Correction Of Varnish Problems In A Power Plant Turbine

Technical Application Bulletin

PROJECT BACKGROUND

- Waste incineration plant with 10 MW power.
- Regular problems when the turbine is started up.
- This was determined to be caused by excessive varnish deposits in the control block.
- The turbine oil had a service life of roughly 18 months.
- The goal this customer wanted to achieve was to extend the filter life, have fewer oil changes, and lessen unscheduled downtime.

INDUSTRIES

DESIGN

What We Did: On the basis of the analysis, the customer began using a Schroeder VMU | Varnish Mitigation Unit a service-friendly filter power unit to remove oil aging products (varnish) from mineral-oil-based turbine oil:

The VMU is used in the bypass flow and offers the following product features:

- Removal of solid or gel-like oil aging products
- Flow rates between 2.2 and 8.9 L/min
- Available as mobile or stationary system

In this case, a stationary system was selected that constantly removes oil aging products from the turbine oil.
DELIVER

• Reduced oil consumption and improved environmental footprint.
• Following inspections performed by the lab, it was possible to increase the oil service life from roughly 1.5 to roughly 5 years with the VMU.
• The customer’s turbine oil consumption was reduced as follows:

<table>
<thead>
<tr>
<th>Power Plant Turbine</th>
<th>Without VMU</th>
<th>With VMU</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Service Life</td>
<td>1.5 years</td>
<td>5 years</td>
<td>+$3.5 years</td>
</tr>
<tr>
<td>Annual Oil Usage</td>
<td>1,408 gal.</td>
<td>422 gal.</td>
<td>-986 gal.</td>
</tr>
<tr>
<td>Oil Costs</td>
<td>$17,362 / year</td>
<td>$5,213 / year</td>
<td>-$12,149 / yr.</td>
</tr>
<tr>
<td>Disposal of Oil</td>
<td>$3,101 / year</td>
<td>$931 / year</td>
<td>-$2,170 / year</td>
</tr>
<tr>
<td>Replacement Valves</td>
<td>$9,310 / year</td>
<td>$2,327 / year</td>
<td>-$6,983 / year</td>
</tr>
</tbody>
</table>

• The customer’s environmental footprint was improved thanks to the reduced oil consumption and resulting lower amount of waste oil.

• Prevention of varnish-based turbine downtime:
• The VMU filter power unit was able to correct the problems occurring when the turbine was started up.
• The customer no longer has unscheduled turbine downtime caused by varnish.

CUSTOMER BENEFITS

• Removal of solid or gel-like oil aging products
• Increased operating reliability of the system as a result of fewer deposits in hydraulic valves
• Increased oil service life

FURTHER APPLICATION AREAS

VMU | Varnish Mitigation Unit
Flow Rating: 2,200 gpm
Max. Viscosity: 365 SUS
Operating Pressure: 116 psi (8 bar)
Fluid Temperature: 86°F to 140°F
Seals: FKM
Weight: 154 lbs. (70 kg)

ROI

Oil Service Life
+3.5 Years

Annual Oil Usage
-986 gal.

Oil Cost Savings
$12.1K

Underlying values:
Oil Service Life = 1.5 years of operation w/o VMU; 5 years w/ VMU; 5 - 1.5 = 3.5 years of additional operation

Oil Cost Savings per year = $17,362 per year of new oil w/o VMU; $5,213 w/ VMU; $17,362 - $5,213 = $12,149 in yearly savings of oil.