WATER

DISTRIBUTION
WATER PUMPING

BACKGROUND: Reliable access to drinking water is an overlooked necessity to the modern world. Water is transported for supply and distribution by gravity-fed or pumped infrastructures. When using pump stations, it is critical to ensure full capacity is always readily available. Standard design practices were created to promote reliable operation, but the technology available has not always been up to the task.

Valve actuation on the discharge side of a pump requires careful consideration. Reliability is critical to ensure full pumping capacity, especially during high demand periods. Equally important is for any discharge valve actuator to provide a guaranteed fail-safe system to protect the pumps in the event of an emergency (when applicable). Commonly used actuator technologies do not represent the most reliable options available and typically require frequent maintenance. A need exists for a more reliable alternative that requires lower cost of ownership.

KEY TO SUCCESS: Oftentimes, water is pumped across distances that climb elevation. Any failure or emergency condition that halts active pumping can result in a flow reversal, where gravity forces the flow back down the line towards the pump. This can cause the pump to spin backwards. To prevent this from occurring, there is typically a check valve on the discharge side of the pump installation. In some cases, a check valve may be combined with an actuator to serve as both the in-line check and control valve package.

When using a single valve & actuator package to provide check and control functions, the means for providing the fail-closure of the valve during emergency conditions is a critical design consideration. While electric actuators are commonly employed in the municipal market, they cannot provide a means to operate without supply power present. An emergency backup power system can be used as an alternative to address this scenario, but most utilities would

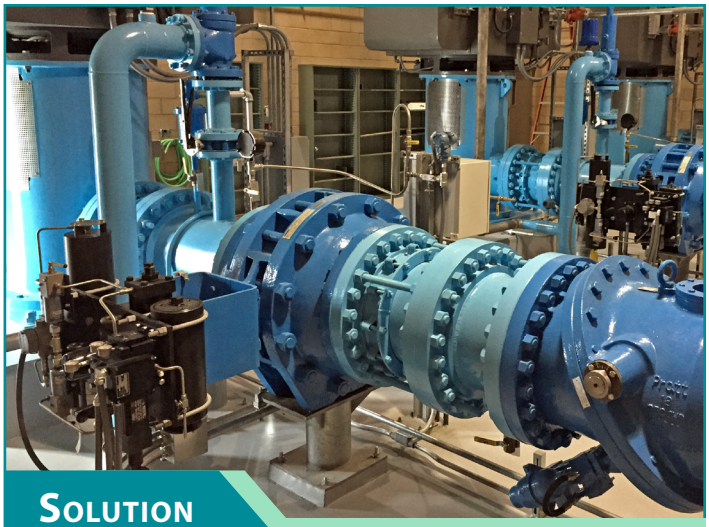
prefer to have a mechanical means for the isolation rather than an electrically based method for added protection.

In smaller pump station designs, a pneumatic (air) based actuation system might be considered. As pump stations become larger in size, a pneumatic system becomes less practical due to the increasing torque requirements of the discharge valving. This makes a hydraulic (oil) based system a more practical approach. Both systems provide methods for mechanical fail-safe systems during an emergency condition, but both technologies also carry concerns surrounding their reliability and maintenance requirements.

Problem: Pneumatic-based systems employ a central compressor system that generates air pressure fed to multiple pneumatic cylinders driving valves. Air is a compressible medium, so it is not a rigid form of actuation. As such, pneumatic actuators are susceptible to "sticking" and "sliding" (also known as deadtime and overshoot), resulting in poor response and control. In addition, the compressor requires periodically running motors to maintain a pressure within the pneumatic system, resulting in a lot of hidden dollars wasted on energy usage. The biggest drawback to the centralized system is that it represents a single-point failure hazard: a failure in the central system can bring down the entire pump station.

Centralized hydraulic actuation systems eliminate the control concerns inherent in pneumatic-based systems due to the use of non-compressible oil in lieu of air. The central hydraulic system does carry the same energy usage and the single point failure hazard concerns as a pneumatic system. Hydraulics also present a new set of concerns regarding the oil medium itself. In any hydraulic system, roughly 80% of all failures are attributed to the breakdown of oil. Maintaining oil within these systems is of critical importance. Hydraulic actuators require periodic oil changes, as well as a method of filtering that also requires periodic attention. This task can be quite burdensome in larger pumping stations where massive volumes of oil may be required in these systems. Even with regular maintenance, a constant fear exists that a high-pressure line or seal will become compromised, resulting in not just a sudden failure of the system, but also a potential large-scale oil leak into the surrounding environment or water supply.

Other self-contained hydraulic actuators represent an alternative to the centralized hydraulic system. They offer independent system control for each valve, eliminating the concern for a single point failure hazard. That said, they still carry over many of the oil maintenance and energy usage related concerns, because they still operate off a reservoir-based system on a smaller scale.



Solution

REXA offers the most reliable actuator solution for a pump discharge valve service. Individual actuators are supplied for each pump discharge valve, eliminating the single point failure hazard posed by centralized systems. REXA delivers smooth and controlled pump discharge valve operation during both normal and emergency conditions. Any speed requirements can be met to maintain a pump curve while also eliminating water hammer / surges that can damage piping infrastructure. REXA is the most energy efficient actuator available, reducing your power costs. With dramatically reduced oil volumes compared to traditional hydraulic systems, REXA eliminates any environmental contamination or insurance related concerns. All oil-related maintenance over the life of the actuator is eliminated, freeing up time and money. REXA actuators include a 5-year product warranty & an expected 10-20-year maintenance-free cycle. No other actuator can provide such reliable operation for your pump discharge valves, helping you always ensure full capacity, while also protecting your pumps from emergency scenarios. Join other drinking water agencies who have learned from experience that the best way to protect your pump station is to rely on REXA.

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