

On the way to the intelligent factory

Digitalisation is seizing hold of companies and is revolutionising them. But this is just the beginning – its full potential will unfold in the Industry 4.0, the next and fourth industrial revolution. As a consequence, valves are increasingly fitted with digital actuators, providing users with increases in sales, higher efficiencies and savings. The pressure on valve, actuator and automation manufacturers to become part of the vision of an intelligent factory is growing.

Mechanics and electrics alone won't be enough for companies to stay competitive in the long run. Intensive collection and analysis of data using data-centric services, IT solutions and software alone make further optimization of productivity possible. Who is able to offer the industry components with added digital value can be more competitive.

Improving efficiency, saving costs

Digitalisation offers a great outlook: according to a study by "PricewaterCoopers" and "Strategy&", German companies see an average annual growth of 2.5 percent thanks to digitalisation and networking of their product and service portfolios. Furthermore, the 235 companies asked in the study see their efficiency improved by an average of 3.3 percent per year, and cost savings of 2.6 percent. By 2020, the study claims that over 80 percent of the value chain will show a high degree of digitalisation.

Siemens also sees digitalisation as a decisive lever for growth in the industry. It promises, states the technology corporation, higher levels of productivity, efficiency and flexibility. A company's entire value chain needs to be mapped digitally. Siemens has therefore made digitalisation one of its key issues for the future. Valve, drive and automation manufacturers are also prioritising data collection and analysis for their products. Digitalisation here means remote control, automated processes and diagnostics.

Intelligent and digital actuators

The intelligent and digital actuator on the mechanical valve creates the digital know-how. "Here, electronic controls as well as integrated sensors



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play the main role”, explains Marcus Geigle, Senior Executive Strategic Business Unit Compression Technology at Hoerbiger Ventilwerke. During operation, position and torque of the drive are measured, as well as temperature, humidity and barometric pressure. “So-called value landscapes can be created hereby. Based on values, individual valves or a group of valves can be controlled, serviced or corrected – on site or through remote access”.

As Hoerbiger continues data is processed either in the service control centre or the operations centre inside or outside of the plant. One example of direct data handling at a valve is the security-related function of the smart partial stroke test, which the company has implemented in its “Trivax” product. “Next to the mechanical movability, the torque can for example also be measured, allowing to check movability of the valve. A classic application for an automated and digitalised valve drive,” states Geigle.

Exchanging information

The times are over when the position of a pneumatic globe valve could only be seen directly on the indicator. “Digitalisation today makes the valve transparent through its electronic actuator, by continuously collecting data and utilising it by intelligently assessing it,” also emphasises Peter Arzbach, director of product management and marketing at Samson AG. This makes it possible to evaluate data, allowing an analytic view of the valve. “In the future the data will be increasingly summarised with data from the environment. More detailed statements can be made, going beyond the simple assessment of the actual state of a valve, which in the end can be used to increase plant availability”.

User expectations for valves already are high. “On the one hand valves need to transmit information to the overall system,” explains Arzbach. On the other hand, they must also be able to receive information from the system, as well as collect information themselves, in order “to create an added value”.

Digitalisation of control valves

The digitalisation of pneumatic valves is already under way, preparing the ground for the industry 4.0. However, there still is potential: “in the case of

shut-off valves it will take a while until the current high level of digitalisation of control valves has been reached,” believes Samson's Arzbach. They are still mostly being fitted classically, with magnetic valves and/ or limit switches.

In summary, the outlook is very good for manufacturers of valves with digital components. “Due to the continuing digitalisation we hope for a clear rise in demand for what we offer, for efficient electrohydraulic valve drives,” explains Geigle, from Hoerbiger. “Who today wants to equip process plants, power plants or pipelines with advanced automated valves, will certainly increasingly opt for digitalised actuators”.

There hardly seem to be any limits for the switch to digital solutions. Compact electrohydraulic drives with a maximum of digitalisation and an extremely wide area of application allow digitalisation of nearly all applications. “The only prerequisite is a source of electricity,” explains Geigle. “This can be realised reliably through solar panels and battery boxes even in the furthest regions, such as sand or ice deserts and the open steppe. There is hardly any limit for the usage of actuators for digitalised valve automation”.

Hardly limits for digitalisation

From a technical point of view there probably won't be any challenges that can't be solved with appropriate effort. “The limit as such lies in how companies accept it,” emphasises Samson's Arzbach. What data should be made transparent? Is the data safe enough? The companies need to answer these questions for themselves, “should they want to use digitalisation the whole distance”.

The use – and the outlook – of digitalisation is huge. It “allows control of valves around the clock,” explains Arzbach. Directly measurable values such as set point, actual position and actuator pressure are continuously monitored and in future will be complemented with further data, such as the flow rate. The positioner can indicate possible faults in the valve to users. Messages such as “inner leakage” or “defect actuator spring” require no further interpretation by the user.

Together with the valve diagnostics integrated in a positioner, digitalisation is able to increase plant availability, as possible faults can be made out and repaired at an early stage. Arzbach: “It is a future goal, to entirely avoid faults, which can be realised by approaches such as proactive maintenance management. Relevant information and assessment of a valve as an actor in a plant are here not only absolutely necessary, but also a substantial competitive advantage”.

The intelligent factory

Digitalisation enables fast, targeted and open communication with automated valves and opens this node in the pipeline system for industry 4.0, i.e. for the intelligent factory. Geigle: “The digitalisation of valve automation will therefore continue to progress. It is a prerequisite for the industry 4.0 and for intelligent and networked systems, which can be predefined to control and optimize themselves to a certain point”.

The real and virtual world are growing together – or with other words: information and communications technologies are merging together with industrial processes. This is reason enough for Siemens to intensively dedicate itself to industry 4.0. A development leading towards digitalisation as being the decisive driver of growth in nearly all branches of industry. “The digital factory isn't a vision any longer,” Anton S. Huber, CEO of Siemens Digital Factory business, is certain.

Trend to individualised products

The industry 4.0 will allow to companies meet the trend towards individualised products and increasingly short product life cycles. “The small lot sizes and increased variant diversity require technologies which can continuously adapt to changing requirements,” reports Festo. In the future, components in industrial plants therefore need to be able to coordinate themselves. Intelligent components will automatically organise and configure themselves. They will determine themselves what they require from a plant. This leads to an autonomous decision-making and control on site. As Festo states, what was once a fixed, centralised plant control will become a decentralised operation. This would for instance allow components to react independently to critical state.

The future has arrived

The basis for industry 4.0 is the exchange of data and information in real-time. Without digitalisation, this would be impossible. The development of industry 4.0 and the resulting applications and automation demand a consistent integration into the digital realm. The future for modern valves has long since begun...

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