



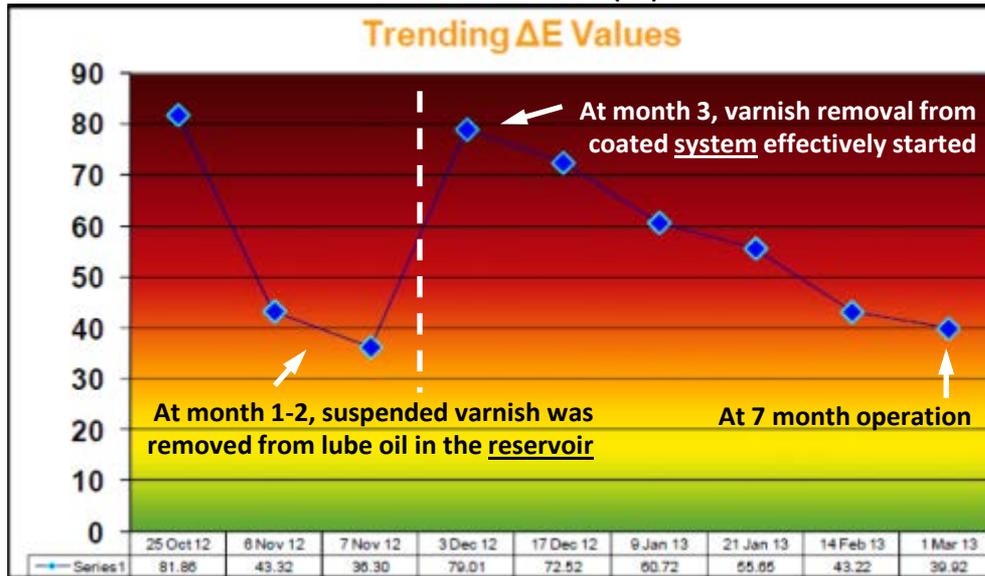
Reliability Improvement for 3RG1702 Compressor by Using Lube Oil System De-varnisher Unit

Background - 3RG1702 has undersized lube oil cooler capacity. High temperature leads to oil degradation which is the precursor of varnish development which coats machine parts and piping internal.

Upsizing cooler is expensive due to high-pressure operation - 80 bar at compressor suction; the alternative of replacing with synthetic oil also costs a bomb. Both also requires overhaul to clean-up varnish sticking to machine parts and piping internal (to the tune of \$>1M). Replacing with the same lube oil more frequently will not effectively remove the varnish that has stuck in the system, meaning lubricated system is operating at undesirable higher temperature. The varnish cannot be removed just by using conventional filter.

To solve varnishing issue, de-varnisher with electrostatic filtration system is used; with lesser cost compared to above suggestions, lube oil is also maintained at pristine condition all the times. Over 7 months of rental from Sept 2012 – Mar 2013, the result is:

Membrane Patch Colorimetric Test Results (ΔE) – the lower the better:



BEFORE (brownish varnish coats the gear)



AFTER 7 months (inspected during Apr 2013 MPHC S/D)

Recommendation – Install lube oil devarnisher unit as permanent solution to the varnish issue. Purchasing is more cost-effective (S\$100k with minimum filter PM cost) vs. rental (S\$9k/month), and is able to maintain the lubricated system varnish-free at all times. This system is supplied by the same company that provided us with the oil mist system.



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How it works – Unlike conventional filter without varnish removal capability, OILKLEEN® GREEN MACHEEN™ electrostatic filter works on principles of physics, creating 18 static energy fields. The contaminated oil is forced through these fields at a specific rate, using kidney-loop configuration.

The energy from the fields pulls the contamination particles out of the oil. Contaminant particles bond to the millions of sharp edges in our collection media inside the OILKLEEN® filter cartridge, decreasing the filter life.

With continuous circulation of lube oil, the whole volume of oil will be filtered and varnish that sticks to machine parts and piping internal will progressively being carried away and disappears eventually.

