Donaldson
HY-PRO™

Paper Machine Lubrication

Dry End Filter Element Upgrade

The Problem

The system supplying filtered and cooled lube oil to the roller bearings on the paper mill dry end was consuming a substantial amount of filter elements. Thus, a better fluid filtration solution was sought to keep things rolling longer while improving bottom line profitability. OEM specified original elements had been in use, but it was anticipated that Donaldson Hy-Pro's elements could provide better ISO fluid cleanliness codes plus longer element life.

The Solution

The original element ($b7_{[c]} > 1000$) was replaced with a Donaldson Hy-Pro upgrade element (HP8314L39-6LB) which is specifically designed to optimize fluid cleanliness and element life in a high viscosity fluid where differential pressure indicators signal the need for element change at low Δp ranging from 18~25 psid (1,3 ~ 1,7 Δbar).

Fluid cleanliness was analyzed before and after the fluid passed through the filter housings with an on-line particle counter calibrated to ISO11171 (ISO codes per ISO4406:1999). No bottle samples were used and on-line samples were continuously taken until at least three consecutive identical samples were yielded to ensure that the sample ports were properly flushed ensuring no false counts due to dirty sample ports.

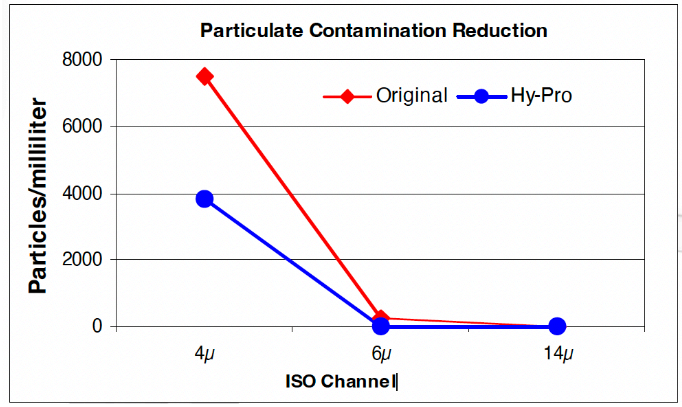
The Results

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 49.3% reduction in particles $4m_{[c]}$ and larger, a 93.7% reduction in particles $6m_{[c]}$ and larger and a 85.2% reduction in particles $14m_{[c]}$ and larger.

The original element had a clean element DP of 10 psid and lasted approximately 41 days. The Donaldson Hy-Pro clean element ΔP was 7 psid then 8 psid and 10 psid after 21 days and 31 days respectively. The Donaldson Hy-Pro elements have been lasting 60~65 days under normal operating conditions. The improvement in fluid cleanliness translates into increased component life and greater reliability.

Original Elements	$4\mu_{[c]}$	$16\mu_{[c]}$	$14\mu_{[c]}$
ISO Code (per 4406:1999)	20	15	9
Actual Particles per Milliliter	~7500	~240	~3.8

Donaldson Hy-Pro Upgrade	$4\mu_{[c]}$	$16\mu_{[c]}$	$14\mu_{[c]}$
ISO Code (per 4406:1999)	19	11	6
Actual Particles per Milliliter	~3800	~15	~0.56



The Conclusion

Improvements in ISO fluid cleanliness codes can sometimes be deceiving since what appears to be only a one or two number decrease in any channel is actually a significant improvement. Take as an example the $6m_{[c]}$ channel in the two tables above: the original cleanliness code was 15, while the same code after upgrade was a 11. This might seem like a minor improvement but a closer look at the actual data reveals the magnitude:

- The actual number of particles $6m_{[c]}$ and larger reduced by a multiple of 16 from 240 to 15 particles / ml.
- There were 93.7% 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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