Power Generation Overview

Hoffman & Lamson
Electric Power Applications

- Condenser Exhausting
- Geothermal Gas Removal
- Vacuum Priming
- Fly Ash Conveying
- Wet Flue Gas Desulfurization
- Turbine Gland Exhausting
- Vacuum Deaeration
- Condenser Initial Evacuation (Hogging)
- IGCC – Gasifier Combustion & Tail Gases
- Explosives Dust Controls – Coal Dust Housekeeping
- CFB – Loop Seal & Cooling Air Blowers
Wet Scrubber – Forced Oxidation

- Designed for 100% utilization of power producing boiler.

- Scrubber designed to operate at or near 100% capacity at all times.

- Utility desire to maximize power production, expect only minor variations in compressor flow.

- Typical performance range is 4000-25000 cfm and 8-20psig.
Blower Selection Criteria

Key Considerations

• Capital/Installation Costs
• Lifecycle Costs
• Reliability of Equipment
• Maintenance Requirements
• Experience of Vendor
• Local Service & Support
• Parts Availability
Multistage Centrifugal Blower

• Direct connect
• Rugged, reliable, proven design
• No pressure lube requirements
• Low noise level, typically 85 dBA at 3 ft.
• 3600 RPM operating speed
• Patented efficiency improvements
## Single vs. Multistage

<table>
<thead>
<tr>
<th></th>
<th>GDI Multistage</th>
<th>Single Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Cost</td>
<td>Moderate</td>
<td>More Expensive</td>
</tr>
<tr>
<td>Installation Cost</td>
<td>Low</td>
<td>Higher due to subsystems</td>
</tr>
<tr>
<td>Design Efficiency*</td>
<td>79%</td>
<td>79%</td>
</tr>
<tr>
<td>Operating Speed</td>
<td>3600 RPM Direct</td>
<td>&gt;8,000 RPM</td>
</tr>
<tr>
<td>Tip Speed</td>
<td>&lt;600 fps</td>
<td>&gt;1000 fps</td>
</tr>
<tr>
<td>Bearings</td>
<td>(2) Ball: Field Changeable</td>
<td>(5) Sleeve: Not Field Changeable</td>
</tr>
<tr>
<td>Gear Increaser</td>
<td>None</td>
<td>Yes – Vertical Split Casing</td>
</tr>
<tr>
<td>Other Utilities</td>
<td>None</td>
<td>Cooling Water</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>Simple</td>
<td>Complex due to design &amp; subsystems</td>
</tr>
<tr>
<td>Noise Level</td>
<td>85 dBA</td>
<td>&gt;95dBA</td>
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Experience

• Over 200,000 Installed Hoffman & Lamson Multistage Units World-Wide

• GDI has more than 60 FGD-FOX Blower units installed. Average Size > 1000 HP

• Hoffman & Lamson FGD Clients include:
  - Suncor – Fort McMurray
  - Georgia Power – Wansley, Gaston, Bowen, Yates, Scherer
  - Alabama Power – Barry, Gorgas, Hammond
  - NRG Texas Power - Limestone
  - Gulf Power – Crist Station
  - Duke Energy Indiana
  - SIGECO – Culley Station
  - TVA – Kingston
  - IPALCO – Harding Street Station
  - Lakeland Electric Co-op
  - China – Wuhan Kaidi Electric Power - Zhanjiang AOLIYOU Power Plant

• For Multistage centrifugal blowers, insist on Gardner Denver
  – Experience
  – Reliability
  – Performance