OMB Gasification –
Industrial Application Updates of Slurry Feeding & Developments of Dry Feeding

Gasification Technology Conference
Nov.1, 2010  Washington DC
Outline

1. Industrial Application Updates of OMB Slurry Feeding Gasification in China

2. Developments of Dry Feeding Gasification
Industrial Application Updates of OMB
Slurry Feeding Gasification in China
17 projects, 45 gasifiers, the largest capacity 2200 TPD
High Capacity OMB Gasification Updates

Up to Oct. 2010, 7 projects totally 16 gasifiers in operation.
Including 5 gasifiers with capacity 2000 TPD.
Jiangsu Linggu Chemical Co. Ltd.

- Location: Yixing, Jiangsu
- Gasifier: 2 gasifiers (A#, B#), 1 in operation, 1 in spare
- Pressure: 4.0MPa
- Single gasifier capacity: 2000 TPD
Gasification unit accumulation running **318 days**.

<table>
<thead>
<tr>
<th>Gasifier</th>
<th>A#</th>
<th>B#</th>
</tr>
</thead>
<tbody>
<tr>
<td>First startup</td>
<td>Jun. 15, 2009</td>
<td>Aug. 21, 2009</td>
</tr>
<tr>
<td>Accumulation running time</td>
<td>171 days</td>
<td>147 days</td>
</tr>
<tr>
<td>Operation load</td>
<td>85~95%</td>
<td></td>
</tr>
</tbody>
</table>

**Typical operation results**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO+H2:</strong></td>
<td>81~84vol%</td>
</tr>
<tr>
<td><strong>Combustible in dry slag:</strong></td>
<td>&lt;2%</td>
</tr>
</tbody>
</table>

Jiangsu Linggu Chemical Co. Ltd.

OMB Gasification
The restart under pressure and on-line switch ensure high reliability of OMB gasification unit.
Shenhua Ningxia Coal Group

Location: Yinchuan, Ningxia

Gasifier: 3 gasifiers (A#, B#, C#), 2 in operation, 1 in spare

Single gasifier capacity: 2000 TPD

Pressure: 4.0 MPa

Startup date: Mar. 2010
## Shenhua Ningxia Coal Group

**OMB Gasification**

### Gasifier Performance

<table>
<thead>
<tr>
<th>Gasifier</th>
<th>A#</th>
<th>B#</th>
<th>C#</th>
</tr>
</thead>
<tbody>
<tr>
<td>First startup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accumulation running time</td>
<td>1200 hrs</td>
<td>1100 hrs</td>
<td>600hrs</td>
</tr>
<tr>
<td>Operation Load</td>
<td>80~100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Coal Proximate Analysis

<table>
<thead>
<tr>
<th>M</th>
<th>A</th>
<th>V</th>
<th>FC</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.09</td>
<td>15.96</td>
<td>28.93</td>
<td>55.11</td>
</tr>
</tbody>
</table>

### Typical Operation Results

- **CO+H2**: 79~81vol%
- **Combustible in dry slag**: <5%

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**First startup Mar. 18, 2010**

**Accumulation running time (Up to Sep. 2010)**

**Operation Load**: 80~100%

**Coal proximate analysis**

**Typical operation results**

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**Gasification Technology conference 2010**

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Other Running Projects Updates
Jiangsu SOPO Group

- Location: Zhenjiang, Jiangsu
- Gasifier: 3 gasifiers (A#, B#, C#), 2 in operation, 1 in spare
- Single gasifier capacity: 1500 TPD
- Pressure: 4.0MPa
- Startup date: Sep. 2009

Up to Oct. 2010

- A# gasifier running for 3000 hrs
- B# gasifier running for 3500 hrs
- C# gasifier running for 4500 hrs

CO + H2: 80~84 vol%
Combustible in slag: <5 wt%
Fenghuang Fertilizer Plant

- Location: Tengzhou, Shandong
- Gasifier: 3 gasifiers, 2 in operation, 1 in spare
- Single gasifier capacity: 1500 TPD
- Pressure: 4.0 MPa
- Startup date: Dec. 2009

CO+H2: 81~82vol%
Combustible in slag: <5wt%
Yankuang Cathay Coal Chemical Co. Ltd.

- Location: Tengzhou, Shandong
- Gasifier: 2+1 gasifiers
- Single gasifier capacity: 1150 TPD
- Pressure: 4.0MPa
- Startup date: Oct. 2005

- Burner continuous operating lifespan: 125 days.
- New record on on-line switch time: 1.5 hrs.
Yankuang Lunan Fertilizer Plant

- Location: Tengzhou, Shandong
- Gasifier: 1 gasifier
- Single gasifier capacity: 1150 TPD
- Pressure: 4.0MPa
- Startup date: Jul. 2008

- Burner continuous operating lifespan: 140 days.
Projects Plan to Start up
Ningbo Wanhua Polyurethanes Co. Ltd.

