An energy saving solution pays big dividends

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Submersible Mixers
9th Addition
August 1996 – October 1997
Project Initiation in 2013

Weighing options
Discussions with Manufacturers

Potential Opportunity
Proposals

- Major purchase
- Manufacturer best offering
- Include trial unit
Installing Trial Mixers
Early winter
Normal winter scum
Moving to “low power” train
Is that a DAF???
## Power Comparison

<table>
<thead>
<tr>
<th></th>
<th>Brand “A”</th>
<th>Brand “B”</th>
<th>Brand “C”</th>
<th>Brand “X”</th>
<th>Original</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP</td>
<td>2.84</td>
<td>3.00</td>
<td>4.00</td>
<td>2.50</td>
<td>7.50</td>
</tr>
<tr>
<td>Stated Power</td>
<td>2.64 kW</td>
<td>2.90 kW</td>
<td>2.54 kW</td>
<td>2.23 kW</td>
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</tr>
<tr>
<td>Measured Power</td>
<td>2.03 kW</td>
<td>2.61 kW</td>
<td>2.34 kW</td>
<td>2.11 kW</td>
<td>6.01 kW</td>
</tr>
<tr>
<td>Thrust</td>
<td>498 N*</td>
<td></td>
<td>1,122 N</td>
<td>510 N</td>
<td></td>
</tr>
</tbody>
</table>

* Value provided by supplier, unconfirmed by ISO 21630 test.
Results

* Four very competitive proposals received
* All demonstrated
  * Adequate mixing
  * Greatly reduced power
  * Ability to retrofit
* Ultimately hinged on existing components
Pumps — Testing — Submersible mixers for wastewater and similar applications
Creating Mixing and Bulk Flow

Many flows, one source

• Inflow
• Outflow, better known as primary flow
• Jet: initial jet and entrained flow
• Bulk Flow
Creating Mixing and Bulk Flow

Intensive mixing zone

Bulk Flow
Mixer Jet

- Jet drives both primary flow and bulk flow
- Jet brings the surrounding liquid into motion
  - The surrounding low-velocity liquid is entrained
  - Majority of the mixing is not in the prop-area
  - Intensive mixing happens along the jet border
<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Cost</td>
<td>$200,000</td>
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<tr>
<td>Installation Cost</td>
<td>$7,100</td>
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<tr>
<td>Focus on Energy Grant</td>
<td>($32,498)</td>
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<td>Project Cost</td>
<td>$174,602</td>
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<tr>
<td>Average Power Use</td>
<td>115 kW</td>
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<tr>
<td>Annual Power Savings</td>
<td>$82,300</td>
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</tbody>
</table>
Calculated costs

Before: $165,821

After: $83,484 + $82,337 = $165,821

Savings: $0

Annual Cost: $83,484
Old vs. New
Observations and Takeaways

* Testing resulted in project modification
* Proposal structure potentially double edged
* Plan to further reduce
  * Order for remaining mixers is placed
  * May evaluate intermittent operations
* Look for the overlooked
Questions?

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