Donaldson
HY-PRO™

Steel Mill High Pressure Hydraulics

Hot Roll Plate Mill Fluid Cleanliness Upgrade

The Problem

This plate mill hydraulic system has several filter locations: bulk tank recirculation, pump discharge, servo pilot, return-line and recirculation line.

After suitable sample ports were installed baseline ISO fluid cleanliness codes were captured with an on-line particle counter. Then several system recommendations were implemented to improve cleanliness and reliability:

The Solution

Filter Element Upgrade: All filter elements were upgraded to Donaldson Hy-Pro G8 DFE Rated elements. Media code 3M (b5[c] > 1000) was used on pump discharge, servo pilot, and recirculation filters. Media code 25M (b22[c] > 1000) was used on the return line filter.

Breather Upgrade: The Donaldson Hy-Pro BF series high flow, high efficiency breather (top photo) was installed on the reservoirs to control ingression of fine airborne particulate

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 below. With the Donaldson Hy-Pro elements there was a 97.2% reduction in particles 4m[c] and larger, a 99.5% reduction in particles 6m[c] and larger and a 99.9% reduction in particles 14m[c] and larger.

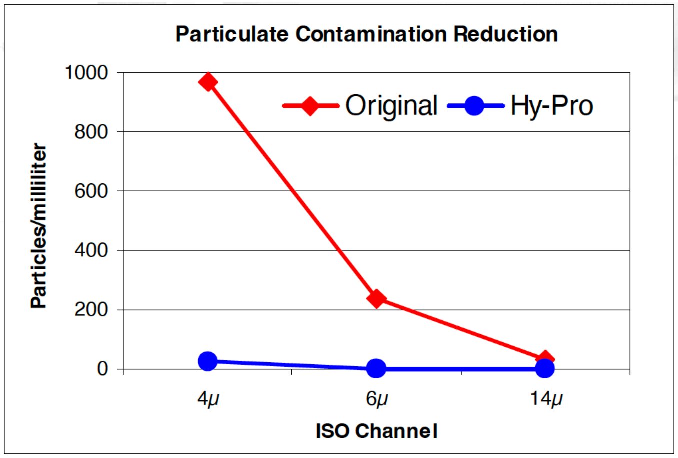
Original Elements	$4\mu_{[c]}$	$6\mu_{[c]}$	$14\mu_{[c]}$
ISO Code (Per 4406:1999)	17	15	12
Actual Particles per Millimeter	~970	~240	~30

Donaldson Hy-Pro Upgrade	$4\mu_{[c]}$	$6\mu_{[c]}$	$14\mu_{[c]}$
ISO Code (Per 4406:1999)	12	8	<1
Actual Particles per Millimeter	27	1.3	0

The Conclusion

ISO fluid cleanliness ratings 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 6μ channel in the two tables above: the original 6μ code was 15 while the same channel after upgrade was 8. This should seem like a big improvement and a closer look at the actual data reveals the magnitude of the improvement:

- The actual number of particles was reduced by a multiple of 184 decreasing from 240 to 1.3 particles / ml.
- There were 99.5% fewer particles 6m[c] in the fluid causing additive depletion and generating wear particles.



Want to find out more? Get in touch.

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