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for Future Generations



**WHITE PAPER**

How to reduce maintenance spend  
and downtime using proactive insights  
from advanced analytics

## Summary

All industrial, manufacturing and utility provision sites have large numbers of essential, complex and specialist equipment. These assets require dedicated maintenance and service plans to make sure they continue working as they are supposed to, at all times. This is the case irrespective of industry; oil and gas sites, wastewater plants, chemical production sites and power stations (to name a few) all operate host specialist equipment that needs dedicated care and servicing to keep running at an optimal level. This white paper will investigate the importance of a holistic service and maintenance programme that focuses on analysis of data supplied from intelligent electric flow control assets (such as actuators).

## What is flow control?

The control of liquids and gases plays a key role within oil, gas, water, power, chemical, industrial and process control applications. Effective flow control can improve efficiency and yield, reduce emissions, minimise environmental impacts and assure safety. This safe and efficient control of fluids requires specialist equipment such as valve actuators. Valve actuators are appliances that move and control valves. They can be pneumatically, hydraulically or electrically powered and allow for the controlled flow of a liquid, gas or powder. This automation removes the need for manual operation and ensures a high degree of reliability, repeatability, accuracy and efficiency. They are key assets that require service and maintenance programmes to ensure that they provide optimum performance and are continuously available; they must operate smoothly day-in, day-out. It is important that they can withstand challenging environmental and operating conditions, such as extreme temperatures and excess vibration. A comprehensive maintenance programme allows critical assets to operate at a peak performance level, ensuring wider site uptime and productivity. A "one size fits all" programme is rarely suitable; service and maintenance decisions should be made based on individual requirements.

## How should operators make decisions about maintenance programmes?

Operators must consider how to balance risk and performance with cost. Not carrying out maintenance operations can lead to equipment and site downtime, but when equipment is regularly removed from service for maintenance, operations may be reduced or paused. One way of approaching maintenance of flow control assets is to service them regularly, regardless of age or usage. While this may seem superficially beneficial, it can also lead to maintenance activities that are not required, as well

as not actually correctly fixing all issues (resulting in asset failure in the near future) and causing process shutdown when not necessary. Additionally, the age of a device is a poor predictor of the likelihood of actuator or valve failure; the precise condition of an individual asset is much more accurate. Some actuators are not frequently operated, instead providing testing or Emergency Shutdown (ESD) capabilities. Conversely, some offer constant modulating control in harsh environments. Naturally, the condition of these actuators will be different to those operating rarely in less abrasive environments. Specific condition monitoring accurately tells the operator how healthy the actuators are. Using data from each asset in the field allows you to understand the actual operational characteristics of each asset. In a management programme that focuses on analytics, data is collected from assets in the field, analysed and then used to optimise the delivery of maintenance. This can result in earlier failure prediction, reduced failure risk and cost, and a maintenance programme that is scheduled to match levels of risk. It can relate to the importance and criticality of each asset if desired.



*A programme for the maintenance of flow control assets can increase site uptime.*

## The dangers of improper maintenance and monitoring

Failure of key assets is a serious issue for plant operators. Implications of asset breakdown (or assets not operating at full efficacy) include poor performance, inferior quality and reduced output yields. Unplanned downtime can also lead to reputational damage and financial loss. Actuators and related flow control products are critical assets that require maintenance programmes to ensure that they are always available. An effective maintenance plan for flow control assets helps ensure long term reliability and viability.



While a maintenance strategy should be able to deal with one piece of equipment breaking and requiring a fix immediately, it comes into its own when planning for the long-term. This holistic approach can increase uptime, eliminate unexpected maintenance costs and help manage the whole life cycle of essential equipment and assets. Rotork's Lifetime Management is a full life cycle asset programme that ensures long term reliability and viability of a site's key assets. It is a service offering designed to seamlessly maintain and improve flow control assets, managing the inherent risks associated with advances in technology, component obsolescence and ageing equipment for customers through a combination of maintenance, inspections and monitoring. A wide-reaching maintenance, service and management programme is important to increase uptime and look after your assets during their lifetime. A maintenance strategy that combines this practical service offering with advanced analytics is even more effective. Intelligent Asset Management is the analytics branch of Lifetime Management. It is a cloud-based platform that collects information from the data logs held within intelligent actuators, offering anomaly detection and easy, accurate reporting and monitoring of the condition of valves/flow control assets.

## Performance data drives effective asset management

Connected flow control devices are part of the Internet of Thing (IoT). The prevailing view is that the real benefit of IoT is the data that can be pulled from devices that sit within it. Many sites may already have flow control assets with abilities to capture data; Rotork has included a data logger within IQ actuators since 2000. However, that data needs to be captured and analysed for customers to benefit from it. It is becoming increasingly common to proactively analyse this data to save plant operators significant downtime and cost, while mitigating operational risk. The analysis is the key issue; without analysis, data is largely unhelpful. Analysis of torque is of critical importance in valve and actuator operation. Torque average, deviation, peak levels and opening/closing torque provide especially useful insights from an actuators data log. Temperature and vibration are also important considerations when judging the health of an actuator. Looking at the average and peak temperature and vibration is useful; sudden or immediate changes are especially indicative of a potential problem. Longevity of data capture is important; the longer an asset is monitored for, the richer the data it provides becomes.

An asset management system that is truly holistic, analysing the performance of all assets, will provide the information necessary to keep a site running at an optimum level. Additionally, a set cost from a service provider keeps budgets

at a guaranteed and manageable level. Investment in a full life cycle asset management programme which focuses on individual performance data offers improved performance and an increase in asset reliability. Productivity can be maximised, while operational risk is reduced. Intelligent Asset Management removes the need to manually review key data, saving time and reducing the likelihood of missing minor issues that if left unchecked, may develop into more serious and costly problems. A proactive maintenance strategy of this kind to increase the uptime of actuators and flow control assets can lead to increased profit and enhanced safety. Analysis of specific performance data can deliver the appropriate level of maintenance based on risks determined from knowledge of an asset's criticality and condition, while also considering asset obsolescence and specific operating environments. It is a critical move towards whole life cycle and asset management, offering reliability and viability of the assets on a site.

## The power of data analysis in action

Intelligent Asset Management has been implemented in a chemical plant in the Asia-Pacific region. The site had previously experienced high levels of unplanned downtime and wished to understand why. Monitoring and analysis of data showed a large change in torque profile for one of the actuators and a report recommending urgent action was issued to the customer. The customer was unable to act for several weeks; the identified actuator tripped on torque meaning the actuator could not fully close. The customer subsequently increased rates of data collection and review, enabling better maintenance plans and increasing uptime of their assets and entire site.

At a power station in India, 36 critical IQ actuators were monitored by Intelligent Asset Management. Rotork's monitoring for potential causes of drive bush degradation or failure by Intelligent Asset Management was used to identify early signs of failure of damaged and bent valve stems.

## Conclusion

Analysis of flow control asset performance should be driven by data. The most efficient way to spend money on maintenance is to look at actual operational characteristics of the actuators and flow control assets on your site, allowing tailored decisions that result in earlier failure prediction, maintenance scheduled to match individual risk and eventual reduction in unplanned downtime and increased operational stability. Intelligent Asset Management is an example of a programme of this kind. It focuses on the data within intelligent electric actuators to provide operators with confidence that they are making the right decisions to ensure their site runs smoothly and their assets are always available.