

rotalk

FLOW CONTROL NEWS FROM ROTORK

PAGE

6

PAGE

9

PAGE

11

PAGE

20

FOCUS

Rotork's role in the emerging hydrogen landscape

PRODUCT

Backwards compatibility of 60 years with the launch of Rotork's IQ3 SET actuator

OIL & GAS

Rotork provide flow control solution at Johan Sverdrup, ground-breaking Norway oil field

CPI

Production of carbon-free hydrogen with CVL actuators

rotork[®]

Keeping the World Flowing
for Future Generations



FOCUS

- How whole life cycle asset management is key to your success **3**
- Rotork's role in the emerging hydrogen landscape **6**
- How data analysis drives improved performance and site uptime **7**

PRODUCT

- Rotork Lifetime Management Services **8**
- Backwards compatibility of 60 years with the launch of Rotork's IQ3 SET actuator **9**
- Improved YT-3400 valve positioners from Rotork deliver enhanced hardware and diagnostics **10**

APPLICATION OIL & GAS

- Rotork provide flow control solution at Johan Sverdrup, ground-breaking Norway oil field **11**
- Rotork assist Belgian gas transmission operator with reduction of greenhouse gas emissions **12**
- Hundreds of Rotork actuators to be used on southern Indian pipeline **13**

APPLICATION WATER & POWER

- Rotork IQ actuators control water at Grand Coulee Dam in Washington State, USA **14**
- Rotork provide electric actuation technology at New Zealand water treatment plants **15**
- Texas water treatment plant boosted by Rotork's K-TORK actuators for ultrafiltration processes **16**
- Rotork electric actuators installed to upgrade Chicago water purification plant **17**
- Over 700 CK modular actuators installed at Chinese wastewater treatment plant **18**
- K-TORK pneumatic actuators used in biggest planned ultrafiltration retrofit in US history **19**

APPLICATION CHEMICAL, PROCESS & INDUSTRIAL (CPI)

- Production of carbon-free hydrogen with CVL actuators **20**
- Green battery factory in Sweden supported by Rotork actuators **21**
- Rotork electro-hydraulic actuators provide critical safety function in Malaysian rail network **22**
- Rotork assists BAE Systems in upgrades to Portsmouth Royal Naval Base **23**
- Actuator control network solution provided at Spanish chemical processing plant **24**

- Rotork Site Services **25**



HOW WHOLE LIFE CYCLE ASSET MANAGEMENT IS KEY TO YOUR SUCCESS

Effective service support is rightly considered as an essential part of production and manufacturing.

SUMMARY

With regular servicing and maintenance, production sites can run smoothly and efficiently. Quality service offerings and asset maintenance increase plant efficiency and productivity, reduce ultimate maintenance costs and minimise levels of risk. But is a reliable and safe service offering always given the priority and investment it should?

The biggest challenge of poor maintenance and asset upkeep is the unintended downtime that accompanies product breakdown. This could result in financial loss and even regulatory fines.

This article will explore the issues and implications that poor asset management can bring to a site and show how Rotork's Lifetime Management programme can assist in preventing asset and production downtime before it occurs.

HOW ASSET DOWNTIME CAN AFFECT YOUR BUSINESS

In a manufacturing or plant setting, one of the most serious problems that can occur is the failure of the key assets that keeps a site running smoothly. Production sites can only run efficiently (without costly downtime), if assets are continually available and correctly maintained. If an asset breaks, becomes obsolete or is not running at ultimate efficacy, the implications can be severe.

Equipment failure can result in poor performance, poor quality and reduced output yields. Additionally, your reputation may be liable to damage if key services are interrupted.

The most obvious effect of an asset failure and the inevitable downtime is financial loss. If a production facility is not able to function and run normally, the monetary



REGULAR SERVICING AND MAINTENANCE PLANS ENSURE SITES CONTINUE TO RUN SMOOTHLY AND EFFICIENTLY.

impact from loss of production can be considerable.

