

Pointers

- You are at risk when contamination exceeds the tolerance of the most sensitive components
- Fully managed filtration services can save money
- On hydraulics, if there is a need for filtration, you are likely also to require contamination control
- Pneumatic systems may require pre-filters, dryers, micro-filters, carbon filters, sterile filters and condensate management
- Filter size rating, max air volume, max inlet pressure and operating temperature are all key selection criteria

The filter

Although filters and separators are often labelled as commodity accessories, the technologies and products are evolving with great effect, as Steed Webzell discovers

The benefits of keeping hydraulic fluid and compressed air clean are well known to time-served plant engineers. They include higher system reliability, longer component life and improved efficiency, as well as more responsive plant operation. In a nutshell, it's generally accepted that the money invested in keeping a system clean pays for itself many times over.

How much you spend, though, depends on the nature of your plant. All hydraulic and pneumatic systems have a critical contamination tolerance level, usually defined by the most sensitive system components – for example, servo-valves and piston pumps. Systems are at risk when contamination exceeds this level, because it impacts on wear rates and the plant's ability to perform as intended.

That said, this is not rocket science: to keep hydraulic fluid and compressed air clean, plant engineers have always relied on filters and separators, along with good system design and established maintenance procedures. But there are relatively new developments, both in terms of engineering services and product designs, that might save a lot of time, effort and money.

Beginning with hydraulics, many plants are now opting for fully managed filtration services, such as those offered by Filtertechnik. This is because the costs of such a service (typically fixed price) are often favourable, in comparison with breakdown costs, and certainly when loss of production is taken into account. But they can also be fairly

convincing, even when compared to the cost of purchasing replacement parts, fitting, diverting plant engineers and, of course, administration costs.

Managed filtration services don't only cover product supply; they should also include taking care of your plant's entire filtration requirements – everything from filter changes to oil analysis and contamination control, ensuring best practice, and that target ISO codes are implemented and adhered to for each plant area. They might also extend to filter stock management, site audits, staff training, and filter and element disposal, in accordance with the Hazardous Waste Regulations 2005.

Fluid service

If you are interested in a managed filtration service, you might want to check that the provider is also able to monitor the cleanliness of your fluids, using a variety of means – for example, on-line particle counting, patch testing and laboratory oil analysis. Common hydraulic oil contaminants, such as water, can be removed through offline filtration processes or vacuum dehydration – so satisfy yourself that your supplier can offer these.

Filtertechnik, for example, makes the point that where there is a requirement for filtration on a hydraulic system, there is generally also a need for contamination control, since 80% of all hydraulic breakdowns are the result of contaminated oil. Although filtration will ease the symptoms, it won't cure the problem, so breakdowns will keep recurring, unless you go the extra mile.

As for innovation with hydraulic filters, we are seeing the kind of progress that should help plant engineers sleep easier at night. For instance, the Filtration Division of Parker Hannifin has introduced its Parfit range of hydraulic filter elements, designed to be interchangeable with products from virtually all other suppliers. The company says they are suitable for use in applications ranging from industrial to mobile plant, as well as test rigs, aircraft ground support equipment and steel and paper mills.

Of particular note, the Parfit filter system uses a standard metal housing and replaceable element that can be changed during routine maintenance leaving the housing in place, thus reducing both waste disposal and element replacement costs.

Unfortunately, compressed air discharged from



Desiccant air dryers: now part of the ECA scheme

Parker Domnick Hunter's energy-saving compressed air drying products (pictured above) have been added to the Energy Technology List (ETL), part of the government's Enhanced Capital Allowance (ECA) scheme that allows companies to claim 100% first-year capital allowances on qualifying plant and machinery.

This desiccant dryer is fitted with 'dewpoint dependent switching' energy-saving controls, which, unlike many similar units, prevent unnecessary desiccant regeneration cycles, thus cutting energy costs and also reducing emissions.

Desiccant air dryers are used on approximately 15% of industrial sites to remove moisture in compressed air before use. Normally, this type of air dryer is energy intensive, but it also eliminates more moisture than refrigerant air dryer alternatives and is usually specified for exposed installations or special applications, including where there is a risk of bacterial growth in pipelines.

factor

compressors is usually full of impurities and contaminants, so of little use to modern industry. Attempts to solve that problem have involved millions of pounds ploughed into research on filtration media and as much again on the investigation of particle dynamics.

Fundamental to getting to grips with the problem is understanding particle size and what matters. According to BS3405, 'grit' is defined as 'particles of solid matter that are retained in a sieve of 75 micron nominal aperture in conformity with BS410 (updated 1986)'. Anything smaller (ie, that will pass through a 75 micron sieve) is defined as 'dust'. But those are not the only problems. In worse-case scenarios, dirty, wet compressed air may contain around 110,000 particles per cubic metre and 0–100ppm of oil. It may also hold rust, viruses and odours, and may be 100% saturated with water. So, depending on the level of cleanliness required, pneumatic systems may require pre-filters, dryers, micro-filters, carbon filters, sterile filters and condensate management (demister) components.

Clearing the air

How do you choose? Filter size rating, maximum air volume, maximum inlet pressure and operating temperature are the most important performance specifications to consider when selecting compressed air filters – and your type preference. All types are designed to remove contaminants, but some have specific features that make them better suited to particular applications. For example, general-purpose compressed air filters can remove liquid and solid contaminants of various sizes, but coalescing oil removal filters are also designed to remove oil and other contaminants at sub-micron level. Then again, adsorbent oil vapour removal filters are there for applications that depend on maintaining a very pure airflow. They use adsorbent materials, such as charcoal, as filter media to reduce vapour to less than 1 ppm. Multi-stage compressed air filters are also available.

Pneumatic system filtration equipment is still the subject of intense R&D, with Parker Hannifin's Moduflex Dry Air system providing an excellent example of what's being achieved – an air preparation system that combines air filtration and drying to cut the cost of dry air. What's valuable here is the system's claimed ability to increase the efficiency and reliability of compressed air systems

through its integral pre-filtration to 0.1 micron and further filtration after air drying, effectively preventing degraded desiccant from passing downstream.

Parker Hannifin says that Moduflex units can also be serviced in situ in less than 15 minutes, due to multiple in-line inlet and outlet connection ports, so maintenance costs should be low. What's more, the system offers service intervals up to 12,000 hours, while a built-in electronic service indicator notifies plant maintenance when attention is needed.

Other compressed air filtration innovations worthy of mention include: a range of contaminant systems and HEPA (high efficiency particulate air) filters from Emcel, designed for the nuclear industry; and new units from Hi-line Industries that feature filtration elements, based on patented pleated filter media that combine efficiency with long service life and low differential pressure drop.

There are also: a new generation of heatless desiccant compressed air dryers from Walker Filtration, with modular extruded aluminium towers and improved desiccant cartridge design, offering claimed rapid re-pressurisation; the F901 series of Delta water separators and filters from Asco Numatics; and, on a more basic, but equally important level, a new range of miniature orifice restrictors from the West Group, incorporating a protective stainless steel filter, with a choice of five, 25, 43 or 73 micron filtration. **FE**

Filters and separators: commodities to some, engineered solutions to those in the know

