Industrial automation, air handling and energy efficiency

As part of its global sustainability, condition-based maintenance and digitalisation offering, SMC has released a new Air Management System (AMS) Series into South Africa. *MechChem Africa* talks to product manager, Brian Abbott, about local manufacturing and engineering expertise; air and energy optimisation solutions; and the company's service support offering for industrial automation.

SMC's air saving speed controller fitting will automatically reduce the non-working stroke pressure of a cylinder, typically saving up to 25% of the energy consumed by that cylinder.

"Industrial automation is certainly not new, but from SMC's point of view, since establishing a local distribution, manufacturing and training presence back in 2016, we have established a comprehensive product and service offering that is tailored to the many automation requirements for South African manufacturers and the environmental conditions they need to accommodate," begins SMC ZA product manager, Brian Abbott.

"We are now experiencing fantastic success, largely due to our local manufacturing capability. The global supply chain crisis is having a huge impact on those having to import automation components, but we can help our customers far more quickly because of our local manufacturing and system assembly capabilities," he explains.

SMC ZA's factory in Midrand, near Johannesburg, assembles air service units and a significant percentage of its crimped-end and tie-rod cylinder range. "We also assemble customised valve terminals for our clients' requirements, which is all putting delivery timescales in our hands, helping us to increase our market share," Abbott tells *MechChem Africa*.

"Most importantly, though, our offering is not only about product, I think we understand the needs of local customers and we strive to offer the best support possible, from the inception and design of an industrial automation system, all the way through engineering and on to commissioning. I think this is where we are starting to set ourselves apart from our competitors," he says.

"Anyone can distribute components, but at SMC we walk down the road with our customers, supporting the systems that make their machines work and all of the interacting components that such systems comprise," Brian Abbott explains, adding that SMC can now offer more engineering, more services, and more systems support. "We are particularly proud of our technical support offering, which I believe is on a different level from anybody else's in South Africa." While largely focused on pneumatic automation, he says that electrical actuators are becoming more popular, mostly because they are more versatile. "They definitely have their place in advanced precision control. But because pneumatic actuators are so easy to work with, they are still ideal for opening/closing, clamping/unclamping and push-pull applications: for point-to-point applications where positional control is less important. But there will always be a place for both electrical and pneumatic solutions," he continues.

From a control perspective for pneumatics, however, valve terminals now play a vital role. "Valve terminals in an industrial machine add sensors and communication protocols to a pneumatic system, forming an interface between the PLC, the pneumatic actuators and the field instruments themselves. They bring control and feedback into play, as well as data collection for analysis. Valve terminals enable relatively simple cylinders to be managed and automated. For automation, information is key, so being able to link peripheral sensors and control equipment to a system through a valve terminal brings many more benefits to customers' manufacturing and processing plants," explains Abbott.

The ultimate key to success, however, is understanding the application: exactly what equipment needs to do and the specific operating environment. "Only once the application requirements are fully understood can an informed judgement be made about an actuator. For automatically opening and closing a door, for example, an electric actuator might be overkill, but where precision is needed, an electrical actuator may be the simplest and most appropriate solution," he argues.

Air management and energy optimisation

"As a company, SMC is geared towards sustainability and the greener economy. We therefore do whatever we can to optimise the operational and energy performance of our solutions," Abbott continues, adding that the new SMC range of Air Management Systems (AMS) has been developed to further advance this journey for pneumatically driven machines.

The obvious starting point for optimisation of a specific application is to properly specify the system requirements in terms of pressures and flow rates required and then to select the component set that most accurately delivers what is needed, when it is needed. "Is a pressure of 6.0 bar necessary? Or can we deliver what is needed using 2.0 bar? Higher system pressure uses more energy and costs more to run.

"Our air saving speed controller fitting, for example, will automatically reduce the non-working stroke pressure of a cylinder. If the working stroke must be 6.0 bar, the return stroke can often be much lower, at say 2.0 bar. This simple adjustment can typically save up to 25% of the energy consumed by that cylinder. And if a whole system's consumption can be reduced by half that much, then a very rapid return on investment can be realised. It is not always possible to use these measures across the board, though, but substantial savings become possible," he points out.

Using SMC's new Air Management System (AMS20/30/40/60 Series), energy savings of up to 62% can be realised. This AMS system monitors and manages the pressure, air flow and temperature of the supply air into individual machines. "The unit sits on the air inlet side of a pneumatically driven machine and can be retrofitted onto any existing system.

"When a pneumatic machine is not producing, this AMS unit will put the machine into idle or standby mode. At these times, there will always be some air leakage, which is often inherent in the system, through blowoff nozzles or purging needs, for example. This all contributes to wasting energy.

"Through continuous monitoring of the machine's air flow rate, the AMS minimises unnecessary consumption. When the detected air flow on the machine drops below the 'working' threshold – and after a pre-set time –the AMS' regulator automatically reduces the pressure and, in the process, allows the system's pressure to naturally drop to a pre-set minimum.

"Unnecessary air use or leakages at 7.0 bar generate significant losses and using an AMS can significantly reduce these," he points out, adding that lower standby pressure is still needed to maintain the integrity of the system. "If a component is clamped into a machine, for example, dropping the pressure to zero will remove the clamping force, so the flow and pressure can only be shut off completely when the whole machine has to be completely shut-down," he explains.

