Dry Flue Gas Desulfurization for Power Plants

Mitchell Krasnopolser

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### Dry FGD Acid Gas Control Technologies

#### Dry Sorbent Injection
- 60/80+% SO₂ removal (ESP/FF)
- Hydrated lime, trona or sodium bicarbonate
- Inject before particulate control device
- Consider impact on fly ash disposal
- Lowest capital investment

#### Spray Dry FGD System w/ HLI
- Up to 98% SO₂ removal
- Up to medium sulfur fuels (<5-6 lbSO₂/mmBtu)
- Lime reagent
- Particulate control follows scrubber
- Dry byproduct – limited beneficial use
- Applied to small and large (900MW) units

#### Circulating Dry Scrubber
- Up to 98% SO₂ removal
- Up to medium sulfur fuels (<5-6 lbSO₂/mmBtu)
- Lime reagent
- Particulate control follows scrubber
- Dry byproduct – limited beneficial use
- Best applied to small units
Spray Dry Absorber (SDA) with Rotary Atomizer

- Standard module designs that surround the atomizer spray cloud with flue gas from above and below
- Smooth turndown for load following for about 5:1 turndown ratio
- One machine/SDA requires less maintenance
- Maximum atomizer-to-wall spacing
- Operating single boiler SDA system designs up to 900 MW
- Operating designs from low to medium sulfur fuels
Rotary Atomizers with SDA

**MODELS**

**MODEL 900**
- Power Output: 75 HP (55kW)
- Speed Range: 14,000 - 16,000 rpm
- Maximum Feed*: 40 US GPM (9.0 m³/hr)
- Size/Weight: 18" (375 mm) dia. X 23" (575 mm) high, 300 lbs (135 kg)
- Wheel: 7.75" (196 mm) dia.
  Titanium or Hastelloy
  w/ ceramic or carbide inserts

**MODEL 1500**
- Power Output: 235 HP (175kW)
- Speed Range: 10,000 - 12,500 rpm
- Maximum Feed*: 100 US GPM (22.5 m³/hr)
- Size/Weight: 28" (700 mm) dia. X 54" (1350 mm) high, 1800 lbs (800 kg)
- Wheel: 10" (250 mm) dia.

* Multiple machine configurations available

**PERFORMANCE**

HCl REMOVAL 99+%  
SO2 REMOVAL 95%

Semi-Dry PFD  
With Recycle

Recycle Feed Tank  
CaO SILO  
S1  
S2 grit  
L1 H₂O  
Ca(OH)₂ Slurry  
L2  
L3 H₂O  
S3  
S4  
F4  
F5 leakage  
F6  
L3  
F3  
FLUE GAS  
F1  
S5  
S6 Discharge
Dual Fluid Atomizers with SDA

Turbosonic Dual Fluid Nozzle

PERFORMANCE

HCl REMOVAL 99+%  
SO2 REMOVAL 95%
Typical Retrofit SDA Arrangement
B&W’s Hydrated Lime Injection (HLI) Upstream SDA

- Inject hydrated lime upstream of the SDA
- Decouples the lime addition from the water addition
- Removes the prior limitations of the SDA system
- Extends inlet sulfur range to 6 lb $SO_2$/MBtu and increases removal rates
- Inlet HLI can also remove the requirement for a lime slurry system or reduce the capacity or sparing on the lime slurry system.
Circulating Dry Scrubber (CDS)

Absorber

Fabric Filter

CDS System
CDS – Component Systems

- Lime Silo
- CDS
- Fabric Filter
- Water
- Hydrated Lime
- Recirculated Byproduct and Lime
Fabric Filter for CDS Applications

- Based on FF experience in 6,000+ MW of SDA applications
- 10m PPS+ bags
- Lower ATC ratio
- Designed for reduced velocities in filtration zone
- Pulse air supply designed for high cleaning rate
- Larger hopper outlet opening
- Trough hopper design to minimize vertical height and accommodate high recirculation rate
## SDA v. CDS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SDA</th>
<th>CDS</th>
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</thead>
<tbody>
<tr>
<td>Coal Sulfur</td>
<td>&lt; 1.5% (typical)</td>
<td>&lt; 4%</td>
</tr>
<tr>
<td>SO₂ Removal Efficiency</td>
<td>90 – 95%</td>
<td>95 – 99%</td>
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<tr>
<td>Experience</td>
<td>Large installed base</td>
<td>Smaller but growing</td>
</tr>
<tr>
<td>Recycle Ash</td>
<td>Limited by slurry % solids</td>
<td>Virtually unlimited</td>
</tr>
<tr>
<td>Fabric Filter</td>
<td>Industry standard</td>
<td>Larger due to high particulate loading</td>
</tr>
<tr>
<td>Operations and Maintenance</td>
<td>• Periodic Atomizer cleaning</td>
<td>• No atomizer</td>
</tr>
<tr>
<td></td>
<td>• Lime slaking system</td>
<td>• Uses hydrated lime</td>
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Mitchell Krasnopoler
Manager, Air Quality
Kiewit Engineering & Design Co.
913-928-7074
Mitchell.Krasnopoler@Kiewit.com