Donaldson HY-PRO™

Steel Mill High Pressure Hydraulics

Hydraulic Oscillator System Element Upgrade

The Problem

The hydraulic oscillator delivering molten steel into casting molds in this application was operating at a sub-standard level. The hydraulic system, which oscillated the pour of steel from an electric arc furnace into the molds, consisted of 250cc pumps driving a large servo valve which oscillated the pouring steel 6mm per stroke. Frequent filter replacements and hydraulic fouling lead to the assumption that improving fluid cleanliness would improve reliability. It was predicted that upgrading from the original elements to Donaldson Hy-Pro elements would be a solution. Elements were located at pump discharge, servo pilot pressure filter, offline loop, and return line.

Original Elements	$4\mu_{[c]}$	$6\mu_{[c]}$	$14\mu_{[c]}$
ISO Code (Per 4406:1999)	15	13	8
Actual Particles per Millimeter	~240	~60	~1.9

Donaldson Hy-Pro Upgrade	$4\mu_{[c]}$	$6\mu_{[c]}$	$14\mu_{[c]}$
ISO Code (Per 4406:1999)	13	11	6
Actual Particles per Millimeter	~60	~15	~0.48

The Solution

Filter Element Upgrade: Original elements with 003 glass media were fitted on the pump discharge filter, servo pressure filter, and the return line filter housings. In the upgrade these were replaced by Donaldson Hy-Pro 3M media code elements. Donaldson Hy-Pro 1M media was used to upgrade the b2.5[c] > 1000 rated glass media element installed in the offline loop filter housing.

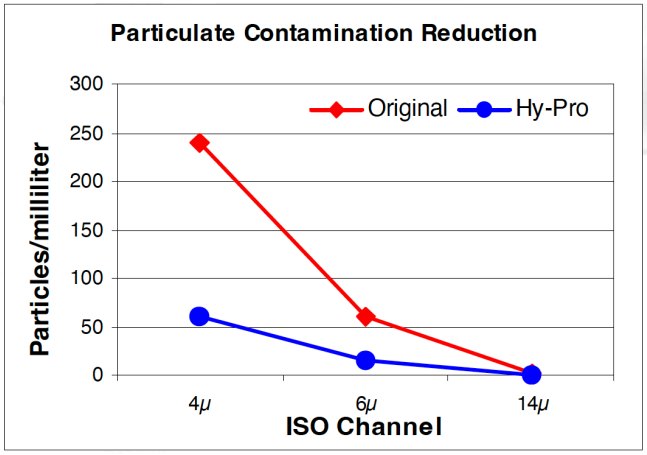
Standard System Information

Operating Temperature: ~110° F

Fluid Type: EcoSafe FR46

The Results

On-line particle counting was used to quantify the fluid cleanliness after the Donaldson Hy-Pro upgrade. The Donaldson Hy-Pro elements yielded substantial improvement in ISO fluid cleanliness codes visible in the tables and graph. With the Donaldson Hy-Pro elements there was a **75% reduction in particles 4m[c] and larger, a 75% reduction in particles 6m[c] and larger and a 74.7% reduction in particles 14m[c] and larger.**



BEFORE

15/13/8

AFTER

13/11/6

The Conclusion

ISO fluid cleanliness codes can sometimes be deceiving because what appears to be only a one or two number decrease in any channel is actually a significant improvement. Take as an example the 4μ channel in the two tables above: the original cleanliness code was 15 while the 4μ channel code after upgrade was 13. This may seem like a minor improvement but a closer look at the actual data reveals the magnitude of the improvement:

- The actual number of particles was reduced by a multiple of 4 decreasing from 240 to 60 particles / ml.
- There were 75% fewer particles 4m[c] and larger causing additive depletion and generating wear particles.

Want to find out more? Get in touch.

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