Turbo Blower Evaluation and Pre-Purchase: Two Large Project Cast Studies

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BOWEN COLLINS & ASSOCIATES
Presentation Overview

- Overview of Projects
- Evaluation and Award
- Summary
Project Overview

- **Timpanogos Special Services District (TSSD)**
  - TSSD 2009 WWTP Expansion

- **South Valley Sewer District (SVSD)**
  - Jordan Basin Water Reclamation Facility
Timpanogos Special Services District (TSSD)

- Located in American Fork, UT and provides sewer services to communities located in Northern part of Utah County.

- The TSSD 18.3 MGD (MMF) wastewater treatment facility consisting of Headworks, Influent PS, Oxidation Ditches, Final Clarifiers, UV Disinfection, Solids Dewatering and Composting Facilities.

- 2009 expansion project will provide BNR capability and increase plant capacity to 30.0 MGD

- Why Turbo Blowers???
Project Overview

**TSSD 2009 WWTP Expansion Project**

- Total estimated construction cost is $71M
- Eight existing oxidation ditches converted to Biological Nutrient Removal (BNR) process
- Two new Blower Buildings for Process Blowers
  - **Blower Building No. 1 – East Side Process**
    - Twelve 300 HP blowers (70,700 SCFM @ 5.6 psig)
  - **Blower Building No. 2 – West Side Process**
    - Eight 400 HP blowers (44,100 SCFM @ 7.9 psig)
- Aeration Control by Blower Manufacturer
  - Control Panels
  - Modulating Air Valves
  - Dissolved Oxygen Probes
  - Air Flow
- Blower Proposals were due in February 2009
South Valley Sewer District (SVSD)

- Located in Draper, UT and provides sewer services to communities located in South Salt Lake Valley
- Owns/maintains approximately 700 miles of sanitary sewer lines
- Wastewater treatment is currently provided by the South Valley Water Reclamation Facility and the Timpanogos Special Services District.
- The new Jordan Basin Water Reclamation Facility is a 15.0 MGD Membrane Bioreactor currently under construction.
- Why Turbo Blowers???
Project Overview

Jordan Basin Water Reclamation Facility

- New 15.0 MGD GE/Zenon MBR Facility which recently bid at $91M

- Process Blowers & Aeration Control
  - Eight 300 HP Units (33,000 SCFM @ 10.5 psig)
  - Aeration Control provided by Blower Manufacturer
    - Control Panels
    - Modulating Air Valves
    - Dissolved Oxygen Probes
    - Air Flow

- Membrane Air Scour Blowers
  - Five 300 HP Units (30,000 SCFM @ 5.0 psig)
  - Controls by GE/Zenon

- Blower Proposals were due in June 2008
# Evaluation & Award

## TSSD 2009 WWTP Expansion Project

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<thead>
<tr>
<th>Criteria</th>
<th>Possible Score</th>
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<tr>
<td>Capital Cost</td>
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<td>Delivery Schedule</td>
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## Jordan Basin Water Reclamation Facility Project

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## Capital Cost

### TSSD 2009 WWTP Expansion Project

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<tr>
<th>System Integrator</th>
<th>ABS</th>
<th>HSI</th>
<th>K-Turbo</th>
<th>Neuros</th>
<th>Neuros Alt</th>
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# Capital Cost

## Jordan Basin Water Reclamation Facility

<table>
<thead>
<tr>
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Evaluation & Award

O&M Cost

- **TSSD 2009 WWTP Expansion Project**
  - [Guaranty W2A Power Spreadsheet.pdf](#)
  - [Contract Price Adjust.pdf](#)

- **Jordan Basin Water Reclamation Facility**
## Evaluation & Award

### Table 1 - Guaranteed Wire-to-Air Power

<table>
<thead>
<tr>
<th>Design Point</th>
<th>Description</th>
<th>Flow (CFM)</th>
<th>Pressure</th>
<th>Barometric (psig)</th>
<th>Discharge Temperature (°F)</th>
<th>Relative Humidity (%)</th>
<th>Blower Model</th>
<th>Number Operating Blowers</th>
<th>Guaranteed Wire to Air Power (kW)</th>
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<tbody>
<tr>
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</table>

*Notes:*
1. Site Elevation: 4,000 ft above mean sea level
2. Include inlet filter pressure drop allowance = 0.2 psig
3. Guaranteed Wire-to-Air Power shall include all losses including motor, inlet filter, drive, cooling system, etc.

