Control Valve Maintenance

Industrial control valves are constantly moving and therefore will wear faster than an on/off block valve. They require more maintenance than block valves and can be very expensive to replace. Proper material selection, sizing and maintenance are crucial to extending the life of control valves.

Pneumatic Control Valves

Pneumatic Control valves utilize a positioner and pneumatic actuator to precisely open or close the valve to a specific position in the valve stroke. Most positioners convert either a 4-20mA electrical current signal or a 3-15 psig air signal into a specific valve opening position by controlling the main air supply going to the actuator. Some older control valves have direct control diaphragm actuators without positioners that work by varying the main air supply to the actuator. This type of control is not as precise as using a positioner. All control valves require this air to be clean and dry.

Electronic Control Valves

Electric control valve actuators utilize 4-20mA servo cards built into the actuator to precisely control the opening of the valve by starting and stopping the electric motor. They have motor brakes or self locking gears to hold the valve in the desired position.

How to Prolong the Life of a Control Valve

The best way to prolong the life of your control valve is to do your homework on the front end and properly select the materials and size of your valve components. A control valve should never be used as a shutoff valve. By design, they are to be used to modulate the flow through a pipeline. When closed a control valve will still leak and has a published leak rate in accordance with industry standard ANSI FCI 70-2. A properly sized control valve will operate from 30 % to 60% valve opening under normal conditions. If you continuously operate a control valve too close to the closed position, you can damage the valve by your process going supersonic through the valve. This can cut seats and or the actual body of the valve. Think of putting your thumb over the end of a garden hose. The more tightly you cover the end of the hose the faster the water travels and the more force it has travelling out of the hose. It is the same principle inside your valve. If the fluid travels fast enough it will cut or erode

the metal components. Also check the material compatibility of the valve components with your process. Make sure there will not be any adverse reactions with your process that will corrode or dissolve the valve components.

Once your valve is specified and ready to be installed, don't forget to include the following components along with the control valve. First, you need a properly sized strainer somewhere upstream of the control valve. Dirt and debris are control valve killers. Second, if you are installing a pneumatic control valve, you must put a filter regulator on the main air supply line.. our team recommends at minimum, a 25 micron filter but a 5 micron is preferred. This serves dual purposes. The filter regulator will protect the positioner from fine particles of dirt that can clog the small air ports inside of the positioner. It also protects the positioner and actuator from over pressurization. Many control valve actuators use lower pressure air supply than standard plant air.

When to Repair or Replace a Control Valve?
Now that your control valve is installed, how do you know when to repair or replace it? There are three prevailing thoughts on this maintenance.

The first is just run it until it breaks or becomes so unstable you can't control your process. This is obviously not a wise choice if your process is critical and you need consistent control. This also usually results in having to completely replace the old valve because what broke or wore out in the valve damages other components and becomes too expensive to repair.

The second method is "Preventative Maintenance". This requires all valves to be taken out of service on set intervals and inspected. The valves are taken apart and any worn components are replaced along with installing new softgoods. The valves are then returned to service. This is done during plant wide shutdowns and can prolong the life of your valves. This method is useful if your plant runs continuously and the process rarely is stopped. This ensures that your valves are always within specs. The downside to this method is that you may be taking apart perfectly good valves that did not need any maintenance but now you are spending money and labor to put them back together. Some plants maintain a complete set of spare control

valves that are swapped out during the preventative maintenance shutdown and then the valves that are removed can be rebuilt later and returned to the store room.

The third method is “Predictive Maintenance”. With the advent of smart positioners and software programs you can monitor your valves and predict when they are starting to fail. Modern electric actuators and digital positioners can monitor items such as valve stroke speeds, torque or thrust required to open or close the valve, how many times a valve has cycled, stiction, and many other parameters. This information along with flow and pressure information from your DCS can help you determine if a valve is still operating properly and if you can skip a repair cycle for that valve. This helps prevent unnecessary rebuilds of good valves during a plant shutdown. These modern positioners and electric actuators can also warn you of a bad valve before it completely fails and corrupts your process. Modern software and networking systems can send you an alarm when a valve is starting to fail or once certain parameters are met.