ALTERNATE IRON MAKING - KEY DRIVER FOR INDIA’S FUTURE STEEL GROWTH

BY

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Limitations of Blast Furnace Based Operation

- Use of Metallurgical Coke requiring good quality coking coal
- Severe shortage of good quality coking coal in India leading to large scale import
- Global supply constraints and associated sharp price volatility
- Environmental problems associated with sinter & coke making due to high level of harmful emissions.
- Direct use of non-agglomerated ores and inferior quality raw materials indigenously available.
- Higher capital & operating cost due to integrated nature of operation
Indian import of coking coal over the years

- coking coal qty
- steel prod
- monetary value

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### Iron Making Processes at a glance under diverse Iron oxide / fuel Combination

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>DIRECT REDUCTION</th>
<th>SMELTING REDUCTION</th>
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</thead>
<tbody>
<tr>
<td>Reducing Agent</td>
<td>Natural Gas / Syn Gas</td>
<td>Coal</td>
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<tr>
<td>Ore Charge</td>
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<td>Coke</td>
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<tr>
<td>Lump Ore / Sinter / Pellet</td>
<td>Midrex, HyL / Energiron</td>
<td>Rotary Kiln</td>
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<td></td>
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<td>Blast Furnace</td>
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<tr>
<td>Ore Fines</td>
<td>Fior, Finmet, Circored, Iron Carbide</td>
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<tr>
<td></td>
<td></td>
<td>Corex</td>
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<tr>
<td>Ore-coal composite pellets / briquettes</td>
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<td>ITmk3, Inmetco</td>
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<td></td>
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<td>Fastmet, Tecnored</td>
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</tbody>
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**KEY DRIVER FOR INDIA**

**FUTURE STEEL GROWTH**
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Salient Features of S-R Processes

- Use of Metallurgical Coke requiring good quality coking coal
- High smelting intensity and hence high productivity
- Ability to use various types of non-coking coal
- Environmental friendliness
- Use of iron ore fines, slimes, etc.
- Electricity generation from offgas or its alternative use
- Hot metal quality, comparable to that produced in a BF
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ITmk3 PROCESS

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COREX PROCESS
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FINEX PROCESS

FINEX plant at POSCO

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HIsmelt PROCESS
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Hot Discharge
HOTLINK®/Hot Transport/Hot Briquetting

Fuel: Natural Gas  Feed: Pellet/Lump

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HyL / Energiron PROCESS

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Coal Gasification – Shaft Furnace Combination
CONCLUSION

- Global shortage of metallurgical coking coals & increasing concern for environment are key drivers for sustained search for adoption of alternate iron production technologies.

- The above facts are highly relevant for India as the country aims for trebling the steel capacity by 2020.

- S-R technologies, essentially using non-coking coal and oxygen, provide opportunities to carry out serious evaluation for adoption in the country.

- S-R technologies viz. Corex, Finex & Hlsmelt have reached commercial stage. Romelt, Ausmelt remain at pilot stages. Except Corex, most of them have to go through different levels of scrutiny before adoption in the country.

- India has, in the past, taken bold steps in adopting new technologies viz. LD process in RSP in fifties, Corex process at JSW plant in mid nineties and now, use of syn gas (coal gasification) for DRI production in JSPL’s Angul Project, Orissa.
THANKS