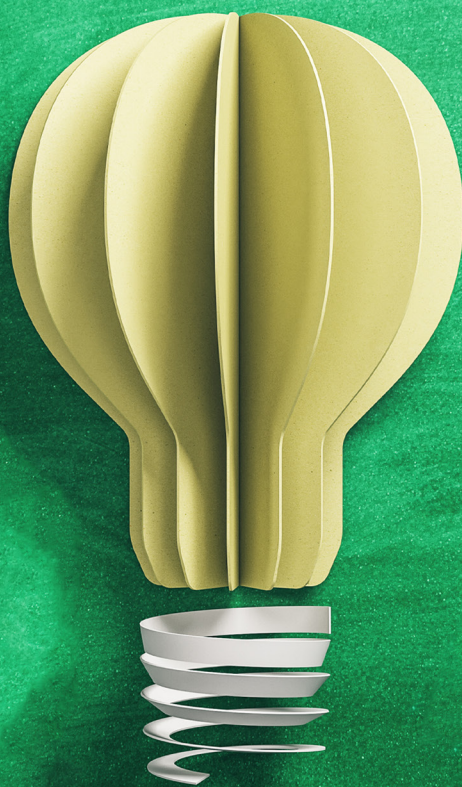


Intelligent flow control



Nicola Curtis, Rotork, UK, explains the importance of whole life cycle asset management within the oil and gas industry.

Effective flow control plays a vital role within the oil and gas industry. Actuators and related flow control products can be found in all applications within upstream, midstream and downstream activities, including offshore production facilities, refining, processing and transportation through pipelines and vessels. These key assets are worth protecting. This article will explore why a holistic maintenance programme is important and should be considered as part of the entire life cycle of an asset in order to gain maximum value for oil and gas customers. An asset management system can play an essential role in the long-term reliability and viability of the products, to prevent unplanned downtime and to ensure the successful delivery and distribution of oil and gas.

The benefits of intelligent flow control in oil and gas applications

Valve actuators can automatically and remotely control valves and are essential items of equipment that are used in the oil and gas industry – including on tank farms and terminals – to control the flow of liquids and gases. Actuators can be pneumatically, hydraulically or electrically powered.

Safety considerations are of overriding importance for tank farm operations. Automated flow control technology is used for safety related duties for the import, export and storage of a range of liquid bulk products. The reliable and accurate performance of actuators is an essential part of providing a safe, efficient and reliable plant. In automated tank farms, actuators are a constant presence. They can provide

isolating duties for routine flow control, fail-safe duties for vital safety-related actions, and modulating duties for process valve applications. Intelligent actuators are designed to provide operators with additional feedback information about the status of the valve through data logs, such as the number of valve operations, alarms, failures to respond events and valve torque profiles. This information can provide guidance on optimal maintenance regimes and asset replacement cycles through maintenance programmes. Straightforward set-up, as well as non-intrusive, double-sealed enclosures (prevention of water ingress and IP rated), makes intelligent actuators simple and efficient to commission and allows for use within explosion-proof environments.

Tank farm safety applications are perfectly suited to intelligent electric actuators, as they often include emergency shut down (ESD) capabilities to stop the flow of the product. This is essential in areas carrying hydrocarbons in case of dangerous events such as fire, flooding, or any event that renders continued operation a hazard. It is vital for tank farms because it ensures isolation in the event of such an incident. Partial stroke testing (PST) options can also be found within intelligent actuators, allowing valves to be function and safety tested without the interruption of key processes. Intelligent actuators are designed to connect to digital control systems; this is especially relevant on sites such as tank farms that use manifolds which can be comprised of many hundreds of



Figure 1. A Rotork engineer on an oil and gas site.



Figure 2. A programme for the maintenance of flow control assets has many benefits.

valves. Centralising control of actuation through a digital system can reduce operational costs.

The dangers of not maintaining assets correctly

Intelligent flow and process solutions maximise operational reliability and efficiency on tanks farms and other oil and gas applications. These assets must be capable of performing in challenging environmental and operating conditions, often experiencing long periods of inactivity or conversely frequent operation. These assets are also exposed to extreme temperatures, excess vibration and other influences which may affect their ability to operate with total reliability.

