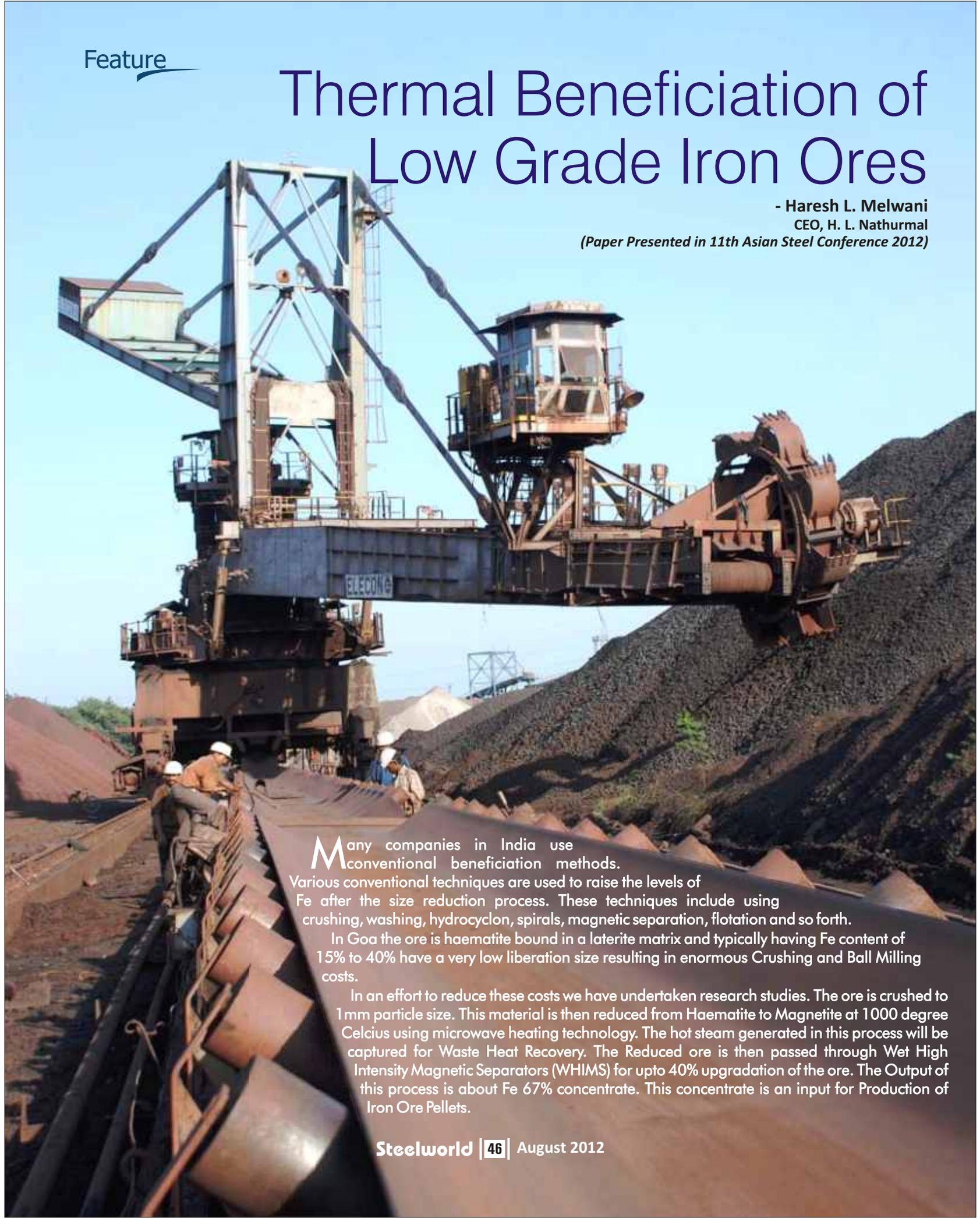


Thermal Beneficiation of Low Grade Iron Ores

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Many companies in India use conventional beneficiation methods.

