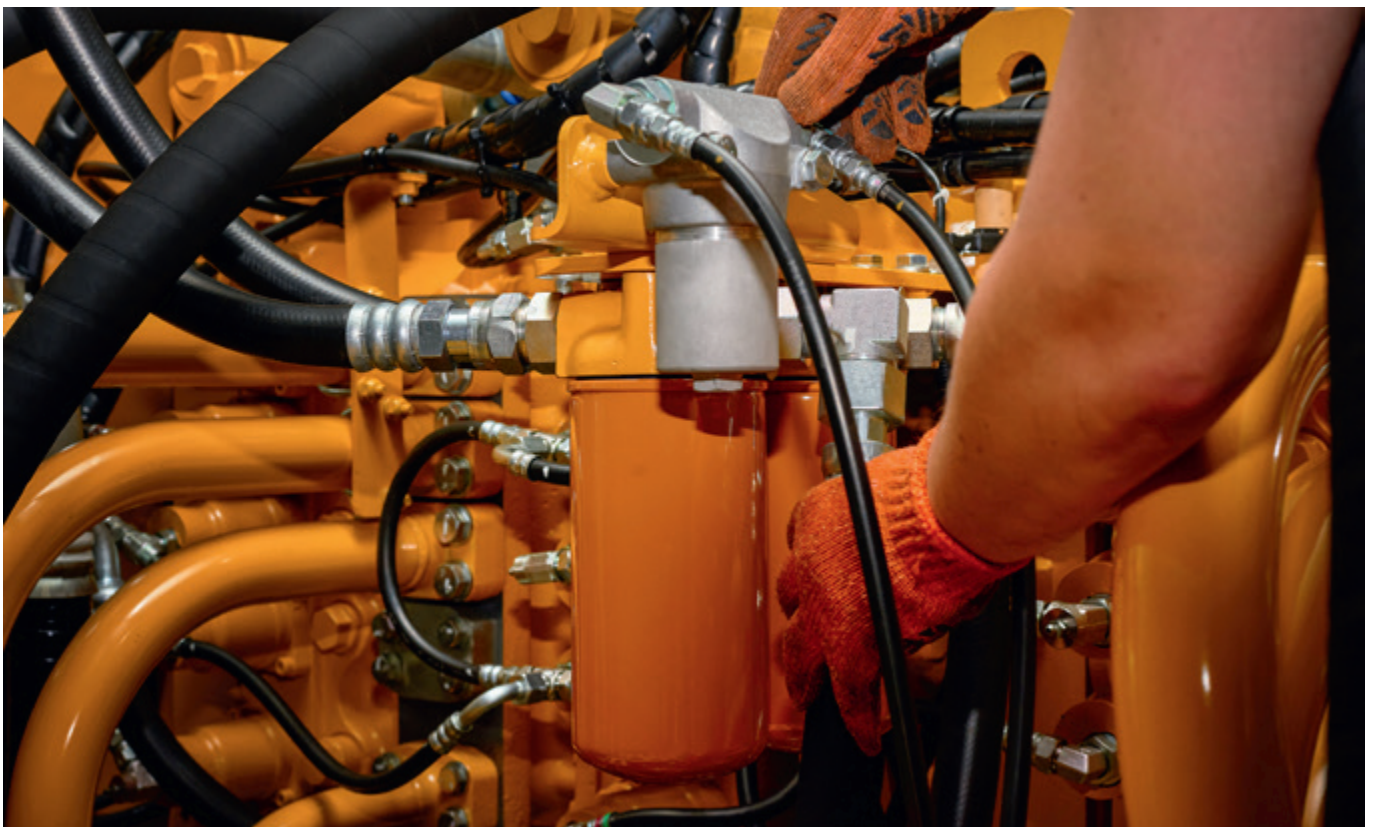


## Best practices for hydraulic oil maintenance

You've made an investment in your hydraulic system, and you want to make the most of it. Depending on how much you rely on your equipment, and its usage level, you'll want to choose the maintenance practice that best suits your needs. Always make sure you're looking after your hydraulic fluid. If you keep the fluid in good condition, you'll maximize your equipment's performance. If you don't know where to begin in planning your hydraulic oil maintenance, don't feel intimidated. Here at Donaldson, we have over 100 years of filtration expertise, and we've seen it all. We'll walk you through the principles and maintenance practices of hydraulic oil systems. By the time we're done, you'll have some informed choices to record in your hydraulic maintenance log.



### Identify your maintenance style

Some people try to avoid the hassle of maintaining and regularly changing out their hydraulic fluid, relying on their mechanic to save the day when their system grinds to a halt. However, it is more cost effective and less problematic to invest time, resources, and a little effort to prevent problems in the first place.

Different maintenance styles come with their own levels of cost and effort, and they won't all deliver the same outcomes. When implementing a hydraulic oil maintenance regime, consider which of the following four options best balance your maintenance requirements against your resources: planned, preventive, predictive, or reactive. Let's look at each in more detail.

## Planned: Keeping to a schedule

Hydraulic systems need regular check-ups. Equipment manufacturer guidelines will recommend an ideal frequency for checking and replacing specific components. These details are worth recording in your hydraulic maintenance handbook. Armed with that information, you can plan ahead and schedule regular downtime. If you carry out your hydraulic oil maintenance in-house, make sure that all required parts are available and that your mechanics have taken any required hydraulic maintenance training before they start. If you rely on external resources, book appointments in advance.

