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FILTRATION SOLUTIONS

DONALDSON ADVISE

Understanding Hydraulic Contamination in New Equipment

Newer hydraulic equipment and systems are designed to be more efficient, faster, and more productive than ever before. Operators may be led to believe these improvements mean hydraulic equipment can run for longer without maintenance, but with newer systems, this assumption may be costly in the long run.

The methods through which manufacturers have improved the efficiency of hydraulic systems have increased contamination sensitivity. Without proper filtration and maintenance, newer systems may experience reduced productivity for weeks or months before operators notice the decline.

By better understanding how these systems operate and why newer equipment has become more sensitive to contamination, we can see the need for filtration solutions that keep systems as efficient and as productive as their first day of operation.

Why is my newer equipment more affected by contamination?

The physics of hydraulic systems, which exploit hydraulic fluid's incompressible nature to exert force, are the cause of hydraulics' strength—and their Achilles' heel.

The high-pressure hydraulic environment forces any irregularly shaped contaminants within the system across and against internal components. This results in abrasion, scoring, and scraping of internal structures which, in turn, may produce even more contaminants within the system.

Newer machinery is designed to do more with less to increase the efficiency and speed of a system. In order to accomplish this, hydraulic system pressures are increased through tighter tolerances within the hydraulic circuit. As a result, the system is much more susceptible to complications from contaminants and the internal damage they cause.

Contaminants with a diameter of five microns or less are problematic for all hydraulic components. However, because newer machinery is more susceptible to contaminants, it is critical that hydraulic contamination control is used to keep your equipment running efficiently.

Susceptibility to contamination

Modern gerotor pumps and radial piston motors within hydraulic systems deal poorly with contamination. These motors will not cope with levels of contamination that older motors took in stride. Modern equipment is liable to suffer serious damage when working with even low levels of hydraulic contamination.

Barely detectable levels of dirt in oil will contribute to wear and tear. Leave the problem unchecked, and systems could suffer catastrophic levels of damage.

Types of hydraulic contamination

Hydraulic fluid may appear clean to the naked eye, but there is simply no way of ensuring cleanliness through a visual inspection. The human eye can typically see dirt with dimensions around the 40-micron mark, but machinery can be damaged by hydraulic contamination a fraction of that size.

So, what is hydraulic contamination? Simply put, anything that shouldn't be in oil is a contaminant. Here are some types of hydraulic contamination:

- Thread/fiber from cloth and paper used to clean components before installation
- Metal shavings/particles worn off during operation
- Fragments of seals that are beginning to break down
- Rust due to age or a damp operating atmosphere
- Ingressed dust or other dirt
- Absorbed air (which causes foaming)
- Water, from the air or entering through a leak

Filtration plays an integral part in the reduction of hydraulic contamination. Ensuring the right filter is part of the hydraulic system is a great way to add protection.

Donaldson is at the cutting edge of filtration technology, with a significant portion of yearly global revenue invested in R&D to ensure delivery of the highest quality filters with the best performance. With a variety of filtration media types, there is an option ideally suited to every possible application.

Even fresh fluid brings fresh contaminants

Many people don't realize that even if you buy new hydraulic fluid, contamination may be easily picked up or already present within the new fluid. The simple transfer of fluid from bulk tank to barrel may also pick up enough contaminants to cause an issue. Likewise, open air vents and connections to plumbing provide contaminants the space to enter.

While in storage, hydraulic fluid should be kept sealed and covered to avoid potential contamination. Check that containers are in good condition. Old or damaged metal containers are likely to rust, and fluid may absorb oxidized material.

Make sure hydraulic fluid containers are not subject to extreme temperatures either. Excess heat may degrade the oil, and fluid expansion may degrade the integrity of containers.

Embracing the new

Although newer machinery is more susceptible to hydraulic contamination, the performance improvements, in most cases more than offset hydraulic contamination cleaning costs. Operators can reduce contamination risk by selecting the best fluid for the job, then implementing rigorous hydraulic contamination control.

A small investment in better quality fluid and filtration means enjoying the benefits of modern equipment without having to worry about surprise breakdowns. If you have questions about how to incorporate effective filtration as part of your contamination control plan, please reach out to a Donaldson expert.

Sources

- https://www.tractorbynet.com/forums/owning-operating/135226-lift-capacity-vs-breakout-force.html

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