A comprehensive maintenance programme is important to help these hardworking assets operate at optimum performance, ensuring the availability of assets to perform the key duties they play within oil and gas applications.

Plant operators rely on actuators to function every single day. Good maintenance of flow control assets is key for the safe and efficient running of a site, irrespective of industry or application; the failure of critical assets always has severe implications. The result of asset failure, obsolescence, or not running smoothly includes poor process control and quality with reduced output yields, financial loss and reputational damage. The monetary impact of lost production due to unplanned downtime can be considerable, even if a site is only off-line for a short period. This can be compounded with fines from regulatory bodies due to the downtime of key services.

Increased asset availability through managed technical support and subsequent maintenance programmes improves product reliability over time and helps to avoid costly, unpredicted downtime. Ongoing technical support that solves challenges further helps to increase availability and reliability, leading to improvements in operational performance. Investment in a dedicated approach/system that looks after the maintenance and operability of assets increases the productive life of the key equipment that keeps a site running.

A holistic view of the whole life cycle of flow control assets

Effective asset maintenance plans must support and solve the challenges that plant managers face. Understanding the issues that plants face daily plays a key role in providing a service solution that addresses the individual problems they may have. Working closely with the end-user to gain a full understanding of the processes of a site always allows for the best actuation solutions to be achieved.

A programme for the management of key assets must make it easy and convenient for operators to identify and access the specific services that they need to improve the reliability, availability and performance of their plant assets. Defining an asset strategy allows for true asset life to be determined and life cycle management to be performed. This can significantly reduce the long-term cost of ownership and demonstrate the long-term value of a site's flow control assets. Updating and maintaining assets will almost always occur while the rest of the site is still operating. Experienced service engineers must therefore work to ensure that there is no disruption to the production process. For example, in 2019, Rotork began a contract with a refining company in Malaysia

to look after a complex infrastructure of hundreds of actuators as well as to control and field bus systems across multiple sites. These had to be considered within the context of all the other essential assets that made up the site. The stated aim was to identify and address potential issues before they occurred. It is essential in similar situations to have knowledge and understanding of where flow control assets sit within this system and consider the impact of asset maintenance upon a big picture.

A service plan for flow control assets should have a holistic view of an asset's life cycle and move towards whole life cycle and asset management. Any strategy must plan for long-term maintenance and support, as well as equipment that needs immediate attention. It should also consider the management of potential obsolescence, which can cause significant life cycle challenges. Many sites will have assets and equipment at different stages of a product life cycle working alongside each other. For example, on one pipeline, an electro-hydraulic actuator may provide safety duties on ball and butterfly valves, while intelligent electric actuators may provide isolating duties. On another site, production could be aided by process control actuators for continuous, repeatable modulating control (such as maintaining back pressure in a coal seam) while electro-hydraulic actuators provide critical fail-safe duties. Other essential flow control equipment may be on site, installed at different times and with different natural life spans. Plant operators and service providers must therefore work together to consider the critical nature of each asset and put a system in place of preventative maintenance. Sites who work with a full life cycle asset management programme, such as

Rotork's 'Lifetime Management' programme, are likely to see increased uptime, a decrease in unexpected maintenance costs and improved performance. When assets are cared for, they will carry on performing for longer.

Maintenance programmes can provide a set cost to the operator, keeping budgets at a guaranteed level. Plant managers will have security with reliably forecasted annual costs and will not have to consider unplanned one-time purchases to replace assets. Flexibility and customer choice are key and different options should be available. A tiered approach to maintenance, providing progressively increased levels of coverage and support, means that customers can tailor a maintenance strategy to ensure continued availability of their flow control assets. An asset management programme with flexibility of appropriate cost levels and services places the customer exactly where they should be – in charge of their own assets.

Conclusion

Oil and gas sites will always have flow control assets in place. Effective flow control is essential for the safe and efficient import, export and transfer of oil and gas products. Essential facilities such as terminals, tank farms, pipelines and refineries must always operate at optimum efficiency, with minimal unplanned downtime to interrupt production. A planned maintenance programme that maintains and improves these key assets, while considering the risks associated with advances in technology, asset obsolescence and ageing equipment, is the most effective way to gain increased uptime and reliable operation. 