

Case Study 20

Acid Scavenging for Hydraulic Forge Press

Background

An aluminum mill produces critical components for military aircraft and highway transportation. These components are forged from aluminum billets in massive hydraulic forge presses that generate in excess of 10,000 tons of pressure during the forming process. Forge presses of this magnitude are rare so keeping these machines operational is critical to prevent long delays waiting for replacement parts. Because the billets are heated to ~800°F (forging temperature) the risk of auto ignition of the hydraulic fluid is very high. Synthetic fire-resistant phosphate ester hydraulic fluids are typically used for their ability to self-extinguish. While these fluids have excellent thermal stability, they are prone to rapid degradation in the presence of water causing the fluid to form acids. Eventually varnish will form resulting in system failure. This aluminum mill was experiencing servo valve sticking, causing extreme vibration which forced a shut down for safety. The mill contacted Northeast Filter to evaluate their hydraulic system condition and propose a quick remedy.

Solution

The VAS team took hydraulic fluid samples from the reservoir and performed a comprehensive analysis. The results disclosed elevated moisture content (0.05% Karl Fischer), high particle contamination (ISO 20/18/16) and high total acid number (2.8 KOH/g). Since water ingress is what likely initiated the breakdown, our first mission was to stop the ingress. The humid environment of the mill was the primary moisture ingress source, so we installed desiccant breathers on the reservoirs to replace the original fill cap breathers. Next, we provided a temporary portable filter system to kidney-loop off the reservoir with water and particulate filter elements to clean-up the reservoir. The final task was to install a permanent stationary filter system with particulate removal, water sorbent, and dry ionic resin adsorbent filter cartridges to remove the acid and varnish. Within three months, the varnish that had formed on the servo valves and other metal components was gone, the system recovered and stabilized to “like new” condition. We also helped them establish a fluid condition monitoring program to routinely assess their system. Over the next two years, they installed identical filter systems at other subsidiary plants.



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