COAL BENIFICATION

TATA STEEL
## Tata Steel and Coal Mining

<table>
<thead>
<tr>
<th>Coal Grade</th>
<th>Clean Coal Production</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mtpa</td>
<td>Ash %</td>
</tr>
<tr>
<td>Jharia Group of Collieries (UG)</td>
<td>Prime Coking Coal</td>
<td>1.1</td>
</tr>
<tr>
<td>West Bokaro Colliery (OC)</td>
<td>Medium Coking Coal</td>
<td>1.9</td>
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</tbody>
</table>

* Difficult to wash
History of Coal Beneficiation in Tata Steel

1952:
- First Coal Washery in Asia put up by Tata Steel West Bokaro & Jharia: Chance Cone Process

1982:
- 1.8mtpa Washery at West Bokaro:
  - Dense Medium Separation & Froth Flotation.
  - Gravity Fed Cyclone Lo-High Separation
- Old washeries converted to Dense Media and froth flotation

1993:
- Started 2.1mtpa Washery at West Bokaro and 1mtpa Washery at Bhelatand.
- High Low Separation, Pump Fed Cyclones, U Bottom Cells
- Increased Automation
- Radial Blender, AMDEL Coal Slurry Analyser
Comprehensive Approach to Coal Beneficiation: 2002 onwards

- Areas were identified as:
  - Mining
  - Sizing
  - Beneficiation
  - Monitoring

- Objective:
  - To reduce clean coal ash from 17% to 14% and below in phases.
  - Improve technology and efficiency of beneficiation to prevent yield loss
Mining : Quality Control Strategy

- Mine face management improved.
  - Blasted coal Inventory
  - Controlling Dilution


- Installation of heavy duty crusher: For crushing inferior coal separately.

- Mine planning: Minex Planning Software introduced: Balanced mining and optimum exploitation.
Sizing - Optimisation

• Crusher RPM & gap settings changed for maximising 3mm-6mm size particle for best liberation.

• Ring granulators modified with heavy duty rings to reduce oversize generation.

• Introduction of sizers in new coal handling plant for improved sizing and better liberation.

• Introduction of rotary breaker for deshaling and crushing simultaneously for Jharia coal.
Beneficiation : Seam processing strategy

CUM WTS IN THREE DIFF SEAMS

CUM ASH IN THREE DIFF SEAMS
Beneficiation : Dense Medium Cyclone

- Started use of viscosity modifier in DSM cyclone circuit
- Shifted to scrolled involute design cyclones from DSM design

<table>
<thead>
<tr>
<th></th>
<th>DSM</th>
<th>DSM with Viscosity modifier</th>
<th>Scrolled involute design</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Ep&quot;</td>
<td>0.05</td>
<td>0.039</td>
<td>0.025</td>
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</tbody>
</table>
Further improvements

• Introduction of Speed controllers for cyclone feed pumps to ensure uniform inlet pressure.

• Improved magnetite quality of domestic supply (cut off grade changed from 88% to 92% magnetics)

• Trial of imported magnetite (97-99% magnetics) undertaken.
Beneficiation  : Froth Flotation

• Multi stage dosing of reagents.
• Reduction in oversize coal from 18% to < 6% in FF Cell.
• Installation of hydrocyclone to optimise recovery of fine coal.
• Replacement of flat bottom cells by U Bottom cells.
Monitoring: Product Consistency in Clean Coal ash
Installation of "ON LINE REAL TIME ASH ANALYSER"

SD 0.66

SD 0.28
THANK YOU