As hydraulic and pneumatic systems continue to evolve, Steed Webzell weighs up the latest innovations benefiting static and mobile plant operations

Full flow fluid

There's hardly a UK plant anywhere that doesn't rely on pneumatics or hydraulics. Although mature technology, the relentless rate of product development dispels any notion that plant engineers might have about a stagnant innovation pool. Compressors, cylinders, valves, seals – you name it, there's always a new or upgraded version. Sorting the 'breakthroughs' from the 'see-throughs' can be challenging, however.

Starting with compressors, key developments relate typically to improved performance and/or reduced energy consumption – for example, using better compressor controls. Hydrovane is among those compressor manufacturers with new sequencers: in its case, the Pro Master 4, which intelligently sequences up to four compressors, fixed or regulated speed. According to the company, it reduces energy consumption by up to 30% by operating all compressors in a network to the narrowest pressure band.

This makes a lot of sense for manufacturers besieged with soaring energy costs and escalating environmental pressures. And there are other benefits. For instance, Pro Master 4 provides on-screen performance data and that also includes downstream equipment. Plant engineers can see information, such as the status of each compressor, as well as network pressure, air consumption and pressure range. The controller also enables compressor inputs and outputs to be tested, and identifies faults, so helping to minimise downtime.

Talking of faults in pressurised systems, aside from the obvious threat to safety, there are also financial reasons for not turning a blind eye. Rotary vane compressor manufacturer Mattei is reminding compressed air users of the legal requirement for a written 'scheme of examination' to be in place. Worryingly, anecdotal evidence suggests that many organisations are not aware of this, even though non-compliance can result in a fine up to £20,000.

The Pressure Systems Safety Regulations 2000 state that users of installed pressure systems must have a written scheme of examination. This document should contain information about items of plant and equipment that form the pressure system, operate under pressure and contain a relevant fluid. It should also offer information including system parts that need to be examined, the nature of the examinations, preparatory work required and the maximum length of time allowed between inspections. The document also has to identify the relevant competent person.

Above and top right: Rohde & Schwarz's switch to a DH oil-free compressor quickly paid for itself

In fact, regulations and standards are aplenty when it comes to fluid power. Most recently, there's a standard covering oil-free compressors, arguably the biggest growth area in compressor technology over the past decade. Atlas Copco says it's the first to announce that all of its oil-free compressors are now certified to Class 0, with regard to oil content, in accordance with the latest edition (2010) of ISO 8573-1. Certificates covering oil content of existing Atlas Copco compressor ranges have been issued by TUV (Technische Überwachungs-Verein), which confirm that no traces of oil could be detected.

Massive savings

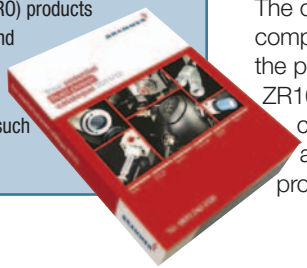
Among plants to benefit is the L'Oreal factory in Suzhou, China, where compressed air quality is paramount in the manufacture of cosmetic products. L'Oreal says it chose Atlas Copco, because its Class 0 Z oil-free range contributed to the plant's ISO14001 and OHSAS18000 certifications. The equipment also reduced its compressor room's energy consumption by 20%.

Closer to home, the West Sussex plant of optical storage media manufacturer Sony DADC is claiming savings of 700,000kWh per year from its oil-free compressor energy recovery systems, which are also providing for a secondary, back-up heating source. The company's Southwater plant operates two compressed air networks, at 7 bar and 8.4 bar, with the principal input coming from an Atlas Copco ZR160VSDFF water-cooled rotary screw compressor. Energy recovery is used for applications on site, such as office heating, providing heat for the packing area and

Fluid power know-how

Brammer, a distributor of industrial maintenance, repair and overhaul (MRO) products and services, has launched a specialist guide to the products, services and support it offers for pneumatic, hydraulic and process systems.

The 'Essential Fluid Power Catalogue' has 1,200 pages and showcases more than 33,700 fluid power products from manufacturers such as Festo, Norgren, SMC and Parker.



condensation protection inside the warehouse.

The compressor has an integral energy recovery capability that enables hot water to be taken from its outlet at temperatures of up to 85°C before it returns at 35°C in a closed loop. This usable heat is transferred to other site operations by means of plate heat exchangers. Energy recovery has cut the demand on its gas-fired heating boiler, resulting in further energy and cost savings.

But 'oil-free compressor' is an umbrella term that embraces various designs. CompAir's DH oil-free compressors, for example, have a different operating principle to conventional oil-free screw and piston compressors – operating without any oil lubrication at all. Here, the compressor block is lubricated, sealed and cooled by water, which is sprayed into the compression element. Water's excellent cooling properties allow the compressor to be operated at low compression temperatures not exceeding 60°C. As a result, the compressor is not only efficient, but power consumption is correspondingly low.

One recent beneficiary is Rohde & Schwarz, a German manufacturer of measurement systems for wireless devices, such as mobile phones. Its electronics plant uses pick and place machines, and conveys components pneumatically. Compressed air must be oil-free air to avoid damage to sensitive valves on the conveyor system. Oil-free compressed air is also used to blow the PCB boards clean.

Water power

Previously, the company used an oil-lubricated compressor, equipped with an adsorption dryer, activated carbon adsorber and filter combination. However, this was costly, as around 20% of the air produced was required for regenerating the adsorption dryer. Its switch to a DH oil-free compressor, with a new energy-saving adsorption dryer, heat recovery system and an activated carbon adsorber, today allows the company to use its existing refrigerant dryer to pre-dry the air.

This, in turn, means that Rohde & Schwarz can reduce the load on its adsorption dryer and extend the service life of the adsorption agent. The company says the extra investment quickly paid for itself through lower energy consumption and also reduced maintenance costs.

But what are the issues surrounding hydraulics? Well, seals are always high on any plant engineer's list of gripes. PTFE has long been thought to harbour a solution. After all, it exhibits very low friction against most materials, is unaffected by most chemical solutions and tolerates a wide range of temperatures. However, its softness makes it susceptible to wear and deformation, and it has low extrusion resistance.

The good news is that Trelleborg Sealing Solutions has now developed a PTFE-based sealing compound that stands up to the demands of hydraulic sealing, centring on friction, wear and high pressure. Trelleborg's Turcon M12 is medium-filled with a mix of non-abrasive mineral fibres, combined with additives, and is said to be compatible with virtually all hydraulic applications.

Another big issue in hydraulics is mobile applications, particularly the challenge of connecting multiple hydraulic lines in a single operation. But this is now made possible by CEJN's new Multi-X quick-connect multi-plates. Working pressures are high, at up to 35 MPa, while connection and disconnection is possible with residual pressure – another feature that helps improve performance and minimise downtime. There is also a lever perpendicular to the hydraulic lines that facilitates one-hand operation.

If ever a technology offered the promise of improved performance, reduced carbon and smarter working, fluid power is it. Francis Bacon's famous aphorism states that 'knowledge is power'. It's time to revisit hydraulics and pneumatics. PE

Below: Atlas Copco was first to announce that all of its oil-free compressors are now certified to Class 0