Keep things **fluid**

Innovation is continuing apace in the worlds of pneumatic and hydraulics. Steed Webzell examines some of the developments most likely to be in demand

Survey data from the British Fluid Power Association (BFPA) suggests that last year was a very good year for both hydraulics and pneumatics in the UK. Demand for pneumatics in 2011 climbed significantly for the second successive year, while industrial uses of hydraulic technology also increased, with offshore, renewables and civil engineering projects linked to the London Olympics all boosting growth.

Kicking off with pneumatics, Ian Morris, director of the BFPA, says there is a wealth of advantages for manufacturing plants choosing pneumatics as their preferred mode of power transfer.

"Take maintenance, for example," he suggests. "If we compare a linear drive unit, based on a pneumatic cylinder, with an electric rack and pinion drive, we can see that on the latter there are many wear parts, such as bearings and gears. However, a pneumatic cylinder just moves backwards and forwards, day-in day-out, with only minimal friction. Additionally, the lack of complexity regarding most pneumatic parts means maintenance is usually a simple process."

Pneumatic simplicity?

Among other factors to consider here is ease of installation. These days, the use of reliable and flexible nylon tube makes routing much less of a problem, while fast-fit connectors, as their name suggests, make assembly very quick.

"Recent technical innovations have made pneumatic equipment even more attractive for a whole host of applications," states Morris. "Chief among these has been the increased use of electronics with pneumatic equipment to help achieve greater accuracy, and to improve control and monitoring."

Commonly referred to as electro-pneumatics, such equipment functions by plugging into control networks at the plant level – such as CANbus. Given the increasing popularity of this approach, more pneumatic equipment providers are now producing CANbus (and other) connectors on their valves, so that they can 'plug and play' directly into the control system.

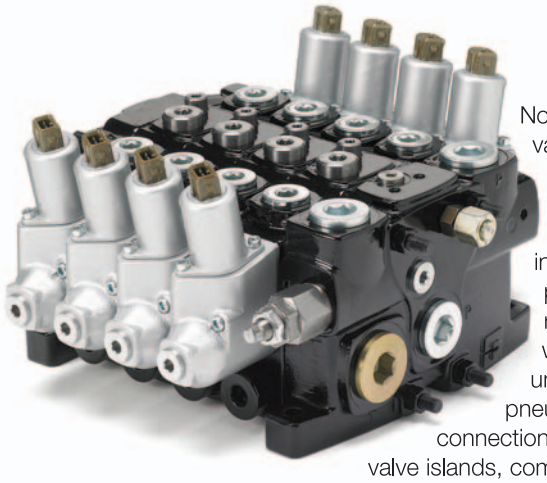
That said, it's not all going pneumatics' way. "It is true to say that, within some environments, electrical alternatives may be more suitable," agrees Morris. "In food plants, for example, electrical actuators are arguably fitter for tasks such as automation, since they don't produce exhaust air. However, in industrial environments, pneumatic equipment is more suitable, because it is robust, simple to operate, and easy and cost effective to maintain."

But what about overall operating and energy costs of pneumatic controls? It's fair to note that conventional equipment generally involves an arrangement of valves or valve islands, actuators, flow controls and sensors, along with connectors and accessories. That, in turn, means several components for each actuator function – and hence the disadvantage of complexity.

However, among latest solutions here is

Ian Morris, director of the British Fluid Power Association

Bosch Rexroth valve stands at Eastman Chemical's recently commissioned Workington plant



Norgren's IVAC (integrated valve and actuator control), which combines the valve, flow controls, cushioning and sensors in a single actuator package. Designed for retrofitting or integrating within new systems, each unit requires only one pneumatic and one electrical connection – so eliminating multiple valve islands, components, tubing and accessories.

Integrated platforms, such as these, cut costs in several ways. On the one hand, it is easier to install, commission, maintain and replace a single unit. On the other, obviating air piping between valves and actuators minimises dead volume, so reducing air consumption by up to 50% and cutting the cost per mm of stroke, compared with conventional pneumatic systems.

Safety-related

The other important aspect, though, is safety and there are also now increasing numbers of safety-based pneumatic devices. Tom Parker, for instance, has introduced the Protect-Air range of pneumatic safety units to its catalogue. This incorporates products such as the HoseGuard air fuse, a protection device for compressed air that automatically cuts the supply when the flow exceeds a pre-set rate – due, for example to a rupture in a system, pipe or hose. It also includes SaveAir, an in-line, energy-saving membrane regulator capable of supplying a constant, precise outlet pressure (factory-set and tamper-proof), regardless of input pressure.

Above: Parker manifold
Right: Norgren's new IVAC cylinder offers dramatic reductions in energy and operating costs

Moving on, however, hydraulic systems are a different kettle of fish. Heavy engineered cylinders and systems up to 50 years' old can still run adequately, but, while this is testament to their durability, technology has improved immeasurably.

Hydraulic controls traditionally consisted of simple solenoid valves to control large flows producing high shocks in the system. But over time these caused fatigue damage to components and piping, resulting in an hydraulic system that could fail and leak. This meant cost for replacing the oil and cleaning up the mess, but also production loss, if the leakage was severe and/or product was contaminated. Water ingress could also result from poorly maintained systems, causing premature failure of rotating equipment, such as pumps and motors.

"Hydraulic valves today offer proportional control to provide smooth control of cylinder functions, thus eliminating shocks," states Matthew Livesey, Bosch Rexroth area manager for the north west. "Plants can now have a hydraulic solution that takes care of pressure control, flow control and decompression of large volumes of fluid under pressure. Pumps can also be applied to regulate flow and pressure with power and load control. This not only improves efficiency, but also the functionality of the system to match process requirements."

Bosch Rexroth has recently started working with Eastman Chemical at its UK plant in Workington. Here, a filter material used in the cigarette industry is manufactured before being compressed by baling presses to reduce product volume, ready for packaging and transport. Some of the presses are now served by a new ring main hydraulic system, with one power unit supplying many presses, each with individual control provided by close proximity valve stations.

The power unit comprises a large cylindrical reservoir and bank of 10 motor pump sets, which together offer low pressure, high pressure and recirculation. Each press has been provided with a dedicated valve control module positioned at the press – so reducing the distance between the valves and press cylinder. This reduces flow paths and piping, and improves performance.

According to Bosch Rexroth, it is very likely that there are many other UK plants still using hydraulic systems installed years ago – meaning inferior performance and progressively higher maintenance, safety and environmental issues. PE

On the move

Parker Hannifin has introduced a new hydraulic directional control valve, targeted at mobile applications moving to a more advanced and energy-efficient load sensing system from a conventional open centre arrangement.

The VP120 uses contemporary flow-sharing technology to address commonly encountered productivity problems associated with pump over-demand.

The valve, which can be operated manually, hydraulic-remotely or with solenoids, is targeted at applications on machines such as compact wheel loaders and mini excavators, cranes, material handling equipment and aerial work platforms.

With fuel savings claimed at up to 30%, versus open centre systems, VP120 is rated for a maximum pump input of 160 l/min and a work section output range of 15 to 120 l/min.

The valve's pressure-compensated, load-sensing work section has its own compensator, so that speed control of multiple functions can be achieved, regardless of changes in pressure or operational rate.