- Location: Ningbo, Zhejiang
- Gasifier: 3 gasifiers, 2 in operation, 1 in spare
- Single gasifier capacity: 1200 TPD
- Pressure: 6.5MPa
- Plan startup date: Nov. 2010
Dry Feeding Gasification

Updates in China
Pilot Plant of Water Wall Gasifier

- Location: Tengzhou, Shandong
- Gasifier capacity: 20~30 TPD
- Pressure: 2.0~2.5MPa

- Demonstration of OMB gasification technology feed with high ash fusion point coal (2007~2010)
  — HI-TECH R&D Program of China (863 Program)
- Currently the only pulverized coal entrained-flow gasification pilot plant in China.
In 2009~2010 Tianba and Nantun coal been gasified to provide data for PDP design.
### Pilot Performance of Water Wall Gasifier

#### OMB Gasification

<table>
<thead>
<tr>
<th>Coal</th>
<th>Tianba</th>
<th>Nantun</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proximate analysis /wt%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1.1</td>
<td>3.35</td>
</tr>
<tr>
<td>V</td>
<td><strong>25.68</strong></td>
<td>7.65</td>
</tr>
<tr>
<td>A</td>
<td>16.07</td>
<td>33.46</td>
</tr>
<tr>
<td>FC</td>
<td>57.10</td>
<td>55.54</td>
</tr>
<tr>
<td><strong>Ultimate analysis /wt%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>64.26</td>
<td>75.62</td>
</tr>
<tr>
<td>H</td>
<td>3.12</td>
<td>4.92</td>
</tr>
<tr>
<td>O</td>
<td>4.76</td>
<td>5.84</td>
</tr>
<tr>
<td>N</td>
<td>0.01</td>
<td>1.32</td>
</tr>
<tr>
<td>St</td>
<td>1.0</td>
<td>1.3</td>
</tr>
<tr>
<td>AFT/°C</td>
<td>FT</td>
<td>1269</td>
</tr>
</tbody>
</table>

![Viscosity vs Temperature Graph](image1.png)

![Temperature vs Flux Rate Graph](image2.png)
# Pilot Performance of Water Wall Gasifier

## Coal Operation temperature/°C

<table>
<thead>
<tr>
<th>Coal</th>
<th>Operation temperature/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tianba</td>
<td>1350~1450</td>
</tr>
<tr>
<td>Nantun (+3wt% flux)</td>
<td>1350~1450</td>
</tr>
</tbody>
</table>

## Syngas composition vol% (dry base)  

<table>
<thead>
<tr>
<th>Coal</th>
<th>CO</th>
<th>H2</th>
<th>CO2</th>
<th>N2</th>
<th>CO+H2</th>
<th>Feed Rate t/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tianba</td>
<td>64.97</td>
<td>24.16</td>
<td>5.89</td>
<td>4.98</td>
<td>89.13</td>
<td>~30</td>
</tr>
<tr>
<td>Nantun (+3wt% flux)</td>
<td>62.29</td>
<td>28.18</td>
<td>4.27</td>
<td>5.26</td>
<td>90.47</td>
<td></td>
</tr>
</tbody>
</table>
Pilot Performance of Water Wall Gasifier

Tianba

Nantun

Nov. 1, 2010

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OMB Dry feeding Demonstration Updates

- Location: kaiyang, Guizhou
- Gasifier: 2 gasifiers
- Single gasifier capacity: 1100 TPD
- Pressure: 4.0MPa
- Temperature: ~1600 °C
- Planned startup date: 2011

- Gasification trial of operating coal finished in pilot plant.
- Preliminary Process Design Package (PDP) finished in 2010.
Single Burner Dry feeding Demonstration Updates

- Company: China Blue Chemical Co.
- Location: Inner Mongolia
- Gasifier: 2 gasifiers
- Single gasifier capacity: 1200 TPD
- Pressure: 4.0MPa
- Planned startup date: 2011

- Simple gasifier structure
- Low investment
- More simple operation
Sum Up

- OMB slurry feeding gasification employed in 17 projects in China, totally 45 gasifiers.
- 16 gasifiers in operation including 5 gasifiers with capacity 2000 TPD.
- 2 dry feeding gasification demonstration projects in structure, totally 4 gasifiers.
Thanks for your attention

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