

Performance Improvement in Iron and Steel Industry : A New Approach

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Since 2000, Mr. Rathor is associated with development of Iron Ore Pelletization and Beneficiation projects. He has conceived most efficient Iron Ore Beneficiation process, which suits to most of the Entrepreneurs who's iron ore sources are not defined & is going to be the future trend for Indian industries.

He is well conversant with Chinese designs & technologies from various Chinese Design Institutes, Technology Providers & Equipment Manufacturers for Beneficiation & Pellet projects. He is also well aware of their advantages and disadvantages for Indian situation as well as knowledge of the changes required while adopting Chinese technologies.



Background

Quite often it has been observed that most of the small & medium sized Iron & Steel Industries faces difficult time. The main reasons are:

- Competition with large sector
- Susceptibility of demand & supply.
- Availability of quality raw materials, fuel, power & its price.
- Plant size & locations.
- Outdated Technology & Poor design
- Lower investment on plant and machinery
- Availability of requisite quality Technical man power
- Service back-up
- Entrepreneurs lacking initiative and wait to follow others
- Not equipped to adopt new technologies
- Govt. Policies

The impact of the mentioned factors is wide variation in the performance of similar industries. The impact is so serious, that sometimes their survival becomes difficult and a few of these close down.

Some problems are beyond the control and some are within the reach.

We will discuss the areas and possibilities of improvement which are within the reach.

The Basis for New Approach

Outdated technology, poor designs, lower investment on plant and machinery are the main factors for high cost and inferior quality of products.

These were designed & developed at the time when energy cost and productivity were not considerable factors, profit margins used to be high.

Now, with the development and availability of new technologies, vast range of highly productive & energy efficient equipments, energy saving devices and control systems, it has become possible to improve the performance and profitability substantially for sustainability of industries.

Our Observations & Suggestions Are For Following Fields :

- A. Iron Ore Beneficiation projects
- B. Sponge Iron projects
- C. Integrated Pellet + DRI project
- D. Engineering Auditing of Plants.
- E. Training and Development of Engineers / Technicians & Operators

Iron Ore Beneficiation Projects

Target High Fe Recovery from Iron Ore Feed

The present practice for Beneficiation plants, being followed has main thrust on low investment and

low processing cost without evaluating other profitable factors.

This approach needs to be evaluated. The performance figures below show the temptation for improvement.

For processing of feed grade Fe (T) - 50%, if tailing grade is reduced by 5%, there is direct benefit of Rs. 175/- per ton of feed.

For 0.6 MTPA Beneficiation Plant (based on feed grade of 50% Fe (T)), this benefit could be more than 20 Crores/ annum.

For achieving this performance, the investment level will be less than 1.5 years payback period.

Conservation of Iron Ore by its 100% Utilization.

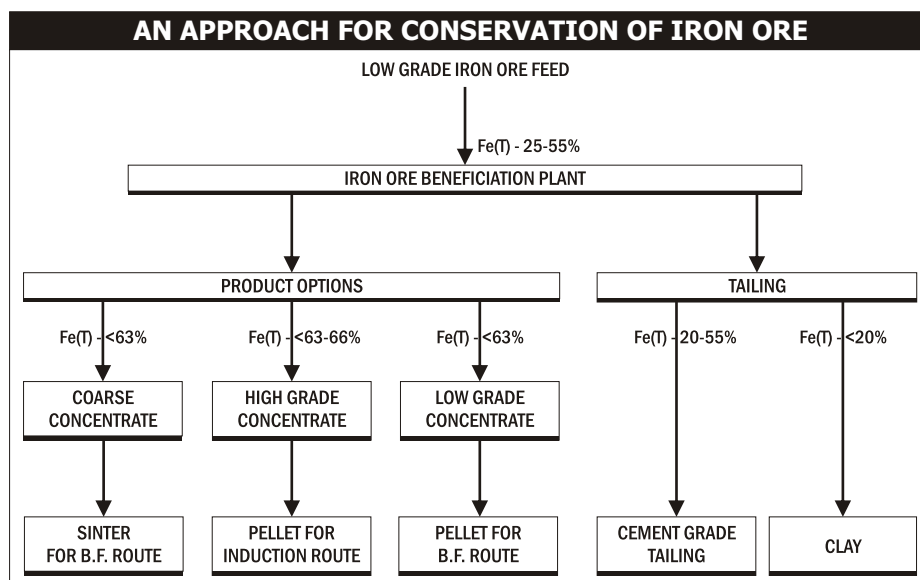
A typical process flow diagram showing an approach for 100% utilization of iron ore. Also for a merchant Beneficiation plant, this approach provides wide cross section of customers.

