Smithfield Fresh Meats Corp.- Clinton, North Carolina

Anhydrous Ammonia System / Energy Savings
Facility Quick Facts

- 10,600 head /day swine slaughter and further processing
- Occupies appx. 35 acres
- 1850 Employees
- 700,000 square feet of Anhydrous Ammonia Refrigerated Space
- 30 Ammonia Compressors
- 276,000 lbs. of Anhydrous Ammonia
Compressors

Use computer control to manage compressor sequencing

The control-system operator must address load variations in a way that avoids excessive motor starts and stops.

Use a mix-and-match compressor sequencing to best meet the load

Keep base-load compressors fully loaded

Benefit beyond energy---Less compressor run-time = less maintenance and lower maintenance costs.
• 2C-1---300HP
• 2C-2---300HP
• 2C-18---500HP
• 2C-8---600HP
• 2C-4---529HP
• 2C-11---500HP
• 2C-12---500HP
• Total---3229HP
Utilize mix-and-match strategy with compressors of different size.

Strategy should utilized dedicated trim compressors, such as VFD-driven screw or reciprocating compressors.

<table>
<thead>
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<th>Unit</th>
<th>Stage Number</th>
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<tr>
<td></td>
<td>1</td>
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<tr>
<td>100 hp</td>
<td>X</td>
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<tr>
<td>200 hp</td>
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Comparison of Condenser Power for Different Control Strategies

- All Pumps First, then Fans
- Pump then Fan, One Condenser at a Time

![Graph showing the comparison of condenser power for different control strategies. The x-axis represents the total heat rejected to condensers (MBH), and the y-axis represents the total condenser power (kW). The graph compares two strategies: All Pumps First, then Fans (blue line) and Pump then Fan, One Condenser at a Time (red line).]
EXAMPLE OF PUMP, FAN & VFD STAGING

Example
- 30% minimum speed
- 80% maximum speed
- First condenser allowed to 10% minimum

What is wrong with the pump and fan order in this example?
Q & A