

APPLICATION

Turbine Hydraulic Control System

VRS Solves Filter-Plugging Varnish Problem

CUSTOMER TESTIMONIAL

Keystone Power Station

CHALLENGE

Daily filter changes required due to varnish-type material plugging the filter

SOLUTION

Varnish Removal System (VRS)

RESULTS

- Insoluble content and filter plugging dramatically reduced.
- OEM filter replacement interval extended from daily to up to six weeks.
- Current VRS filter has been in use for 14+ months and still has 50% capacity.

Customer Profile

The Keystone Power Station in Shelocta, Pa., is a coal-fired 1,700 MW power station providing power to the PJM regional transmission organization serving the northeast United States. An LE customer since 1980, it has been in operation since 1967.

Application

The #2 DEH System Turbine Hydraulic Control System is a critical piece of equipment at the power station, with downtime being extremely important to avoid.

Challenge

Using a specialty fire-resistant hydraulic fluid, the company was experiencing premature plugging of the OEM particulate filter on the system, which necessitated replacement as often as daily. Testing and inspection of the oil and the plugged filters indicated a varnish-type material was the culprit.

LE Solution

John Hayes, LE lubrication consultant, recommended LE's new VRS as a last chance option to capture varnish effectively and economically. The most complete varnish removal and prevention system on the market, the VRS removes oxidation byproducts and prevents varnish formation during cooldown. It does not interfere with the main system and is suited for most hydraulic and lubricating fluids.

Results

In June 2020, the power station started using the VRS. Since then, OEM filter replacement intervals have been reduced dramatically to up to six weeks. The current VRS filter element has been in service for more than 14 months and still has 50% capacity, indicating remarkable holding volume. Insoluble content and plugging have been dramatically reduced.

"Since installing the VRS, we haven't seen anywhere near the previous levels of insoluble content," said Patrick Loe, technical services engineer at Lubrication Engineers. "While the system's historic MPC values did not seem concerning, it appears the VRS is removing a buildup of insoluble material in the oil, as shown by the reduced pentane and toluene numbers." (See table on next page.)



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“Since installing the VRS, we haven’t seen anywhere near the previous levels of insoluble content.” – Patrick Loe, technical services engineer

The Varnish Removal System combines highly efficient varnish removal and oil quality monitoring in one modular system. The filter unit acts as a kidney loop, continuously circulating fluid through the filter media. In addition an Oil Quality Sensor can be used to monitor oil degradation. The VRS can be configured for applications with fluid volumes up to 36,000 liters (9,500 gallons). The long fiber cellulose cartridges are specially designed for the removal of varnish byproducts that are dissolved in the fluid. Unlike other technologies, the cartridges do not add water to the fluid; instead, they remove water and other solid contaminants.



Results (cont.)

Date Samples Taken		July 2020	06-04-2020 (VRS Installation)		07-14-2020 (VRS In Use for 40 days)	
Test	Units	New Lube Reference	Inlet	Discharge	Inlet	Discharge
Varnish Potential (MPC), ASTM D7843	CIE LAB ΔE	4.6	11.0	3.6	11.1	5.0
Pentane	% by Weight	0.00	0.90	0.16	0.00	0.00
Toluene	% by Weight	0.00	0.01	0.02	0.00	0.00

Thank you to John Hayes, LE consultant (pictured), and Matthew Lehman, turbine maintenance supervisor, for providing the information used in this report.



L170953 08-21