Donaldson HY-PRO™

Coal Crusher Gearbox Lube Filtration

Total System Cleanliness Approach

The Problem

Coal fired power plants typically operate several ball mills or coal pulverizing mills to crush the incoming coal to the optimum size for combustion. This means that each power generation unit has five or six mills. The gearboxes that run these coal mills are usually lubricated with high viscosity oil, such as ISO VG320 or ISO VG460. Traditionally, these large gearboxes have no filtration and the oil is changed on a service interval. Oil analysis, and even visual inspection, revealed that the oil in the gearboxes was contaminated to levels not suitable for any lube or hydraulic system.

The Solution

Applying a total system cleanliness approach is necessary to maximize uptime, extend gearbox life, extend fluid life, reduce limited maintenance resource demands, reduce fluid disposal costs and even save money on power consumption. Installing a dedicated filtration system and applying the following strategies can prove to be very effective.

- Set a target for fluid cleanliness to be verified by periodic oil analysis.
- Install high efficiency glass media or desiccant breather on all gearbox vent ports.
- Change the criteria for replacing the oil from a time interval to a decision based on the oil condition determined by oil analysis.
- Install a dedicated filtration system on each individual gearbox to filter the oil continuously during operation.

The Results

A fluid cleanliness target of x/16/13 was established and the FSL side loop filtration system was installed along with fresh synthetic oil. Less than a day after the installation, gearbox oil contaminant levels were reduced significantly and the cleanliness target was achieved (see table 2).It is important to have a solid grasp on ISO codes to understand the magnitude of dropping the ISO code from x/21/16 to x/16/11 and lower. In this case the amount of particles per milliliter > 6 micron dropped from 11,184 to 360 and the number of particles per milliliter > 14 micron dropped from 323 to 11.This represents a 3,006% drop in particles > 6 micron and a 2,836% drop in particles > 14 micron. Approximately 2 1/2 months later the same filter element was in use and the ISO code was x/13/11 with only 71 particles > 6 micron and 13 particles > 14 micron per milliliter which represented a drop of 16,592% and 2,384% particles per milliliter respectively.

At the time of the last data point, the fluid in the specified gearbox had achieved servo quality cleanliness.

Table 2

				ISO 4406 Code			Actual Counts	
Date	FSL Filter	Time Running (Hrs)	Running (Days)	ISO		Code	>6	>14
8/14/2006 14:00	OFF	0:00	0	21	/	15	11593	298
8/15/2006 8:00	OFF	0:00	0:00	21	/	16	11184	323
8/15/2006 10:30	ON	2:30	0.1	17	/	12	1848	32
8/15/2006 11:30	ON	3:30	0.15	17	/	11	1214	15
8/15/2006 15:00	ON	7:00	0.29	17	/	11	673	17
8/16/2006 6:30	ON	22:30	0.94	16	/	11	360	11
8/16/2006 14:00	ON	30:00:00	1.25	17	/	12	837	35
8/17/2006 8:30	ON	48:30:00	2.02	15	/	11	308	12
8/18/2006 8:00	ON	72:00:00	3	16	/	12	355	21
8/18/2006 12:00	ON	76:00:00	3.17	16	/	11	361	12
8/21/2006 10:30	ON	146:30:00	6.1	15	/	12	317	20
8/22/2006 6:30	ON	166:30:00	6.94	15	/	11	339	12
8/23/2006 9:00	ON	193:00:00	8.04	17	/	13	674	69
8/28/2006 11:30	ON	315:30:00	13.15	15	/	11	216	15
8/29/2006 11:00	ON	339:00:00	14.13	15	/	12	251	23
8/30/2006 9:00	ON	361:00:00	15.04	15	/	11	153	20
8/31/2006 8:00	ON	384:00:00	16	15	/	12	174	30
9/1/2006 10:00	ON	410:00:00	17.08	15	/	12	204	23
9/8/2006 8:00	ON	576:00:00	24	17	/	14	638	83
10/2/2006 11:45	ON	1155:45:00	48.16	17	/	12	777	44
10/3/2006 13:24	ON	1181:24:00	49.22	16	/	13	685	73
10/15/2006 13:24	ON	1469:24:00	61.22	14	/	11	138	13
10/30/2006 13:00	ON	1829:00:00	76.21	13	/	11	67	13

Want to find out more? Get in touch.

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