

MAINTENANCE FOR CRITICAL EQUIPMENT

Dave Godfrey, Rotork, UK, considers how flow control actuators benefit from regular, proactive maintenance in severe service applications.



When the UK's Buncefield oil storage terminal exploded in 2005, it was said to be one of the most devastating industrial disasters in recent memory. This tragedy is a reminder of the need for a strict maintenance regime in severe service applications, as it was caused by faulty equipment meant to monitor the level of fuel in a storage tank.¹

There is no single definition of a severe service application, it generally refers to processes where the repercussions of equipment failure can be catastrophic. This could include operations involving hazardous chemicals like ammonia or caustic acid. For operators, the key question becomes what are the potential consequences if a specific actuator were to fail?

Effective monitoring and maintenance of all flow control equipment is essential. However, prioritising the highest level of care for the most critical actuators makes the difference. This proactive approach prevents not only costly shutdowns and extensive damage, but also protects lives.

Ensuring optimal performance of critical actuators

Critical actuators that manage flows in the oil and gas industry require ongoing monitoring and maintenance to ensure reliability. A service programme proactively maintains critical equipment to avoid failures. To understand the level of support a site needs, Rotork's engineers work with companies to consider each individual situation.

The goal is to identify the actuators within a facility that are most critical. These are the ones whose failure would result in the highest costs, the greatest challenges, or the most significant process interruptions. In a facility with 100 actuators, this might mean focusing on just 10 that require the highest level of maintenance due to the severe impact their unavailability would cause.

Not every actuator would cause a serious incident if it were to fail. Rotork offers reliability services, a tiered maintenance contract package. The three tiers – health check, standard maintenance, and enhanced maintenance – provide different levels of cover, but for severe service applications, the enhanced maintenance tier is likely the best fit. Companies can choose an enhanced package for actuators controlling their severe service processes and one of the other levels for less hazardous situations.

Under the health check tier, engineers conduct site visits to inspect actuators. However, the enhanced package offers a more comprehensive approach, with more frequent visits that include detailed inspections of internal components. Engineers remove covers to examine the actuators' internal workings and replace seals, oil, and parts as needed. This can be further enhanced with an intelligent asset management system, like Rotork's iAM, where data is gathered on critical metrics such as vibration, temperature, torque, number of starts, and instances of power loss.

This data is fed into an algorithm that enables the team to assess an actuator's health and make recommendations around maintenance, helping to head off failures, potential safety incidents, and process shutdowns. As industries move increasingly towards electrification, intelligent

asset management is very much linked to Rotork's IQ3 Pro range of electric actuators, which are fitted with data loggers.

Of course, safety is the most important consideration. One customer operating in Asia has a single actuator on a critical valve that would cost US\$1 million per day in downtime if it were to fail. So, whether it is safety or cost, an enhanced maintenance level of service support will likely be appropriate in some situations.

Sustaining performance: managing equipment lifecycles

The rise of electric actuation delivers greater precision, efficiencies, and environmental performance. A proactive approach to lifecycle management ensures actuators are consistently monitored and maintained as they age. This strategy also helps customers plan well in advance for replacement costs, offering both reliability, and financial predictability.

At industrial sites, actuators are categorised into four stages: preferred, supported, mature, or obsolete. For sites equipped solely with preferred products, spare parts are readily available, and engineers have the knowledge and experience to repair and service them. However, managing older actuators is equally important, and this is where lifecycle management and obsolescence strategies come into play, ensuring continued reliability and performance.

If some products are obsolete, spares may no longer be readily available and with older actuators, this is potentially an issue. Companies are likely to face delays while parts are sourced and some parts might no longer exist. Without available spares, they may need to be replaced entirely if a fault occurs.

If a site has 100 actuators that are all obsolete, they might still perform efficiently and could remain operational for another decade. However, if any become unavailable, what could have been a simple, cost-effective repair may instead require a full replacement – resulting in significantly higher expenses. If 10 fail at the same time, the company could face a large, unexpected cost.

Although obsolete actuators are typically excluded from service contracts, engineers remain committed to supporting customers across all assets, regardless of their age.

A recent obsolescence survey at one of the main fuel tanks at the UK's Gatwick Airport identified several obsolete actuators. As a result, the airport opted to replace 24 units and integrate the new actuators into its maintenance contract.

Specific technology has been developed to control critical actuators effectively and efficiently. Pakscan™ network protocol can control several motorised valves, including those in severe service applications, and can support the full automation of complex plants. This capability delivers savings in both time and costs.