This can be the case even if a site is offline for a short period of time. In every instance, preventative or predictive maintenance is a more cost effective option than expensive downtime.



ASSET MANAGEMENT CAN REDUCE THE LONG TERM COST OF OWNERSHIP AND INCREASE UPTIME.

There is a possibility for other financial considerations; regulatory bodies may issue fines for downtime to key services, such as a power station or a utility company.

Your reputation is liable for damage if your production flow is disrupted. For many sites (such as utility providers) there is an expectation of constant supply and customers may only think about them when something goes wrong, such as a failure to supply. It takes only a short interruption for reputation to be damaged.

Dave Godfrey, Product Manager – Service & Aftermarkets at Rotork, said: “The ultimate challenge that will arise from

poor maintenance and asset upkeep is unintended downtime caused by product breakdown. Losing the operation of an asset will cause financial burden and other downtime impacts like fines from regulatory bodies and potential damage to reputation.”

MOVING BEYOND A “BREAK/FIX” MENTALITY TOWARDS WHOLE LIFE CYCLE ASSET MANAGEMENT

Effective asset management is one of the most important considerations you can take for the long term reliability and viability of your assets and therefore for your site processes. Economical management can reduce the long term cost of ownership and increase uptime.

If not given the correct attention and investment, there is a danger that the main consideration is reactive maintenance; a part or product breaks and needs to be fixed. But to truly prevent costly downtime, a service plan needs to have a holistic view of preventative maintenance and move towards life cycle and whole asset management. A truly effective maintenance programme moves beyond the notion of “break/fix” and even past “plan/maintain” and explores what happens if assets are not considered with a holistic view; it

should take into account an asset’s whole life cycle, including the management of potential obsolescence. If approached in this way, maintenance can be considered as predictive. A maintenance strategy needs to not only take into account instances of one piece of equipment breaking and requiring a fix immediately, but planning for long term maintenance and support. A holistic and long term view can increase uptime, eliminate unexpected maintenance costs and help manage the whole life cycle of essential equipment and assets.

Service experts, like those from Rotork Site Services, will look at an entire process and facilitate the support and maintenance in place of site workers. Dave Godfrey said: “If service experts manage and take away the responsibility of the individual asset, then those on site can refocus their time and attention on the running of the operation of the site as a whole. This leads to site efficiencies and a focus on improving site processes. The customer can focus on what they are experts in- and let us focus on helping to maintain reliable process availability. We have the skills and experience to look beyond fixing an asset if it breaks; we can work with you to have a full life cycle asset management programme so that we know when an asset will need support.”



LIFETIME MANAGEMENT REDUCES THE CHANCE OF FINANCIAL AND REPUTATIONAL DAMAGE.

LIFETIME MANAGEMENT - A COMPLETE SOLUTION TO THE MANAGEMENT OF ASSETS

Customers who work within a full life cycle asset management programme will see their investment delivering improved performance, reduction of costly downtime and an increase in asset reliability. Rotork's Lifetime Management programme is the customisable suite of services within Rotork Site Services designed to seamlessly maintain and improve your assets; we offer bespoke levels of maintenance processes to the individual needs of customers. It assists with the migration of technology, whilst avoiding the disruption of obsolescence, allowing for a reliable operation that is always available and up to date. As the original designers and manufacturers, we are the best place to go to get the highest levels of service possible.

The aim of Lifetime Management is to provide you with constant support and minimum- to- no disruption to your production flow. We manage the inherent risks associated with advances in technology, component obsolescence and aging equipment for you. Supporting the continuous and reliable operation of your plant allows for improved performance and increases in valuable uptime. A predictive maintenance strategy can facilitate continuing high production demands. Lifetime Management ensures maximum reliability and availability of assets through a world class service operation, ultimately reducing the cost of ownership and maintenance risks. This means customers can maximise their production output, take control of their costs and manage the risks of downtime and reputation

damage through a focus on constant asset availability and site uptime.

