

AN ATTRACTIVE IDEA

Magnetic filters can capture destructive particles which other filters tend to miss

By John G. Smith

Canyon Technical Services was surprised by the failing power ends on its nitrogen pumpers. Regular oil samples were supposed to spot any unusual threats before equipment problems spiralled out of control. The lab which tested the fluids even promised to generate an automatic email if any unacceptable contaminants were spotted. "Since we were not getting all the emails, we were thinking everything was fine," recalls Nitrogen Division Manager John Andrews.

Maintenance teams just had no way of knowing that the automated warnings were lost in the electronic clutter of cyberspace.

It exposed a gap in the company's Preventive Maintenance strategy – and launched the search for a filter that would do a better job at trapping any destructive particles.

The solution came in the form of magnetic scrubbers, which have since been added to all power ends in the nitrogen fleet. The latest nitrogen pumper will even have these attractive options added to hydraulic, lubrication and nitrogen systems. "We've installed it in such a way that our operators, before they fire up prior to any pumping job, they can pull the magnetic filter rod out, and take a look at it to see if there are any [unwanted] particles," Andrews adds.

It is hardly the only company to see a benefit in the enhanced filtration. Surefire Industries, for example, is now adding magnetic scrubbers to the hydraulic and lubrication systems on its oil field stimulation equipment. "It's like a



BEST COMPRESSED: One Eye Industries works with compressed rare earth magnets, which create a tight hold on small particles. (Photo: One Eye Industries)

first line of defence and providing an ability to save my pumps in case of a failure downstream," says Surefire Industries Senior Design Engineer Oleg Tsvik.

Companies from National Oilwell Varco to Serva Group, Stimline Oil Services, Suncor, BHP, Rio Tinto and Precision Drilling are employing One Eye Industries' magnetic filtration to protect their systems as well.

Many companies may not recognize the need for added filtration, admits Roger Simonson, the founder and CEO of One Eye Industries. "The majority of the filters out there are very good filters. But, the problem is, they're not designed to deal with the most damaging contaminants under 10 microns in size, such as iron and steel, because you need [fluids to]

flow. Your filters can't impede that flow. If you don't have flow, your hydraulic system's not going to run."

Buyers may even be confused about the level of protection that is offered in the first place.

Filters are typically described with "nominal" ratings. But these ratings refer to the smallest particles that may be captured by saturated media, which can only handle limited flows before heading into a bypass situation. In contrast, an "absolute" rating identifies the largest opening in the brand new filter media.

To compound matters, the most destructive particles tend to be less than a micron wide, which means they can easily pass through a traditional filter, slip behind rolling elements, and focus unwanted



stresses in one location, causing the spalling that will shorten bearing life.

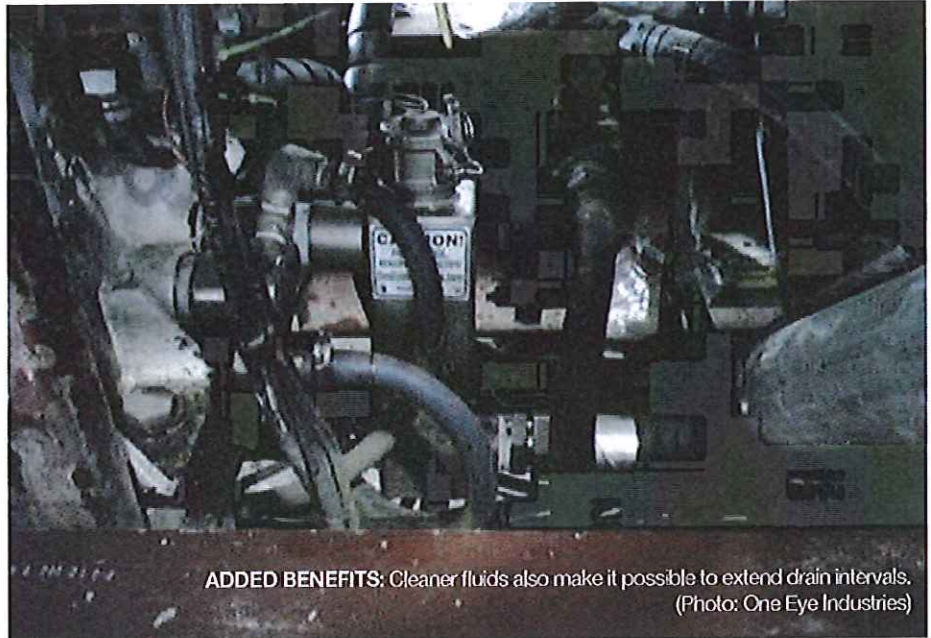
The contaminants themselves are not limited to failing equipment. A fresh supply of lubricant, coolant or fuel can still contain the fine ferrous metals that originate from erosion and corrosion in pipelines and storage reservoirs, Simonson says. Particles from degrading fibreglass filter media can also be transformed into a hard wear contaminant and will stick in a hydraulic system's valves.

