

CASE STUDY

TOPIC: Varnish Contamination In Solar Titan 130 Gas Turbine Generator
LOCATION: Power House of Major University – New York, USA
DATE: October 10, 2019

Problem: Maintenance personnel at the Power House of a major university in New York noticed discoloration of the Mobil SHC 32 Lube Oil in their Solar Titan 130 Gas Turbine Generator after several years of operation. This prompted them to conduct oil analysis, and the lab results revealed an elevated varnish potential number of **MPC 53**. If left untreated, operators were worried that varnish would eventually plate out on the metal surfaces within the lube oil system, causing elevated bearing temperatures and possible premature wear and failure.

Solution: To effectively mitigate the varnish contamination in the turbine oil, maintenance personnel decided to use a 10 GPM Varnish Removal System from Oil Filtration Systems® equipped with Granular Adsorbent Media and a High Efficiency 5-Micron Beta>1000 Filter Element to re-circulate the oil in a kidney-loop configuration, continuously removing impurities while the turbine was in operation.

Evaluated By: Lisbeth W. Hill - Data Analyst

ANALYSIS INDICATES COMPONENT & LUBRICANT CONDITIONS ARE ACCEPTABLE. If still in service, the oil is suitable for continued use. RESAMPLE at the next scheduled interval. The VARNISH POTENTIAL is in the NORMAL range. Tests were performed within our Company by another Bureau Veritas laboratory: 12715 Royal Dr. Stafford TX 77477. 281-240-3042.

SPECTROCHEMICAL ANALYSIS IN PARTS PER MILLION																						
LAB NO.	SAMPLE DRAWN	Wear Metals										Contaminants			Additives							
		Iron	Chromium	Nickel	Aluminum	Lead	Copper	Tin	Silver	Titanium	Vanadium	Silicon	Sodium	Potassium	Boron	Molybdenum	Phosphorus	Zinc	Calcium	Barium	Magnesium	Antimony
0957	09/18/19	<1	<1	<1	<1	<1	<1	<1	<0.1	<1	<1	<1	<1	<1	<1	856	<1	3	<1	<1	<1	<1
0949	09/11/19	<1	<1	<1	<1	<1	<1	<1	<0.1	<1	<1	<1	<1	<1	<1	880	<1	<1	<1	<1	<1	<1
0948	09/04/19	<1	<1	<1	<1	<1	<1	1	<0.1	<1	<1	<1	<1	<1	<1	908	<1	<1	<1	<1	<1	<1
0947	08/28/19	<1	<1	<1	<1	<1	<1	<1	<0.1	<1	<1	<1	<1	<1	1	922	<1	<1	<1	<1	<1	<1
0061	07/01/19	<1	<1	<1	<1	<1	<1	<1	<0.1	<1	<1	<1	<1	<1	1	1105	<1	2	<1	<1	<1	<1
1313		<1	<1	<1	<1	1	<1	<1	<0.1	<1	<1	<1	<1	<1	<1	1	<1	1004	<1	<1	<1	<1

SAMPLE INFORMATION							FLUID PROPERTIES/CONTAMINANTS												
LAB NO.	SAMPLE DRAWN	UNIT	FLUID TIME	UOM	FILTER CHG.	LUBE SERVICE	MPC	MPC wt.	D6304-C(KF) D7279 Vis D664(M) Particles	Particles >4µm	Particles >6µm	Particles >14µm	Particles >21µm	Particles >38µm	Particles >70µm	ISO Code	RPVOT		
0957	09/18/19				No	S	7.067	0.0	108	31.1	0.06	1523	291	22	6	1	<1	18/15/12	204
0949	09/11/19			HR	No	S	17.832	0.0	54	31.3	0.06	5400	1349	49	10	<1	<1	20/18/13 *	202
0948	09/04/19			HR	No	S	24.463	0.0	65	31.2	0.22	1867	403	21	6	<1	<1	18/16/12	216
0947	08/28/19			HR	No	S	34.282 *	0.0	59	31.3	0.22	16157	4562	85	16	<1	<1	21/19/14 *	203
0061	07/01/19	36000		HR	No	S	53.320 *	0.0	161	31.1	0.34	78248	16832	142	28	1	<1	23/21/14 *	230
1313		35000 35000		HR	-		47.051 *	0.0	33	31.0	0.22	79	18	2	1	<1	<1	13/11/8	229

KEY: UoM - Unit of Measure Y - Yes N - No C - Changed S - Sampled > - Greater Than < - Less Than N/R - Not Reported (M) - Modified/method

Testing performed by Bureau Veritas®, an ISO/IEC 17025:2005 accredited laboratory, L-A-B accredited Certificate Number L2254. †: Not in scope of accreditation. For further details on outsourced testing, contact the laboratory directly. ‡: This test is run based on a trigger test, in this case "C" values indicate that the trigger test was either not positive or the result was below the reportable limit. For a list of trigger tests refer to <http://www.bureauveritas.com/oil-analysis>.
 Notice: This analysis is intended as an aid in predicting mechanical wear. Test results, maintenance recommendations and accuracy are affected by customer provided samples, equipment identification, maintenance history and apply only to this sample as provided. No guarantee, expressed or implied, is made against failure of this piece of equipment or a component thereof. The ultimate responsibility for the maintenance of this piece of equipment and all of its components is the responsibility of the equipment owner.



Results: The starting varnish content in the oil was **MPC 53**. After approximately **4 weeks** of run-time, the varnish potential dropped significantly to **MPC 7**.

In addition, the particle count in the oil improved from **ISO 21/19/14** to **ISO 18/15/12**.

Conclusion: By implementing a 10 GPM Varnish Removal System from Oil Filtration Systems®, and maintaining the lube oil of their Solar Titan 130 Gas Turbine Generator at or below the recommended varnish potential of MPC 10, maintenance personnel at the Power House of this major university did everything possible to ensure optimal reliability and performance of their Gas Turbine, while minimizing down-time and costly repairs.



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