Dramatically Cutting Maintenance Costs Using Partial Stroke Test (PST)

What is PST?
Partial Stroke Test (PST) is designed to perform diagnosis by slightly closing a valve during plant operation.

In general, PST is executed on valves that perform shutdown according to safety logic engineered using a Safety Engineering PC (SEP). A safety instrumented system (SIS) performs process shutdown only when a failure occurs in the plant. It is therefore necessary to periodically test valves to ensure that they will respond to a shutdown event (hereafter, this test is referred to as a proof test). The interval at which proof tests are conducted depends basically on the valve failure rate and the allowable value of probability of failure on demand (PFD). Such a proof test is required since a PST can validate about 70% of the possible failure modes. Under normal conditions, a safety integrity level (SIL) is first determined from the relevant area in a plant; then the PFD of a safety loop is evaluated according to the SIL. Finally, a proof test interval is determined from the failure rate of the entire safety loop, including valves and the given PFD value. For this reason, the proof test interval must be maintained to ensure the validity of the safety loop.

Advantages of PST
Experts assert that most valve failures can be detected by a PST in which valves are slightly closed. Since a PST can be performed periodically while online, it can extend the proof test interval without sacrificing the PFD value. This strategy enables significant reductions in plant maintenance costs.

Note: For details on the coverage of PST-based valve diagnosis and the relation between the PST interval, proof test interval, and PFD value, refer to the vendors’ manuals for the valves.

System Configuration

- PST makes it possible to extend the proof test interval without reducing the SIL of safety loops.

PLUG-IN ValVue ESD on PRM
(Plant Resource Manager)

Features of ValVue ESD
- PST Scheduling & Execution
- PST Analysis, Viewing & Archiving
- ESD Valve Condition Monitoring & Trending
- PST Results Reported to PRM Database

Support for direct HART connection enables ProSafe-RS to collaborate with PRM and restart PST, reducing unnecessary shutdowns.

Certified valve positioners
Certified sensors
EJX-series differential pressure transmitters
Certified sensors
YT-series temperature transmitters

SVI II ESD
- SIL3 Certified Shutdown at 4 mA
- Automatic PST Function
- Shutdown Event Capture
- ESD Function and PST Function on a Single Wire Pair
Product Requirements for PST

PST requires the combination of the products listed below and the use of the resource management functions of PRM.

- ProSafe-RS R1.02 or later
- PRM R3.01 or later
- CENTUM CS 3000 R3.06 or later (CS3000-HIS is required to use PRM)
- HART-enabled ESD valve controller with PST functions and PRM PLUG-IN-enabled software
  Example: Dresser's SVII ESD valve controller and ValVue ESD PRM PLUG-IN software

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