It continuously monitors the actuators to ensure nothing

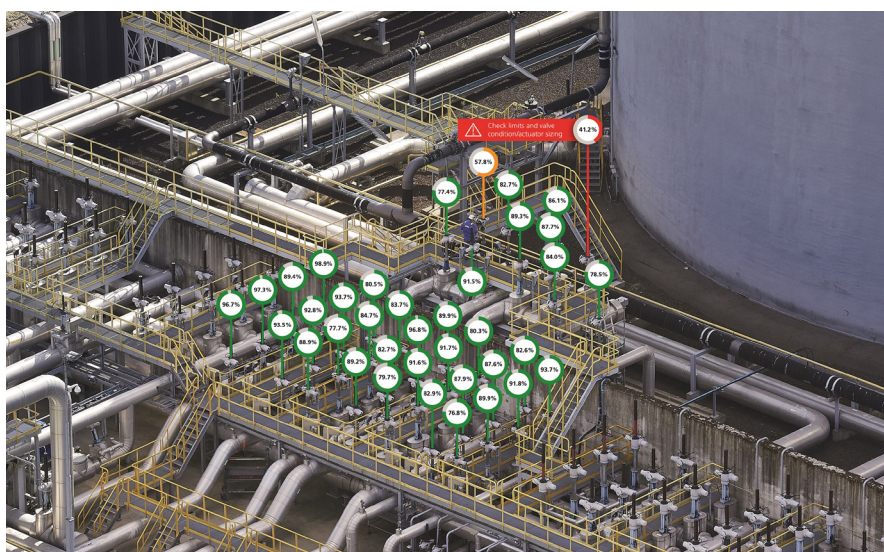


Figure 1. Asset management systems gather performance data for analysis.

unexpected is happening and enables an operator to override automatic settings to operate any individual actuator. For instance, an operator could precisely open a specific valve to 35% to alleviate pressure build-up.

Pakscan has been installed in one of the most significant offshore development projects in the Norwegian continental shelf, Johan Sverdrup. It controls hundreds of actuators, ensuring optimal performance. Rotork Service is also providing ongoing asset management and condition-based maintenance.

Pakscan can connect up to 240 electric actuators on a single 20 km, two-wire loop. It enables the remote control of actuators and valves and includes built-in field network



Figure 2. A reliable maintenance plan can help reduce downtime.



Figure 3. A Rotork service engineer carrying out a health check.

redundancy, ensuring uninterrupted control even in the event of equipment malfunctions or cable failures.

In-house aftermarket expertise: intelligent asset management for enhanced site control

Asset management technology offers multiple benefits, such as improving safety, reducing environmental damage, and scheduling, all of which can improve uptime. By addressing equipment issues promptly, potential problems can be resolved before they escalate into critical failures or cause unplanned shutdowns. Such shutdowns can be exceptionally costly and may also pose heightened risks to both safety and the environment.

An intelligent asset management programme analyses data log data to determine actuator conditions, predict upcoming issues, and recommend actions. These diagnostics include key insights like vibration analytics, usage statistics, torque profiles, and health scores.

Improving site uptime

One specific example of this can be found where a service programme helped improve a site's uptime and optimised its processes at a major petroleum terminal in Malaysia. The project involved the construction and maintenance of storage and distribution facilities needed to transport crude oil, petroleum, chemical, and petrochemical products to the Refinery and Petrochemicals Integrated Development (RAPID) tank farm. The end user ordered more than 570 intelligent IQ3 multi-turn actuators, which were ideal due to their operational accuracy, the ability to download the data logs, and power supply options. IQ3 actuators are also ATEX-certified and suitable for Safety Integrity Level 2/3 applications. Rotork service carried out extensive on-site commissioning. They provided field support for repairs, upgrades, and maintenance through a global network of fully trained and experienced service engineers. This onsite support helped to reduce downtime and improve operational efficiency.

Conclusion

Combining predictive and preventative maintenance provides operators with fixed costs, simplifying budget management. They also provide plans focusing on long-term maintenance and support, moving beyond simply dispatching engineers to address failures. This strategy helps manage the long-term sustainability of the entire facility, enhances uptime, and minimises unexpected repair costs.

Intelligent electric actuators can enhance safety, efficiency, and environmental performance. While ongoing maintenance is essential to all such devices, this becomes much more critical when controlling flows in severe service applications. Buncefield showed how poorly maintained equipment can have severe repercussions. Operators have hopefully learnt from the lesson it provided and act to ensure nothing similar happens again. 

Reference

1. 'Buncefield: Why did it happen?', Control of Major Accident Hazards, (2011). https://webarchive.nationalarchives.gov.uk/ukgwa/20220701173308mp_/https://www.hse.gov.uk/comah/buncefield/buncefield-report.pdf.