BUDGETS AND COST FLEXIBILITY

The set cost of a programme like Lifetime Management brings benefits from a budget standpoint. It keeps costs to a guaranteed and manageable level because customers will always know what their costs will be and what services they will receive. With increasing changes in the global market, budgets are likely to move away from CAPEX towards OPEX. A service programme that supports anticipated and recurring spending, rather than expensive one-time purchase and replacement, will support the long term forecasting and viability of your business.

Dave Godfrey said: "Within the world of service and aftermarkets, we know that what matters to customers is support and efficiency. With Lifetime Management, we offer complete support and easy forecast spending. Our customers want to know that we can support their products if they need our help (in terms of spare parts and service), but they also want to know that we have the expertise to offer true lifetime solutions. We are the OEM of Rotork products, so we are the experts in managing their life cycle. We can tell customers everything they need to know, all with the end goal of the maximum uptime possible, in a way that is manageable for them."

Reliability Services is the part of Lifetime Management that is especially appropriate when considering budget spend. It is a tiered approach to maintenance, with four Management that is especially appropriate

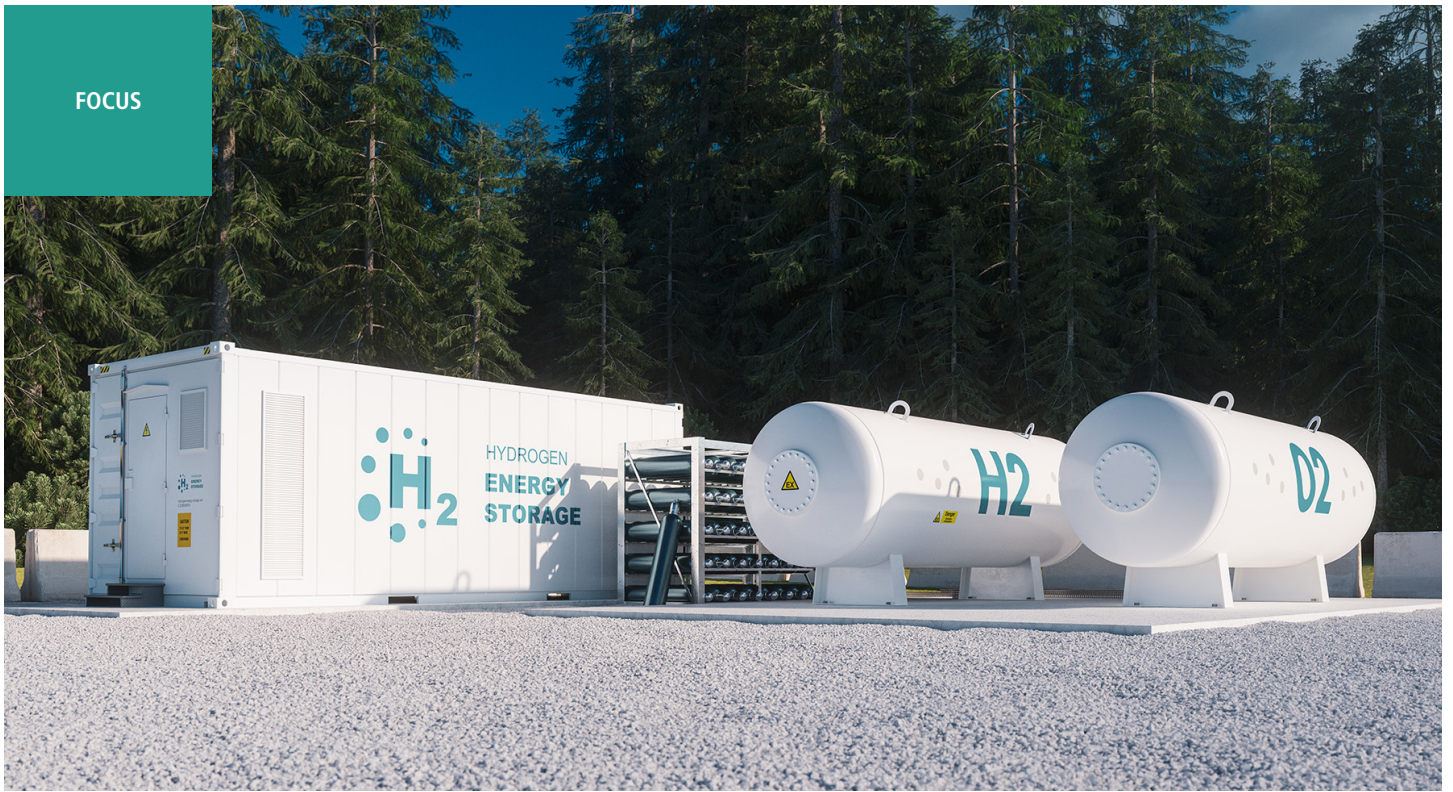
when considering budget spend. It is a tiered approach to maintenance, with four options (Health Check, Planned Maintenance, Enhanced Warranty and Predictive Maintenance) that provide progressively increased levels of coverage and support. Our tailor-made programmes increase reliability and availability and allow customers to have flexibility about what services and cost levels are most appropriate. Some services may be offered as standalone options.

