Partial Stroke Testing Devices – Why users correctly distrust their PSTD’s ability to prohibit spurious over-travel, and a logical solution

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Introduction

One of the major buzz words among many engineers in the process industry today is Partial Stroke Testing (PST). If implemented correctly PST can greatly reduce the amount of unnecessary downtime due to maintenance and or required testing of critical emergency shutdown valves (ESDV). However despite the many benefits of PST engineers are often times extremely hesitant to utilize it due to the inherent shortcomings that have been associated with the more commonly known PST methods that are on the market. Currently the most commonly used PST systems include solenoid valve or positioner based pressure regulating systems and mechanical jammers.

PST Overview

During a PST a valve is partially stroked typically 5-20% of the valve’s normal stroke towards the fail-safe position to prove that the ESDV assembly is capable of moving towards the fail-safe position. This test is not intended to prove that the ESDV will achieve full closure or adequate shutoff in the event that the valve is tripped. The only way to confirm that the valve will achieve full closure and adequate shutoff is to fully stroke the valve to perform the necessary leak tests. Partially stroking the valve from the normal operating position does however give the user a certain level of diagnostic coverage for the valve assembly (the amount of diagnostic coverage varies depending on the specific application). The diagnostics coverage that is achieved during a PST statistically allows the user to extend the full stroke test interval while at the same time maintaining the appropriate safety integrity level (SIL).

Currently on the market the mechanical jammer system is the simplest and most straightforward method that is being used. This process is purely mechanical and is typically incorporated into the mounting hardware between the valve and actuator or directly into the actuator itself. Prior to performing a PST using this process an operator is required to physically install a pin into the valve coupler or the actuator body. Once the pin is installed the control room de-energizes the actuator and releases 100% of the actuator air supply pressure to allow the actuator to stroke the valve until the PST position is reached. At this point the pin that was previously installed by the operator prevents the ESDV from over traveling past the PST position by contacting a mechanical stop. Once the PST position is reached and confirmed by the local operator the control room re-energizes the actuator to bring the ESDV assembly back to the full open position which concludes the PST.