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Wireless valves for control

Valve technologies are critical components when it comes to process control. Continued advances in valve technologies will be required, including automation techniques, to keep pace with improving process requirements. Technology advancements for process control are being sought with careful attention when it comes to new technologies. Many plants are replacing manual rounds and periodic inspections with wireless monitoring to improve visibility and process reliability. The next advances will come from final control elements, or valves. This article is to open your planning to include new technology.

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Valves are a common item on the list of eliminating problems and improving efficiencies in processes or facilities. Identifying, locating, and inspecting valves is a time consuming chore but is required to achieve higher levels of productivity and increased safety. Recognizing which control elements have the greatest effect on product quality, productivity and safety is worth the effort. Prioritization of assets is the first step for an effective improvement mission. Attack your reliability issues on a case by case basis and prioritize them on their history and likelihood to cause problems.

What is the problem you need to solve?

Improvement plans require a vision but, prior to the vision, is the identification of what you are trying to solve. In a nutshell, it may be as simple as eliminating the mistakes. Nine out of ten users have acknowledged mistakes concerning valves that are in the wrong state within the past twelve months. Problems resulting from these mistakes consist of production losses, product rework or scrap, safety issues including people in undesirable situations and even worse when the local community is at risk. You have witnessed recent incidents resulting in the general manager, or CEO, on local or national news apologizing for these situations, and no one wants to see more of these. Acknowledgement of a problem is a good first step toward a longer term vision of production excellence. Then identify what is required to eliminate those mistakes. A logical step in many cases is to automate the assets involved in those mistakes. Common practice should be to drive change through proven results, especially when the plan includes a new method.

Automation improvements can become complicated and costly when they are in a classified location or where changes to the control system are required. Both of these create a higher cost scenario for the improvement and the perceived cost may likely outweigh the perceived benefits. There are two errors that are common with that justification of change. One is that the consequences of mistakes may be understated. For example, a $100 manual valve should be valued by the cost of the mistake, not just the valve. The second is the cost to implement the change is overstated. For example, increasing process visibility by upgrading a legacy control system may be cost effective while upgrading the whole system may not be cost effective or necessary.

It is often human nature to resolve small situations with the least amount of visibility. In other words, the small mistakes are not reported. Just like putting duct tape over a leak will solve a problem in the short term; it hides a bigger problem in the long term. Equating this example to a cost view, replacing a $100 manual valve with an automated valve could eliminate the possibility of a $300,000 spill and possibly keep the CEO off the nightly news.

Wireless users are better able to identify processing deviations sooner because they know more about their process and can react faster. The investment of wireless instrumentation enables change and permits enhanced visibility. The single most important improvement for the future of some plants will be to increase the level of automation to achieve higher profitability, with an additional benefit of increased safety in their facility potentially leading to reduced insurance and medical costs. Solving problems the same way you did ten years ago limits your progress and ignores the proven results of wireless. Using legacy technologies limits your improvement options. Implementing wireless requires less cost, reduced time for project implementation, and fewer resources. Wireless can be easily implemented into your existing control system infrastructure with no, or minimal disruption. Many have discovered that the performance of wireless automated loops is comparable to wired automated loops. To effect change, confidence, gained through experience, as well as proven results are required. This process is the same for proposing any solution. The difference today is that wireless technology must be reviewed in the same manner as any other valve technology improvements under consideration. Wireless provides a solution to automate valves as well as providing awareness of manual valve position. Both methods provide confirmation that the valve position is at its required set point. Approximately

Isolation Valve – Monitoring Valve Position.

Linear Automated Dump Valve, includes feedback.

half of the automated valves in a plant are driven by a solenoid that do not include feedback for confirmation. The reason is primarily due to the cost of adding feedback wiring. The most important piece of information concerning a valve is not the state you want it to be in but, rather, the state it is actually in! This crucial information can be used to eliminate mistakes. Wireless automated valves are an intelligent choice because position feedback is included in their normal operation. Operators have more information at their disposal giving them the ability to pinpoint problems faster and resolve issues before they affect the process and cause a mistake. There is no question that valves with feedback are more reliable when compared with valves without feedback. Operations and maintenance are more reactive to operating problems whether it is from something stuck in the line, the loss of pneumatic air pressure, or a drop in the signal causing valve alignment errors. There may be no desire to replace that $100 manual valve; however, there could be an increase in its reliability by simply monitoring it. Wiring has complicated and impeded improvements in the past because of a previous cost/benefit analysis. However, now that valve can be easily monitored and can be given attention sooner, making many incidents preventable.

Manual valves can be converted to automated valves simply by removing the handle, adding a pneumatic actuator, and installing a wireless valve automation solution. The human element is then eliminated, allowing changes to the process faster, remotely, and without delay. A wireless controller uses the same actuator and valve technologies so only the instrumentation is replaced or added. Wireless automated valves are the best replacement for valves that are currently actuated by a human. Applications include: isolation valves, drain and dump valves, blow down valves, water fill and transfer valves. Wireless automated valves in these applications can be controlled remotely and on demand without human intervention. Automation also enables interlocks and safety checks so plant safety is maintained or improved.

Control system integration

The simplicity of wireless automation makes integration to any control system or PLC easy. A wireless network is connected in a similar arrangement as traditionally wired I/O; however there is no selection of I/O type. The input and outputs are simply mapped. This makes selection and deployment even easier.

¼ Turn Automated Dump, includes feedback

Security should not be a concern, there are many options but it may be best to start simple. Use wireless without using IP addressing and only connected to the control system I/O structure.

Building your business case for reliability improvements

It was mentioned before that to enable change, and especially with a new process or method, proven results are required. This requires your own test cases. Wireless test cases will prove the ease of implementation and will show that it is as good, if not better, than existing processes or methods. Wireless will also make an ROI (Return On Investment) easier. The budget of a project is reduced considerably by removing the material cost of wires, cabling infrastructure, junction boxes, engineering time and cost for connecting to the control system, labor time, cost for electrical installation, and the reduction in time spent managing these resources and schedules. Removing these barriers to a project while adding the benefits of reduced consequences of mistakes, such as replacing the $100 valve and eliminating the $300,000 mistake, will make the next project approval easier.

What is your next step

To gain knowledge and experience with wireless automation it is necessary to start small and build experience. Avoid solutions where valve position feedback is not included and avoid those solutions using multiple vendors. Go for a walk around your facility and look for opportunities to remove headaches and look for potential reliability improvements. Initiate test cases and start building experience levels. Begin mastering the digital intelligence possible with process control while reducing complexity for operations and maintenance.

If you do not want your plant manager in front of a news camera, you should act sooner rather than later and have a solution to reduce mistakes. You need to become the hero and have a plan that can quickly be used for improvements that can be installed quickly and easily. Armed with right valve technology, the best combination of products, and an improvement strategy, you can have a positive impact on your operations.

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