# Best Practices In Sponge Iron Industry

Presenting by

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# Agenda

- Best Practices in DRI section
- Best practices in SMS section
- Best practices in WHRS section
- Best Practices in Rolling Mill

# Best practices in DRI section

## Implementation of Temperature shield kiln coat (Nano-Porous Ultra Thermal Insulation)

- Reduction in kiln surface temperature 30 deg. C
- Reduction in heat loss 15-20 %
- Cost of insulation Rs. 4000/$m^2$.
- Implemented in M/s. Godawari Power & Ispat Ltd. Raipur,
  M/s. JSPL Raigarh,
  M/s. Electro steel , Haldia
  M/s. Shyam Metallic, Sambalpur Odisha

## Installation of Iron Ore Wet Screening Plant

- For Separation Ore in four Different Sizes (i) 6-22 mm, (ii) 2-6 mm (iii) +75 micron to 2 mm, (iv) -38 micron (sludge).
- Coal saving achieved 0.06 MT/MT

# Best practices in DRI section

## Installation of Deshelar System

- Improves quality of coal .
- Increases efficiency & production of washery
- Generated by-product is used in Power Plant.

## Segregation of Injection Coal Size in DRI

- Uniform Distribution of Coal improves process parameter/ efficiency.
- Maintain uniform temperature profile inside the kiln.
- Consistent temperature profile helps in reduction of Iron ore, coal & improves product quality.
- Production efficiency improved
- Coal consumption reduced
- FC in Ash char reduced

# Best practices in DRI section

## Use of 100 % Imported Coal (Both Feed & Injection)

- **Reduction in Specific coal Consumption**
- **Reduction in Specific Air requirement**
- **Reduction in 30% load on FD & ID Fan**
- **Reduction in Dolachar by 50%**
- **Reduction in Carbon to Iron (C/Fe) ratio**
- **Reduction in Thermal Energy Consumption per ton of DRI.**
- **Kiln & cooler main drive RPM reduced by 50%.**
- **Heat is retained in kiln for more time Reduction in feed coal quantity which results more space inside the kiln.**
- **Increase in Production**
- **Reduction in Power Consumption**

# Best practices in DRI section

## Use of High Grade Pellets

- Yield Improves from 57% to 68% by use of pellets in place of iron ore
- Reduction in Production factor from 1.76 to 1.5(MT/MT).
- Reduction in solid fuel consumption by 0.14MT/MT

## Coal Moisture Drying out thru coal Dryer

- Proper coal segregation
- Reduction in Specific coal Consumption.
- Increase in steam generation
- Increase in production
- Maintaining Proper temperature inside the kiln.

# Best practices in DRI section

## Natural cooling for a cooler in place of forced cooling

- In DRI, coolers are used for indirect cooling of sponge iron
- Previously the cooling tower was used for indirect cooling.
- Due to the very low delta T of the cooling tower, natural cooling is used.
- The Power Consumption was reduced due to the stoppage of the pump & CT fan.

## 9. Installation of Pre-Heater kiln

- Pre-heating of pellets increases the higher feeding rate.
- Pre-heater kiln is connected before the main kiln.
- Pellet is fed thru a feed tube to the pre-heater kiln at room temperature.
- The retention time of the pellet is 45 to 60 minutes With 90deg. C in pre-heater.
- Increased production by 10 to 15%.
- Pellet temperature increases from 700 to 900deg. C
- The High tumbler index (794) pellet & imported coal should be used for reduction in Accretion, Fe in fly Ash & LOI in flu gas.

# Induction Furnace

Best practices in SMS

## Replacement of Silica Ramming Mass (SRM) with Neutral Ramming Mass (NRM)

- The life of silica Ramming Mass was 12-15 heat, Natural Ramming Mass gives a life of 75-80 heat
- The use of NRM provides 20-30 kWh/MT of Power saving
- The slag generation is reduced in comparison to SRM

## Improved Scrap Quality

- Melting time is reduced
- Power requirement is less
- High Yield Percentage.
- Improved Production

## Optimization of the charge mix in the furnace

- Modification in tundish board size
- Installation of furnace automation system

# Electric Arc Furnace

Best practices in SMS

## Replacement of Elect. Energy with Chemical Energy

- By Additional Oxygen Lancing with the increase in hot metal feeding & oxygen blowing
- By Changing the charge mix, DRI 20-23%, Hot Metal 74-77% & Plant Return 2-3%
- Tap to Tap time 70 minutes.
- Oxygen Blowing 70-80%
- Oxygen Lance from side panels & thru slag door along with coke injection system
- Yield 79-80%
- Elect. Energy Consumption Zero.
- Successfully operated in Usha Martin.

## Challenges & Opportunity

- $CO_2$ emission increased by 1100kg/heat
- The life of oxygen lancing nozzle is reduced by 600-500 heats
- Needs to clean rooftop position

# Best practices in Captive Power plant

## Installation of Retrofit Energy Efficient ESP Controllers

- Reduction in Elect. Consumption by 40%
- Investment of ESP Controller Rs. 6 Lakh
- Simple Payback 2.5 yrs.

## Installation of Sonic Horn Soot Blower

- Provides online continuous cleaning of the inaccessible surface with new low frequency intensity sound technology
- Can be installed in place of steam soot blower in AFBC, APH, Economizer, WHRB Boilers, ESP & Bag filters.
- Annual Elect. Saving 10-20%
- Annual Steam Saving 20-30%

## Installation of an online continuous tube cleaning system in the condenser

- For Sustaining optimum vacuum over longer periods
- Increase in Power generation by 2-3%
- Cost of Installation Rs. 15-20 Lakhs.
- Simple payback of 7-8 months

# Best Practices in Rolling Mill

## Direct Hot Billet Rolling

- Hot Billets produced from Steel Melting Shop are directly rolled in rolling mill without heating in re-heating furnace.
- The Thermal Energy used in re-heating furnace is saved
- The Monitoring saving is about Rs. 500-600/Ton

## By Increasing Mill speed in 25mm Rolling Mill

- By Increasing the speed from 3.5m/sec. to 4.3m/sec.
- By using stand 9-10 in place of stand 7-8
- The production rate is increased by 15-20%
- The Elect. Energy saving approx. 3kWh/Ton

## By Converting Single Strand to Double Strand Rolling of 20mm TMT

- The production rate is increased by 10%
- The Elect. Energy saving approx. 20kWh/Ton in 20mm TMT
- The Elect. Energy saving approx. 8 kWh/Ton in 8mm (block)

## (All Above Implemented in Nalwa Steel & Power)

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# ThankYou