An added level of protection is obviously going to be vital in a mine or drilling operation, particularly in an era of high commodity prices, he says. "The cleaner you keep a hydraulic system, the less downtime you will have. You're not going to have your valves stuck with very fine contamination. You're going to have a better-running system. The cleaner the oil is, the better it's going to run."

Cleaner fluids also make it possible to extend drain intervals, which can be a valuable benefit in isolated regions where supplies like oil and filters arrive on costly flights.

Still, there is a difference between one magnetic technology and the next. Traditional technology, used by many Original Equipment Manufacturers, employs ceramic magnetic filter rods and plugs that actually sit in the midst of the fluids they are designed to protect. But the rods and plugs can crack in the face of shifting temperatures and vibrations, sending tiny pieces of the filter through the lubricant. "It is an extremely hard wear media," Simonson adds, referring to the magnetized wear contaminants that will stick in valves, shafts and bearings.

One Eye Industries has instead chosen to work with rare earth magnets that are compressed to



ADDED BENEFITS: Cleaner fluids also make it possible to extend drain intervals. (Photo: One Eye Industries)

alter magnetic fields, increasing pulling power and creating a tight hold on small particles – even in the face of high flows or thick fluids. The process creates a scrubber with 10 times more pulling power than a traditional magnet. Put another way, a 12-inch filter rod with a diameter of one inch could be used to lift 240 pounds, compared to the 40-pound limit of a traditional magnet.

"We filter all kinds of weird and wonderful stuff," Simonson says, noting how the technology has been used to filter everything from oils and grease to chocolate and toothpaste. The protective power can also be added to a natural gas pipeline without restricting its flow.

It can even remove non-ferrous particles like silica dust, aluminum and brass, he insists. This is possible when contaminants combine with other ferrous material, or when particles of every sort develop a static charge as they flow through a moving fluid.

The filters can take on different forms, depending on the applications. Magnetic rods and scrubber filters, for example, can be

installed in a tank or line.

One Eye Industries' most popular option in applications like hydraulic systems comes in the form of a reusable spin-on canister known as the ADD-Vantage 9000, which includes a 2-stage stainless steel element. Even when the bypass is activated, the magnetic filter continues to pull contaminants out of the fluid.

Once these filters are cleaned, any removed contaminants can be analyzed in a lab, helping to identify the original source of any wear metals and spot underlying mechanical issues.

Of course, they need to be cleaned with more than a typical parts washer. "For engines and hydraulics, where you have the opportunity of varnish, you want to clean them ultrasonically," Simonson says. It's why One Eye Industries had developed a biodegradable cleaning solution, and offer cleaning systems for customers with 4 or 5 elements. Larger users can even use a system that cleans up to 6 of the filters at a time.

It all adds up to an attractive idea. 