SMC's AMS consists of three main elements: a regulator, which is either electro-pneumatic or mechanical; an isolation valve; and a management hub. The regulator and the shutoff valve are both controlled from the hub, which has flow, pressure and temperature sensors integrated into it.

And while no information is stored on the device, the unit has built-in OPC UA data communication capabilities, which is the recommended communication protocol for Industry 4.0, along with options for either Profinet and Ethernet I/P communication protocols. So SMC's new AMS can be used to upload data to the Industrial Internet of Things (IIoT) for analysis and trending purposes.

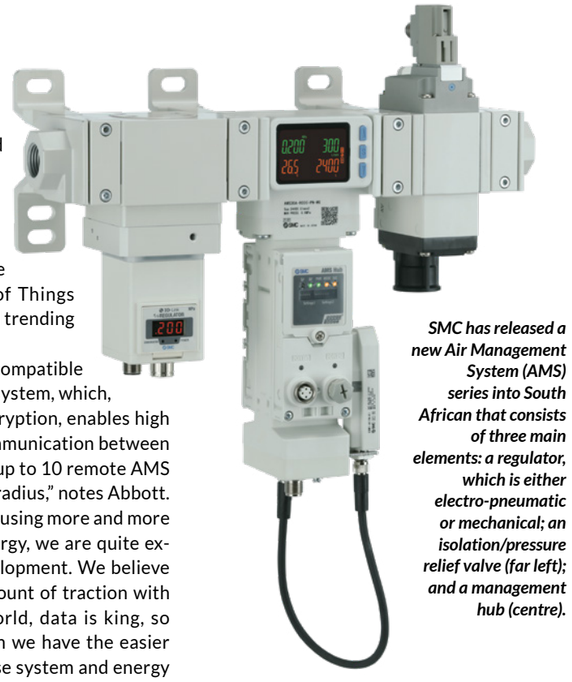
"The AMS is also compatible with SMC's wireless system, which, thanks to unique encryption, enables high security wireless communication between a base AMS hub and up to 10 remote AMS units within a 100 m radius," notes Abbott.

"With industry focusing more and more on trying to save energy, we are quite excited about this development. We believe we will see a fair amount of traction with it. In the modern world, data is king, so the more information we have the easier it becomes to optimise system and energy performance.

"Monitoring the pressure, flow and consumption of a machine also makes it much easier to benchmark the costs of the equipment and, if the trend is in the wrong direction, operators can quickly be alerted to tackle leaks or other maintenance issues before they cause machine or plant downtime," he says.

"It is also easy to install and use the new Air Management System, be it in a new installation or as a retrofit. Along with valve terminals, our advanced SMC AMS units can transform traditional pneumatic automation systems into efficient, optimisable, Industry 4.0-ready manufacturing facilities, which is fast becoming a necessity for those wishing to remain globally competitive," Brian Abbott concludes.

www.smcza.co.za



SMC has released a new Air Management System (AMS) series into South African that consists of three main elements: a regulator, which is either electro-pneumatic or mechanical; an isolation/pressure relief valve (far left); and a management hub (centre).

Position sensor for 2.5 m hydraulic cylinders

SIKO's SGH25 wire-actuated encoder, available in South Africa from INSTROTEC, is characterised by a measurement range of up to 2.5 m and an extremely long service life. With this performance profile, the wire-based position sensor is suitable for applications in mobile machines such as dumper trucks, excavators and agricultural machinery, where it measures the position of hydraulic and telescopic cylinders and communicates it to the machine control system via integrated communication protocols.

In comparison to the SGH10 basic model with a measurement range of up to 1.0 m, the SGH25 has an extended measurement range of up to 2.5 m, while its big brother, the SGH50, covers large measurement ranges of up to 5.0 m. The SGH series can be integrated directly into hydraulic cylinders. A newly developed plastic provides a strong design and extends the fluid temperature range from 85 °C previously to 105 °C now. As far as shock and vibration resistance is concerned, SGH sensors set the standards. The SGH25 has been tested to vibration standards otherwise used for helicopter drives, and it easily withstands individual shocks of up to 100 times the force of gravity. The sensor's flexible cable cushions the hardest impacts, while the hydraulic medium also helps with damping.

With the integrated teach-in function, the measurement lengths of the sensor can be set individually. The SGH25 can cover a multitude of measurement lengths (0-2.5 m). Both the number of variants and the stock requirements for any spare parts therefore fall. Another feature is the KV1H modular plug connection, with a protection rating of IP69K.

The SGH25 was developed especially for extreme conditions in mobile hydraulics in agricultural machinery or construction machines. The sensor resilience has been designed and tested both electronically and mechanically for the service life of a typical cylinder.

It is available with analogue interfaces and with CANopen or SAE J1939 protocols for transmitting data between the SGH sensor and the machine control system. Redundant versions with CAT3, performance level D-PLd, meet the highest requirements for safety-critical applications in accordance with EN13849. There is a choice with safety variants between a redundant or analogue interface, redundant CANopen, redundant SAE J1939 or CANopen-safety.

For cylinder manufacturers, the use of SGH position sensors offers a large potential for savings, as the cable-based design concept makes hollow boring of the piston superfluous.

The SGH wire-actuated encoder can also be installed in telescopic cylinders, which provides a significant competitive advantage compared to traditional measurement systems.

www.instrotech.co.za

Scan the QR code here for more information about the SGH25]