite different than that of Chinese pelletizing Industry. The grate-kiln process offered by Chinese is yet to be proved in view of the fact that Indian ore under consideration is 100% hematite.

Design Institutes in China are still in the process of proving suitability of the grate-kiln technology for pelletizing Indian hematite iron ore. Dravo/Lurgi (Aker Solutions) did not elicit interest to directly offer small and medium sized pellet plants due to their cost ineffectiveness and also manpower availability. This explains the current challenges posed for these smaller projects in India.

### **Right technology for India**

Straight Grate Pelletizing Technology of Aker Solutions, USA is being offered by VT Corp, Mumbai, for the first time in India for design capacities of 0.6 MTPY and 1.2 MTPY.

Straight Grate Technology is the only proven technology for Hematite ore of high combined water (LOI > 2.5%).

Besides providing a total solution, VT Corp will also assist right from a Concept to Commissioning of 0.6 MTPY and 1.2 MTPY pellet plants.

### **Is it the right time to invest in pellet plant?**

Capital investment made now for low grade iron ore mining, beneficiation, pelletizing, direct reduction, steel

making and rolling will certainly be a wise move to exploit the opportunity-in-waiting once the global recession ends.

Pelletization has always been a very profitable stage of value addition. It is even more profitable if the investment is made at a time when input costs are low. The return on investment for a pelletizing facility is likely to be around 2 years.

Based on the prevailing market price at around Rs.1000 per tonne of the beneficiated iron ore as the pellet feed and an estimated cost of conversion to pellets at Rs.1500 per tonne, the total cost of pellets is about Rs. 2500 per tonne.

With the prevailing market price of pellets at Rs.3500 per tonne, there is a net profit margin of Rs. 1000 per tonne of pellets produced.

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