

FEATURE ARTICLE



Bill Fabian, Emerson Services Business Development Consultant, Emerson, Stange

THE BENEFITS OF VALVE CONDITION MONITORING

Unscheduled downtime is responsible for significant costs in global process industries. For example, ARC Advisory Group estimates that around \$20bn, or 5% of annual production, is lost as a result of this downtime every year.

They further estimate that around 80% of those losses are preventable. It is essential to understand the condition of critical assets within the process to avoid unplanned shutdowns.

The vast amount of data that is generated about equipment condition and performance offers a great opportunity to engineers, but it can be overwhelming to collect and analyse, especially in a time of decreasing workforces and expertise.

Studies have shown that professionals spend around 60% of their time managing data before being able to focus on more critical, value-added work such as analysis and decision-making. The quantity of this data continues to increase with time.

While new and valuable technology is responsible for creating the influx of data, properly applied technology can also provide an effective solution. Furthermore, it allows engineers to take full advantage of the information collected, generating significant

benefits for industry in terms of efficiency, safety and reduced costs.

Valves are a critical final control component for any flow-based process and play a key role in overall availability and variability. This makes valves an essential asset requiring inclusion in any predictive maintenance-enabling condition monitoring solution.

What is Valve Condition Monitoring? Valve Condition Monitoring involves the seamless collection and interpretation of valve condition data by valve diagnostics experts.

Valve Condition Monitoring is an activity that can be carried out by plant personnel or a service provider. However, it is estimated that most industrial plants use less than half of their diagnostic capabilities. Expertise and technology delivered by an expert service provider can help close the consumption gap between the functionality that is available, and the functionality that is actually utilised.

The result is that plant operators can have increased confidence in their valve health status, allowing any required work to be easily planned and carried out at a convenient, scheduled time, avoiding expensive unplanned downtime.

In addition, any spare parts required can be identified and ordered in advance, which both reduces the need to keep large amounts of replacement parts in storage and avoids the problem of repairs being delayed by shortages or supply problems.

The benefits of Valve Condition Monitoring Critical valve assets can have a significant impact on processes, so these are often the primary focus of a Valve Condition Monitoring solution. A malfunctioning or failing critical valve can reduce yields and efficiency and cause product contamination. It may lead to fluctuations in process flow, poor control response, or even total loss of control. There is also the risk of severe valve cavitation, asset damage, and complete unit shutdown.

Condition monitoring avoids these negative impacts, safeguarding production levels and product quality. By following critical assets – the ones with the most impact on production – downtime and loss of production can be minimised, creating sizable cost savings and increases in revenues.

The insights generated from monitoring supports more efficient shutdowns, turnarounds or outages (STOs), which can amplify savings. For example, it costs about \$5,000 on average to pull a valve, yet in an STO where valves are maintained to a schedule rather than using data-driven decisions, around 30% of the pulled valves are found to not need repairs.

Even for a small, 30-valve outage, this means Valve Condition Monitoring could result in a \$45,000 savings. Often, the maintenance savings involved in one STO can cover the cost of an entire condition monitoring service contract.

An extended STO can often be as costly as unplanned downtime. Valve Condition Monitoring allows STO maintenance to be planned and executed using actual valve data, making it more cost-effective and time-efficient. Also, repair parts can be ordered early, avoiding the high cost of rushed orders.

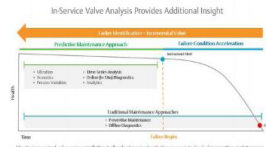
The benefits of Valve Condition Monitoring, then, are clear. It identifies problems between maintenance events, and detects equipment degradation, which allows planning for necessary equipment repairs, while avoiding the costly mistake of taking the wrong assets out of the process.

How Valve Condition Monitoring works The core principle of Valve Condition Monitoring can be summarised as: see, decide, act.

See: Smart devices are used to collect the asset data and transmit it to valve experts that carry out the analysis.

Decide: Using equipment data and decades of experience and knowledge, these valve experts will provide their insight on valve status and the likelihood of failure, making recommendations as to what actions should be taken.

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Monitoring critical valves using predictive technologies points with the appropriate level of preventive maintenance and offers diagnostic clues for root cause analysis to complete valve reliability.

Importance of Time Series Analysis Emerson proprietary analysis tools for time series analysis enable to enhance the speed of root cause analysis. This provides more time to engineer conditions that can cause travel deviation.



In-service valve analysis provides additional insight that complements existing maintenance programs and provides earlier information of an impending asset failure.

It is extremely uncommon for a final control asset to fail suddenly. Such failures are far more likely to be a long-term process which can be identified by detecting mechanical degradation before failure occurs. Regularly reviewing valve operation and understanding the normal operation of a valve provides a much better estimate of when degradation will reach a point where it noticeably affects control, reliability, or safety.

It does not mean that 24/7 monitoring is required; instead, recurrent tests and data recording are triggered for the effective tracking of all key device parameters. If urgent issues are identified during regular review of valve data, the customer will be informed quickly. On a

specified frequency a formal report is created to provide an overview of asset health, with recommended actions and expected outcomes.

Act: The end-user and Emerson are able to work together to create a plan to implement the actionable recommendations.

Implementing an effective Valve Condition Monitoring solution A Valve Condition Monitoring system starts with the selection of critical valves and applications. This may require expert assistance to identify the key assets, through a formal criticality analysis.

Effective monitoring solutions are scalable, so it is typical to start by studying the critical valves first, then expanding coverage as requirements and budget dictate. End-users can start small and expand the service as internal business cases are proven.