Industry 4.0 at your fingertips: Health check for fittings

Until now, it was not possible to predict gradual changes in the valve parts during the closing process. The result was often costly measures to prolong the service life. Thanks to intelligent measuring technology, it is now possible to detect any possible seal wear at an early stage.

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Shutting off and controlling solid flows poses challenges that should not be underestimated for process engineers and plant operators alike. Various disturbance variables, which result on the one hand from the rheology of the product itself, but are also influenced by the kinematics within the plant, are often very difficult to determine and can usually only be mastered with a great deal of experience. Although solids - powders or granulates - can usually be described very well, for example by determining the shear forces, the pouring cone or the air holding capacity, ever finer evaluation criteria are required in order to be able to handle the material flow cleanly. Frequent product changes make system performance even more difficult. To support specific solutions, i.e. to be able to discharge a product uniformly, or to dose it with high repeat accuracy, plant manufacturers and component manufacturers have developed various devices and aids that achieve good results, depending on the task at hand. The following components have proved their worth in this respect:

- Vibrating dosing discs in soft-sealing or PTFE linings of

butterfly valves keep the product flow going and dissolve bridges. Dosing tolerances of a few grams are thus possible with these valves. Wing sluices make the product flow uniform, with shooting materials and discharge powders and granulates behaving predictably in the gravitational product flow.

• Inflas butterfly valves significantly reduce wear on abrasive media and are extremely gentle on the product. However, the problem of changing the movement of solids in the system due to wear in the system itself is often neglected. If, for example, the surface quality in the discharge cone of a storage tank changes due to the abrasiveness of the product, the flow result inevitably changes. If a seal wears out, leakage occurs which impairs the performance of the system. Shut-off and control valves, rotary valves, screw conveyors or vibrating troughs therefore have a high potential for disturbance variables, which can cause considerable headaches for the plant operator. Traditionally, it is of course attempted to counter this by means of suitable measures, which are usually based on the many years of experience of plant manufacturers and operators. In some cases, considerable safety factors are applied in order to achieve acceptable life cycles. This increases the cost of materials and maintenance and drives up the total cost of ownership (TCO). Here a changed way of thinking is gaining ground, which, at least in theory, has existed for a long time: Preventive maintenance even of supposedly simple components. Here, the potential downtime in the event of a malfunction is essential.

Correct statements about the condition of a valve

Self-monitoring of critical components, without having to use the resources of a higher-level control technology, is not new in industry. Suitable intelligent sensor technology is available in abundance. The measures to be derived from the measured values with regard to maintenance, however, are based on the experience of the operating personnel and are rarely really economically objective.
Expert systems and appropriate well-filled databases are also rarely available. With frequent staff turnover, expert knowledge is quickly and irretrievably lost.

In the context of the industry reflection 4.0 these tasks are given enormous impetus. If, on the one hand, the identification of valves (including their precise specification), e.g. via QR codes, the self-analysis of components such as shut-off and control valves gains enormous weight. The data cloud available up to now, an immense abundance of simple individual data, gives way to a permanent, qualified analysis of the assembly‘s own condition. It is not left to the experts alone to evaluate the flood of data and determine suitable measures. Based on the manufacturer‘s experience, the expert determines the corresponding limit values and permissible deviations from the target characteristic curves and correlates various factors in relation to each other and in the context of the installation environment. Operators thus receive clear and unambiguous information about the condition of the valve.

For sensitive media

The Inflas sealing system was developed for use with highly abrasive or very sensitive media. The system is available with all soft-sealing shut-off butterfly valve discs with replaceable sleeves.

• Nominal sizes: DN 80 - 400
• Overall length: EN 558 Series 20, ISO 5752 Series 20, API 609 Table 1
• Leak test: EN 12266 (leak rate A), ISO 5208, category 3
• Temperature range : -40°C to +200°C (depending on pressure, medium and material)
• Max. Operating pressure: max. 16 bar

Reliable detection of end positions and other measured values

10 years ago, EBRO determined the characteristics of seal wear in soft-sealing Inflas valves and anchored them in the control system of these valves. If there is a risk of failure due to leaks, the operator receives the corresponding interfering signal in advance, so to speak. This makes it possible to plan appropriate maintenance and largely avoids spontaneous system failures. In this way, the goal of optimized performance and thus cost control, is significantly supported.
The look-ahead functions are based on the „SBU Advanced“ position end position detection system developed by Ebro. From simple end position

Kontakt

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Inflas butterfly valves considerably reduce wear in abrasive media and are extremely gentle on the product. Nevertheless, we are looking for ways to determine wear more precisely and thus be able to intervene preventively.

enquiries to complex evaluations of vehicle movements, measurement data is recorded and automatically analysed.
The reliable detection of the end positions „open“ and „closed“ is carried out by millions of Hall sensors, successfully used in automotive engineering. These are used there to camshafts the position of crankshafts and camshafts and to determine the wheel rotations in ABS. Enormously fast signal changes can thus be achieved without contact and thus wear-free. The end position signals are available at classic cage clamp terminals. Switching states, power failures, operating hours and running times are recorded and stored, temperature responses are evaluated. Trends are determined and form the basis for risk assessments of a failure.

More than just an electronic nameplate

The Ebro app is available for service technicians, plant constructors and operators on site. It receives this data via Bluetooth and makes it readable in plain text. For data protection reasons, the Bluetooth function can be swiched off by a jumper or enabled individually.
It is also possible to transfer all evaluations, but also individual data, to the system operator‘s cloud. Thus it automatically gives a fairly complete picture of the state of the valve, the changes to be expected, the systmatic malfunctions that occur, even if they are not necessarily due to malfunctions caused by valve wear, and the proposed solutions to problems. This makes the scheduling and clarity of planned maintenance shutdowns much easier. If you know what is going on in your system, you can react accordingly and focus on the right places. In particular, reliable operation in countries with frequent potential for malfunctions due to infrastructure problems and inadequate training levels can be guaranteed by means of appropriate advance warnings. Some standstills or even damage can be limited or completely averted.

Conclusion and outlook:
The investment costs for the new technology are kept within limits, since sensors can be used that are mass-produced for other industries. However, the benefits are often obvious and can usually be quickly communicated to cost-oriented operators. Plant engineers find it much easier to locate faults, especially during the commissioning phase.
After all, even after many years, all relevant specification data is still available in plain text.
This proves that Industry 4.0 does not have to remain a theoretical, cost-intensive approach. The Ebro SBU Advanced is just one example - there are already other suitable solutions available for cost optimization that can be integrated immediately.
- Powtech: Hall 4, Booth

SBU Ebro Advanced with Hall sensors and standard Bluetooth module