



DRI PLANT WITH COAL BASED SYNGAS



DRI PLANT WITH COAL BASED SYN GAS

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1.INTRODUCTION

1.1. What is DRI?

- Direct reduced iron (Sponge Iron), is a metallic material produced by reducing iron ore to metallic iron at temperatures below the melting point of fusion.
- DRI is one of the feed input for producing steel, like pig Iron and scrap (used/wasted steel). But it has better quality advantageous.

DRI COMPOSITION (sample)

Metallisation	92.0 – 96.0 %
Fe (Total)	86.1 – 93.5 %
Fe (Metallic)	81.0 – 87.9 %
C	1.0 – 4.5 %
S	0.001 – 0.03 %
P ₂ O ₅	0.005 – 0.09 %
Gangue*	3.9 – 8.4 %

PIG IRON: FE ~95%

Typical value	BF
C	4.5%
Si	0.5 ± 0.3%
Mn	0.4 ± 0.2%
P	0.09 ± 0.02%
S	0.04 ± 0.02%
five-harmful elements	0.001%-0.01%

1.INTRODUCTION

1.2.Different forms of DRI

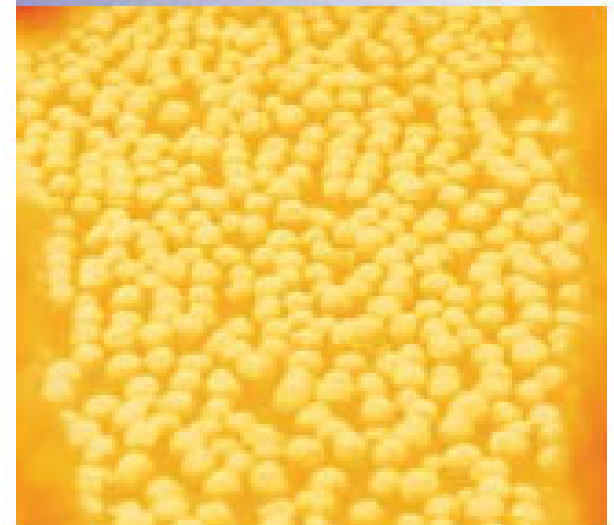
COLD DRI (Pellet & Lump)



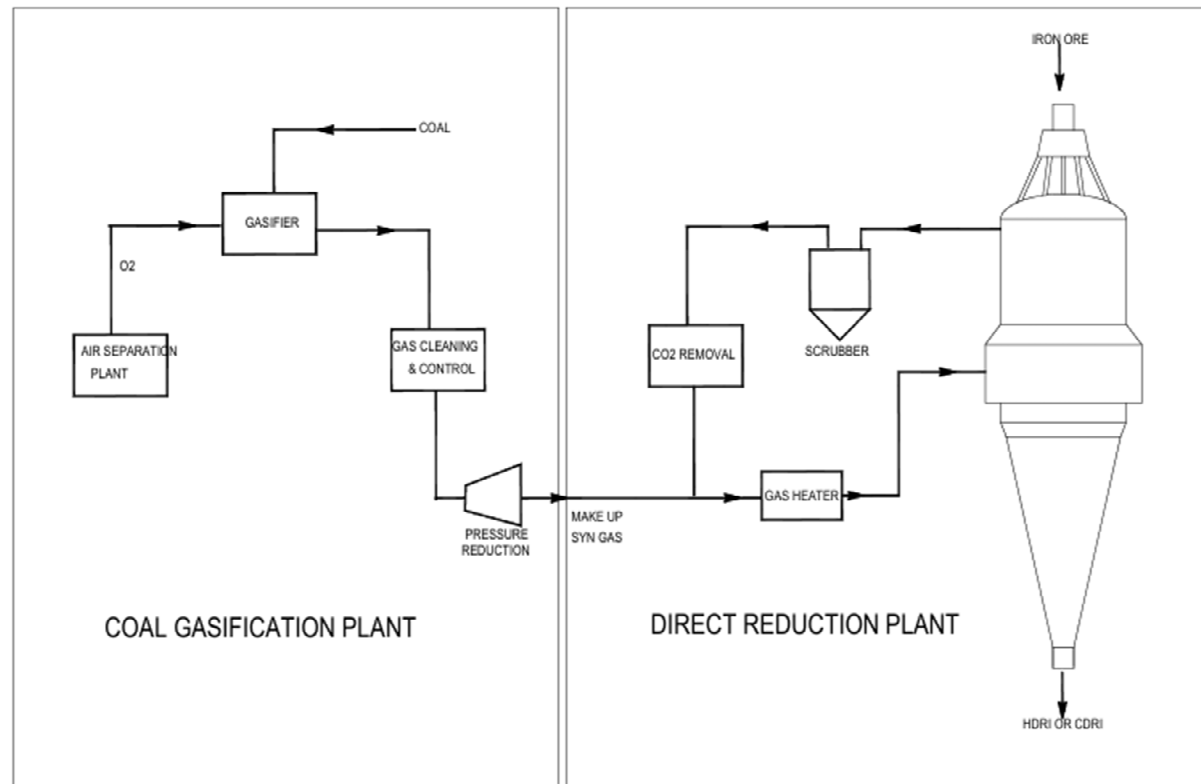
HBI - Hot Briquetted Iron



HDRI - Hot DRI



2.FLOW SHEET



3.SYNGAS SPECIFICATION:

- SYN GAS QUALITY REQUIRED (DRY BASIS %)
 - H₂: 55-60%
 - CO: 33-38%
 - CO₂: 2.2-2.5%
 - CH₄: 1-2%
 - N₂+AR: <1.5%
 - H₂S+COS: <0.1PPM &
 - TAR/DUST: <0.1 mg/NM³
- SYN GAS Pressure &Temperature: Pressure ~2.5bar at ambient temperature.
- SYN GAS QUANTITY: ~ 780 Nm³/ton of DRI

4. UTILITY REQUIRED:

- Specific consumption (For 1mtpy DRI plant scope)
 - Syngas: 780-800 Nm³/ton of DRI
 - Power: ~ 60 kwh/ton of DRI
 - Water: ~ 1.0 m³/ton of DRI
 - O₂: 15-25 NM³/ton of DRI
 - N₂: 100- 110 Nm³/ton of DRI

5. CAPEX :

- CAPEX (for 1mtpy DRI plant including below units)
 - CO2 REMOVAL UNIT
 - HEATER UNIT
 - DRI SHAFT FURNACE (with related aux units)
 - SOLID HANLDING
- Needs detail study and data collection on above to arrive Capex
- Battery limits, Utility requirement, combination of productions and site condition will have impact on Capex

6. DRI CONVERSION COST :

- DRI Conversion cost(for 1mtpy DRI plant)
 - Syngas
 - Power
 - Water
 - O₂ & N₂
 - Labor & maintenance cost
 - Finance cost
- For arriving exact conversion cost, need precise data as stated above,
- Approx cost will be ~ **75** Euro /ton of DRI

Thank you