Adopt a planned hydraulic oil maintenance strategy to keep your equipment in optimal condition for as long as possible. Getting specific dates onto your calendar for switching out oil and replacing filters means that you can plan the rest of your business around scheduled outages. Avoiding surprises is good for your wallet as well as your peace of mind.

Planned hydraulic oil maintenance has the advantage of optimizing your system's performance but it can be expensive, in terms of time invested as well as cash spent. If your machinery is running at its best with minimal glitches and breakdowns, you're maximizing the operational value of that equipment. But scheduled downtime comes with a cost, and maybe you'd like to gamble on your machinery working just fine without a break. There's always a chance that planned hydraulic oil maintenance will be more expensive than dealing with problems as they arise.

If predictable production uptime is your highest priority planned maintenance is often the best choice and working around planned and scheduled maintenance is easier than surprise outages. Without planned hydraulic oil maintenance, you may risk catastrophic failure and unplanned downtime, bringing the entire operation to a halt. If you feel that planned maintenance is a cost you can't justify, consider adopting a preventative or a predictive approach.

## Preventive: Just in time

If you can't commit to a schedule of planned maintenance, one alternative to consider is preventive hydraulic oil maintenance. In this case, you keep an eye on your equipment and its performance, allow a certain amount of degradation, but intervene before any damage reaches the threshold for failure.

For example, consider this scenario: one of your employees reports a small leak coming from a stack valve on one of your machines. You consider the implications. The leak seems pretty trivial now, but if you don't deal with the problem and the seal fails, you'll lose your hydraulic fluid and the consequences could be catastrophic. Monitor it for a few days to see how quickly the situation develops. You don't need to address the issue today, but you can add replacing the valve seal to a list of jobs that need to be done, and start planning hydraulic oil maintenance for a future date based on observations over a few days of operation. Once you know there's a maintenance date coming, consider what other jobs you can add to the list between now and then with the aim of addressing them all together to avoid multiple shutdowns.

You might take the opportunity to replace any components that will be at or near the limits of their expected lifetimes since you're already making repairs. You should track this type of information in your hydraulic maintenance log. If a pump has under one thousand hours of operational life-expectancy remaining, you can expect you may need to shut your system down for a second time in a bit over a month just to replace that pump. If it's on a critical machine in your infrastructure, a second shut down could be a big deal. In this case, get it replaced while the equipment is already offline.

## Predictive: Seeing the future

What if you can't commit to either regularly or intermittently scheduled maintenance? Predictive hydraulic oil maintenance involves monitoring your equipment's performance, analyzing the evidence, and making informed judgement calls on whether a problem might be imminent. Keep notes in your hydraulic maintenance log so you are aware of any trends. By performing hydraulic oil maintenance before there's a failure, but while there is initial evidence of impending trouble, you stand to save time (both system up-time and maintenance effort) and money.

Consider the following scenario: the differential pressure port on most hydraulic filter assemblies indicates the back pressure created when fluid traverses the filter element. This pressure increases over time as contaminants carried by the hydraulic fluid build-up in the filter media, obstructing the passage of the fluid itself. When pressure in the filter exceeds the filter's bypass valve rating, the valve will open to protect the filter – the fluid can now flow freely, but it will be unfiltered.

If you monitor the back pressure, you can gauge the degree of contaminant build up in the filter media. You could do this by fitting a simple popup indicator, an analog transducer, or a pressure gauge. When the back pressure nears the filter's bypass valve rating, you know it's time to act - that filter needs replacing. Using this predictive strategy means you can avoid the effort and cost of replacing parts before it's necessary, but you may find yourself having to schedule a maintenance job in a hurry to avoid complications.

## Reactive: Too little, too late

The worst approach to hydraulic oil maintenance is the reactive one. This should not be anyone's strategy for hydraulic maintenance. At the opposite end of the spectrum from the fastidiousness of daily hydraulic maintenance, reactive hydraulic oil maintenance is employed by those who have low, or intermittent usage rates for their equipment, or who don't know when and how to perform routine hydraulic oil maintenance tasks. Waiting for a component to fail completely before addressing the problem is an expensive strategy, and one you should avoid at all costs.



It's surprising how common reactive hydraulic oil maintenance is. Of course, spare parts manufacturers and garages don't complain about customers who are happy to spend thousands on a repair instead of installing a fresh filter periodically. And oil suppliers will be delighted to provide 380 liters/200 gallons of fresh fluid every year if you don't want the trouble of spending a couple of hundred on a quality tank breather. Save yourself the hassle and cost!

## Looking to the future

The hydraulic oil maintenance landscape is evolving. These days, we're working with Industry 4.0 and the Industrial Internet of Things. Instead of planning to blindly switch out a pump after 100,000 operating hours (per manufacturer guidelines), using predictive maintenance it might be possible to do that job within a day of component failure – which could be much later!

We already have the technology to monitor a pump's temperature and the flow of its case drain line, both of which typically rise with wear. Monitor vibration at the pump's bearings too, and you'll get a decent indication of whether a blow-out might be imminent. But here we're talking about time-consuming manual monitoring, analysis, and prediction. What if you could go a step further and connect these sensors to a smart device? Now you could rely on sophisticated software, or even AI, to take over monitoring your equipment and just send you alerts when human intervention was required.

## Determine the hydraulic maintenance strategy that's right for you

As you weigh these options, and consider the usage rate of your equipment, make an informed decision on which strategy works best for your equipment and business. Are you willing to deal with problems when they happen, with contingency plans to get back on track? Or will you play it safe and start ordering spare parts and allocating time slots with your mechanics the same day you commission new equipment? What checks and recommended procedures will you put in your hydraulic maintenance log today?

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