### D. Contract Price Adjustment

1. The guaranteed wire-to-air power usage of each blower unit (including the cooling system, motor, intake filter and VFD or inverter) shall be proven by measuring each guarantee point during factory testing. Should the factory tests show that the actual wire-to-air power usage is more than the guaranteed wire-to-air value, the owner will adjust the contract price as follows:

   **Adjusted contract price = A minus B**

   Where:
   - \( A = \) Contract Price.
   - \( B = $10,000 \times \text{C if C is greater than zero.} \)
   - \( C = \text{sum of evaluated wire kW (see below)} \)

   *C* shall be calculated as follows:

   \[
   C = \sum \text{evaluated wire kW (see below)}
   \]

   \( \text{Evaluation Factor = \frac{\text{evaluated wire kW}}{\text{A}}} \)

   \( \text{Evaluated kW} = \text{A} \times \text{Evaluation Factor} \)

2. Adjustments will be made to the payment at the time payment for blower units that are accepted and approved by owner.
3. No credit shall be allowed in the case where total actual wire kW is less than the total guaranteed wire kW.
4. Manufacturer shall complete corrective action and re-certification of the testing in a reasonable time frame to not delay overall project. All costs for the second testing including travel and accommodations for any required witness shall be the responsibility of the manufacturer.
Experience & References

- **TSSD 2009 WWTP Expansion Project**
  - **Blower Manufacturer**: Submit a list of installations of the Supplier's blower equipment, including the following information for each listing:
    - Owner and Location
    - Contact information
    - Number of blowers
    - Size of blowers
    - Date of installation
  - **System Integrator**: Submit a list of the Supplier's aeration control systems, including the following information for each listing:
    - Owner and Location
    - Contact information
    - Type of aeration system control
    - Number of blowers controlled
    - Date of installation.
Experience and References

- Jordan Basin Water Reclamation Facility
  - The previous experience of each Proposer and/or Manufacturer will be evaluated relative to number of installations, length of operation, local personnel experience, and positive references.
Materials of Construction

- TSSD 2009 WWTP Expansion Project
  - Submit detailed descriptions of the equipment and materials necessary to meet the requirements identified in the technical specifications, including number of operating blowers, blower horsepower, and required appurtenances. Provide general arrangement drawings, equipment details, catalog sheets and similar items. Submit blower curves for each specified point at site conditions.

- Submit detailed descriptions of the aeration control systems necessary to meet the requirements identified in the technical specifications. Provide general arrangement drawings, sample P&ID drawings, instrumentation catalog sheets, modulating valve and actuator catalog sheets, and similar items.

- Submit factory testing procedures proposed to verify blower performance and guaranteed wire-to-air power values. Indicate deviations from the specified test procedures.
Quality Assurance

- Jordan Basin Water Reclamation Facility
  - Points will be awarded based upon manufacturer’s commitment to turbo blower product research and development, quality of components used in blower system and quality control measures implemented at manufacturing facilities. In addition, product warranty, factory testing, and field testing offered by each manufacturer shall also be evaluated.
Evaluation & Award

Service, Support, Maintenance & Warranty

- **2009 TSSD WWTP Expansion Project**
  - Full and timely support during construction and start up
  - Location where design assistance will be provided
  - Training capability for Owner’s staff
  - Post commissioning support for Owner and plant staff
  - Continued product support with timely delivery of spare parts
  - Warranty coverage of equipment, materials, workmanship and labor
  - Ease of performing maintenance needs (accessing, removing, cleaning, replacing equipment, etc).
Evaluation & Award

Product Support

- **Jordan Basin Water Reclamation Facility**
  - Points were awarded to manufacturers and component suppliers who offer product support services such as
    - Start-up and operator training services,
    - Additional operator training beyond facility start-up, such as quarterly site visits and maintenance contracts
    - The number of service/maintenance agreements, number of available maintenance personnel, and location of service centers will be considered.
Evaluation & Award

✓ **Submittal Responsiveness**
  - Points were awarded based upon Bidder’s ability to provide a complete and responsive submittal package.

✓ **Corporate/Financial Stability**
  - Demonstrate financial stability and resources sufficient to provide replacement parts, service and support the blower equipment through the life of the plant.

✓ **Delivery Schedule**
  - Points were awarded based upon the Supplier's demonstrated ability to meet the project schedule. Consideration was also be given based on Suppliers lead time schedule information and schedule information on spare part delivery.
## Evaluation Summary

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<tr>
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<td>89</td>
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<tr>
<td>Expansion Project</td>
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### Jordan Basin Water Reclamation Facility

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<th>Neuros</th>
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<tbody>
<tr>
<td>Jordan Basin Water</td>
<td>120.7</td>
<td>122.1</td>
<td>108.4</td>
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<tr>
<td>Reclamation Facility</td>
<td>(89.4%)</td>
<td>(90.4%)</td>
<td>(80.3%)</td>
<td>(95.4%)</td>
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Summary

Lessons Learned

- Increased Confidence in Turbo Blower Technology
- Immature Market
  - Comparing “apples to apples”
    - Guaranteed Wire-to-Air Power
    - Testing Protocols
  - Competitive & Variation in Pricing
  - Aeration Control
- Contractor Assignment & Schedule of Payments
  - Shop Drawing Submittals

Questions??