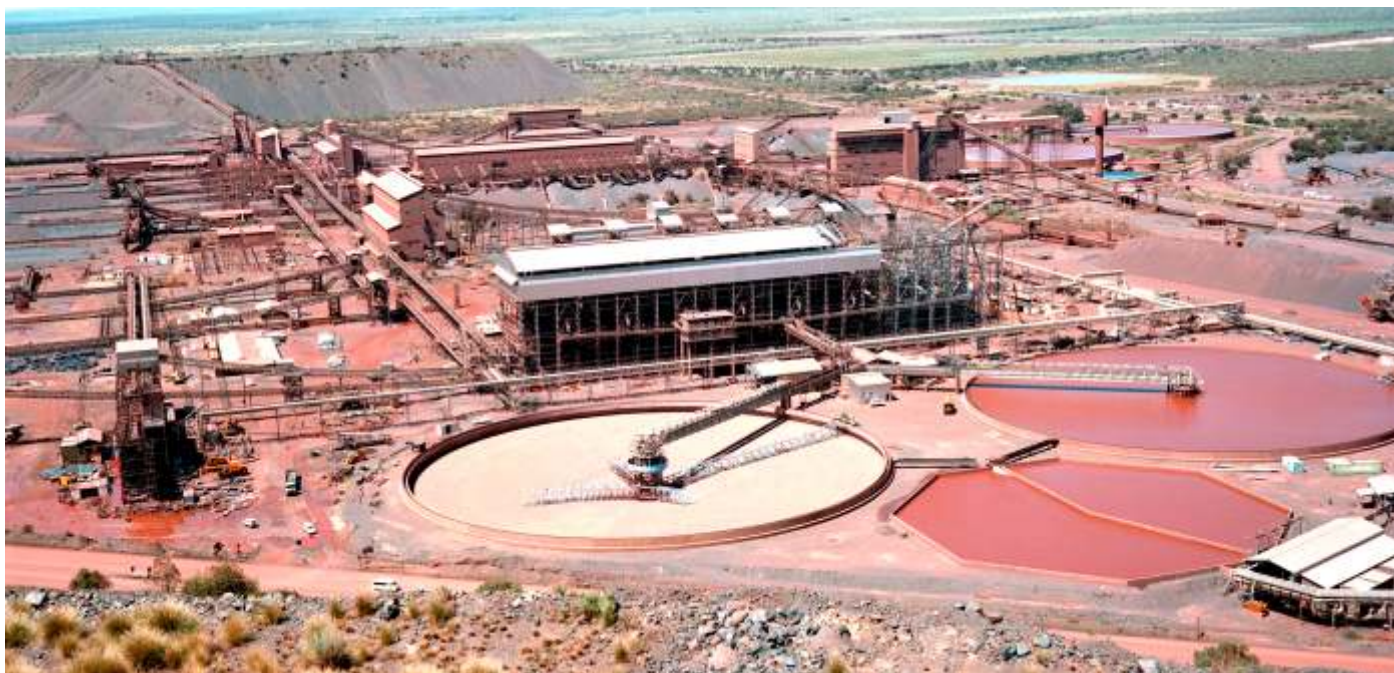
Sponge Iron Projects

The existing Rotary Kiln Sponge Iron Plants had been designed long ago based on calibrated iron ore for feed size of 5 to 18mm.

Similarly, the pellet plants had been designed for producing 8 - 18mm size & approx. 200 Kg CCS pellets for use in Blast Furnace, HYL & Midrex reducing furnaces.

In context of Rotary Kiln Sponge





Iron plants, we all know that the reduction time is dependent on lump size. Compared to same size of lump ore, reduction time of pellet is less.

Thus, Rotary Kiln Sponge Iron plant design needs evaluation and changes for maximizing benefits.

We propose to consider:

- Add Static Pre-heater in existing plants.
- Select 7-14 mm or 6-12 mm pellet sizes for DRI Rotary Kiln feed.
- Change Rotary Kiln and Cooler size suitable for Pellet use.
- Alternatively, Integrated Pellet+ DRI Plant for new Project.

Integrated Pellet + DRI Plant Projects

An ultimate solution in present scenario is Integrated Pellet + DRI Plant.

In an Integrated Pellet + DRI Plant, iron ore fines are converted into pellets & directly fed into

Sponge Iron Kiln at a temperature above 900 deg. C.

Heat required for Pelletization is derived from exit gases of Rotary Kiln. No additional fuel (imported coal/ fuel oil/ producer gas) is required for Pelletization. Thus we can save on expensive fuels and

Capital investment for Producer gas plant.

As the pellets entering the kiln are above 900 deg C, no pre-heating is required inside the kiln. The full length of Kiln is utilized for reduction.

Following are the extra ordinary benefits of this technology:

- Less land requirement
- Over all savings on capital investment
- Efficient utilization of heat energy for Pellet making
- Pre-heating zone of Rotary Kiln also utilized as reducing zone. Thus substantial increase in Rotary Kiln productivity.

Engineering Auditing of Plants

So far we do not have the culture of auditing plant designs & performance figures at appropriate time.

Many a times, it is observed that the plant designs are biased and based on the technology and equipments, available with the technology suppliers and their associates.

This is one of the potential areas, if evaluated carefully, may be an eye opener.

Examples:

1. It is a known fact that Grate-Kiln-Cooler technology is more energy efficient than Straight- Grate technology. But in practice, this is not seen in any of the Grate Kiln Cooler

technology pellet plants put up so far.

2. In most of the Beneficiation plants, Fe recovery and Yield is very less. In some plants, the tailing grade is as high as + 50% Fe (T).

3. Most of the plants are operating at under-capacity than the actual designed parameters.

Many users are not fully aware of the further scope of improvement.

Such issues/ reasons needs to be looked into critically.

Training and Development of Engineers / Technicians & Operators

With the present quality of technical education, almost every industry is suffering but its impact is more on small and medium scale industries.

Large scale and financially sound companies have made arrangements of their training centers to develop the required quality technical manpower. But the medium and small industries neither can afford nor develop required infrastructure. This is one area of concern where industries have to think, change their attitude and co-operate with each other to build some systems by which they would be able to develop required quality of man power.

For any of the above suggestions, it will be our pleasure to provide technical support services.