Controling Varnish in Control Oil

A 1005 MW power plant in southern Canada was experiencing sticking valves in their EHC control oil on their steam turbine. Already having a vessel for removing acid in the oil the plan was to change from fuller's earth to ion exchange. The ion exchange insert would remove both varnish and acid. This plan was implemented for nearly 6 months with limited success and varnish numbers slowly climbing to 50 plus. The maintenance staff already familiar with BCA technology through the use of the MR system on the main lube oil oil of their Frame 7 Gas turbines asked ISOPur if there was a system designed for use with Phosphate Ester oils and in a smaller sump with 250 gallons (946 liters).

ISOPur makes an AVR system that is self-contained and flows at .5 GPM (1.89 LPM). This stand-alone system was implemented as a permanent kidney loop on the EHC system and run non-stop on the oil. Varnish content in the EHC fell by nearly 50% to 25 in 30 days.

Equipment Information

Unit #	**: STG-TK-201 CONTROL OIL**
Component	**: HYDRAULIC**
Location	:
Unit Mfr/Model	:
Unit Serial #	:

Lubricant

Manufacturer	: ICL INDUSTRIAL
Brand	: FYRQUEL EHC PLUS
Grade	: 46
Sample #	: 2024/03/08-116
Lab Tracking #	: 71Y4 - 259

Varnish Potential MPC (dE)	i-pH
28	4.26
25	4.47
28	5.96
24	4.44
25	3.36
54	4.46

Sample Information								Contaminants (ppm)			Physical Tests				Additional Tests				
Sample Date	Oil Mfr.	Oil Brand	Oil Grade	Component Service	Oil Service	Units	Oil Chg	Sodium	Potassium	Silicon	Visc 40°C cSt	Visc 100°C cSt	Visc Index	Water %	TAN (mgKOH/g)	ISO Method	ISO Code	ISO 4u Count	ISO 6u Count
Ref. Sample	ICL	FYR EHC+	46																
2024/03/05	ICL	FYR EHC+	46				N	0	1	0	45.5			<0.001	<0.04	ISO	16/15/13	465	211
2023/12/11	ICL	FYR EHC+	46				N	0	0	0	45.6	5.71	41	<0.001	<0.04	ISO	16/14/12	329	118
2023/09/12	ICL	FYR EHC+	46	~48			N	0	0	1	46.1	5.67	35	0.005	<0.04	ISO	16/15/14	500	180
2023/06/06	ICL	FYR EHC+	46				N	0	2	1	45.8	5.80	47	0.003	<0.04	ISO	18/17/15	2269	918
2023/03/09	ICL	FYR EHC+	46				N	0	0	1	45.4	5.90	57	<0.001	<0.04	ISO	16/15/13	330	170
2022/12/09	ICL	FYR EHC+	46				N	0	0	1	45.7	5.92	57	<0.001	<0.04	ISO	18/16/13	1643	496

The maintenance manager when asked about the advantages of the ISOpur AVR system cited the following:

1) The AVR system is simple and easy to use.
2) The filters are 4% of the cost of the Ion Exchange filters.
3) The sticking valves have gone away since implementing the ISOPur AVR purification system.
4) The Acid removal collection system is lasting longer based on oil test results, less acid is being developed.

He then went on to say that although he wanted the varnish number down into the single digits as long as we have returned to a reliable system without sticking valves he is happy with the ISOPur AVR system.

During the initial clean-up of the vanish the filter was changed every 30 days. The filters are changed every 30 days as recommended by ISOPur, with the oil sampling happening at the same time. Looking at cost of ownership BCA technology AVR filters can be changed once every 3 months for 6 years vs one ion exchange filter.