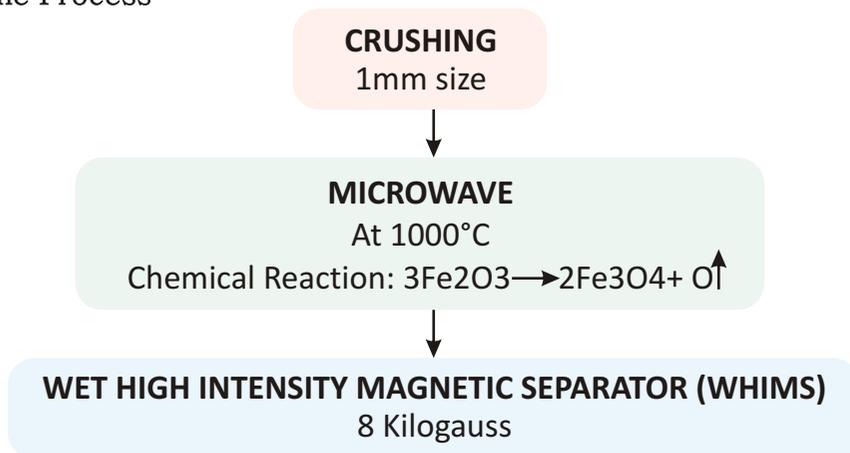
Various conventional techniques are used to raise the levels of Fe after the size reduction process. These techniques include using crushing, washing, hydrocyclon, spirals, magnetic separation, flotation and so forth.

In Goa the ore is haematite bound in a laterite matrix and typically having Fe content of 15% to 40% have a very low liberation size resulting in enormous Crushing and Ball Milling costs.

In an effort to reduce these costs we have undertaken research studies. The ore is crushed to 1 mm particle size. This material is then reduced from Haematite to Magnetite at 1000 degree Celcius using microwave heating technology. The hot steam generated in this process will be captured for Waste Heat Recovery. The Reduced ore is then passed through Wet High Intensity Magnetic Separators (WHIMS) for upto 40% upgradation of the ore. The Output of this process is about Fe 67% concentrate. This concentrate is an input for Production of Iron Ore Pellets.



The Process



Ready Local Market

In Goa, We have two blast furnaces and one more Blast Furnace in Reddi-Maharashtra and 5 sponge iron plants. These plants require Fe 62% and more for their operations. With the closure of Mining operations in Karnataka, the supply of raw materials to these plants is disturbed.

Raw material users need a reliable & constant supply Pellets of BF grade and Sponge Grade for feeding into their furnaces. Goan Haematite Ores being Low Grade need to be improved before they can be Pelletized to the necessary

specifications.

Cost Analysis

While at the moment cost is not a major consideration in these tight supply conditions, for long term stability and considering the future availability of ores, we decided to research the low grade haematite ores indigenous to Goa.

The High Grade magnetite Concentrate is obtained at a cost of Rs.5,000 per dry metric tonne and can be easily pelletized using either microwave cooking or conventional pelletizing methods.

The conventional beneficiation methods have a comparatively lower capital cost but the running costs are higher.

Advantages

Thermal reduction of Haematite into Magnetite using Microwave cooking is a very low energy consumption method as lab scale tests have shown. Commercial scale is under study, but figures should not be very different.

Exhaust from process is only steam, which we plan to utilize for power co-generation. So the process is Environmental Friendly. This will also help us earn carbon credits in the future. This process can utilize ultra low grade Haematite ores of as low as Fe 25% which cannot conventionally used. **Future Steps**

These operations have been carried out on a laboratory scale and a pilot plant scale and these will soon be converted into a commercially viable project. Talks with suppliers for developing the various machinery and the components to go along with this machinery such as Ceramic Trays, Conveyors. Silica Carbide baskets etc are being carried out.