ISOPur™
Fluid Technologies, Inc.

Case Study

Application: Marine

ISOPur Fluid Technologies purifies ship service diesel generator lubricating oil on the marine vessel "State of Maine"

Introduction

The MV "State of Maine" is equipped with three identical Ship Service Diesel Generators (SSDG) units. Each diesel sump is piped to a marine self-discharging centrifuge and normally purified after the main engine on the rotation schedule. Bath Iron Works sponsored the following study to determine the best alternative to noisy, maintenance laden centrifugal cleaning.

The Challenge

During the cold shutdown condition of the Maine, lubricating and hydraulic oils sit collecting water and promoting corrosion. In some cases, contamination would be severe enough to cause delays and scheduling problems. As an alternative to centrifugal systems, Bath Iron Works sponsored a head to head test of ISOPur's Balanced Charge Purification (BCP) technology during a planned stand-by period. ISOPur's goal was to out-perform the centrifuge while not adversely affecting the additive package.

The Solution

The ISOPur unit with BCP technology was installed in conjunction with a marine self-discharging centrifuge. The lubricating oil within SSDG #1 and #3 was filtered with the centrifuge on a regular basis. SSDG #2 was purified with an ISOPur fluid purification unit only and not serviced with the centrifuge. The study showed considerably cleaner oil in the SSDG serviced by ISOPur's BCP technology. SSDG #1 and #3 did not perform as well and viscosity restoration was ineffective.

The ISOPur unit attached to SSDG #2 was very aggressively cleaned of particulate and viscosity was dramatically restored to new oil specifications. Comprehensive analysis concluded that the BCP technology did not affect the additive package. In addition, the maintenance cost of the ISOPur unit was less than one-fifth that of the centrifuge. The oil quality continued to improve over time as the ISOPur unit removed preexisting sludge. Bath Iron Works reported that the continued operation of SSDG #2 was free of sludge and reached cleanliness levels of six times greater than new oil after only 90 additional days of BCP purification. The following is a breakdown of the oil analysis:

	Centrifuge		ISOPur Unit		Centrifuge		
SSDG #	#1	#1	#2	#2	#3	#3	New
Sample Date	5/15/01	7/15/01	5/15/01	7/15/01	5/15/01	7/15/01	6/15/01
Iron	7	7	8	10	10	8	8
Chrome	0	0	0	0	0	0	0
Lead	0	0	0	0	1	0	0
Copper	2	0	2	1	3	0	0
Tin	16	16	15	13	11	19	18
Aluminum	2	2	2	3	3	2	3
Nickel	0	0	0	0	0	0	0
Silver	0	0	0	0	0	0	0
Molybdenum	0	0	0	0	1	0	0
Titanium	0	0	0	0	0	0	0
Silicon	5	11	5	9	4	10	18
Boron	1	1	1	1	1	1	1
Sodium	330	330	326	321	318	338	339
Magnesium	80	78	77	83	83	83	88
Calcium	7394	6889	7216	6913	7726	7641	7610
Barium	0	0	0	0	1	0	0
Phosphorous	311	315	305	304	325	321	329
Zinc	583	594	589	562	628	622	641
Vanadium	0	0	0	0	1	0	1
Viscosity @ 40	124.47	125.18	124.9	135.1	126.88	130.12	136.3
Viscosity @ 100	13.33	13.56	13.3	14	13.3	13.78	14.2
Oxidation	1.25	0.01	0.09	0.02	0.04	0.01	0.01
Sulfation	0.45	0.01	0.03	0.04	0.03	0.01	0.01
Nitration	0.07	0.02	0.07	0.04	0.07	0.03	0.01
Water %	0.13	<0.05	0.24	<0.05	0.18	<0.05	<0.05
Fuel Dilute %	<2.00	3.1	2.63	2.08	<2.00	2.55	<2.00
Glycol%	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Soot	0.08	0.02	0.03	0.07	0.03	0.02	0.02
Zinc Depl.	0	0	0	0	0	0	0
TBN	35.53	37.05	35.95	34.27	36.11	35.5	38.56
Water (KF)	9198	2276	4818	1982	2398	3023	1071
ISO>2	18,980	14,735	106,723	18,827	53,244	15,855	15,201
ISO>5	6,511	5,054	36,618	6,459	18,268	5,439	5,215
ISO>15	620	481	3,483	616	1,742	518	497

Shaded areas indicate superior performance, with no sludge, and restored viscosity.

The Return

The BCP technology restored oil viscosity to new oil specifications by removing water, sludge and oxidation by-products, thus requiring 80% less maintenance and reduced man-hours. Oil replacement was reduced and the ship was ready for training cruises and operational duty. These were all contributions to a significant return on investment for the MV "State of Maine".