CONCLUSION

The most serious problem that can occur on a production plant, facilities provider or other operations site is lack of production. If key equipment and assets are not correctly maintained and serviced the implications of unplanned downtime can be severe, with financial and reputational impacts.

The solution is a planned, or even predictive, maintenance strategy. An effective programme must engage with individual needs and consider the whole life cycle management of assets. Long term planning of asset maintenance helps manufacturers, plant operators and businesses to continue operating, manufacturing and producing in a smooth and organised way.

Rotork's decades of expertise in actuation and flow control mean that all service offerings are designed to give the support we know our customers need. Dave Godfrey, said: "To truly understand Rotork assets, there is no-one better than Rotork. We provide lifecycle management of Rotork products to ensure process continuity. We've got a history of over 60 years of actuation and we understand the industry. At Rotork, we not only support our customers throughout the whole life cycle of their assets, we invest heavily in research and development, which feeds directly into our Service and Quality teams. Our customers in the field can be assured that our expertise and knowledge of actuation and flow control means we will support them through every stage, increasing their uptime and improving their performance."



ROTORK'S ROLE IN THE EMERGING HYDROGEN LANDSCAPE

Hydrogen has clear potential to play an important role as the world transitions to clean, low-carbon energy.

A reduction of greenhouse gas emissions is essential in achieving The Paris Agreement's goal of limiting global warming to between 1.5 and 2 °C. Hydrogen production will play a significant role in reducing these emissions; it offers a fuel source that is carbon free when it is burnt, producing zero carbons at point of use. Hydrogen can be used as a transportation fuel, heating source, in fuel cells and as a feedstock in industrial processes (e.g. steel and chemicals production). Most of the world's hydrogen is currently produced using fossil fuels such as coal and natural gas, but it can also be made with renewable energy sources. "Green hydrogen" is created by using nuclear or renewable energy as the feedstock.

Flow control products can be found in almost every process control application throughout the green hydrogen industry, from renewable power generation to hydrogen production, storage, distribution and consumer delivery.

An emerging technology within green hydrogen is the use of electrolysis to create hydrogen; an electric current is applied to water, splitting it into hydrogen and oxygen. The energy used in this process is usually a surplus from renewable sources.

A recent example of flow control within electrolysis to produce green hydrogen is the critical role played by Rotork CVL process control actuators for a French equipment manufacturer. Each electrolysis skid was equipped with multiple CVL actuators mounted on globe valves to regulate the pressure and level of the water at the heart of the electrolysis process. The precise control provided was essential.

The fail-safe functionality of the actuators was important and their ATEX IIC certification was a further requirement. It is important that actuators like these provided high levels of safety and reliability in explosive environments.



ROTORK'S CVL ACTUATORS ARE USED IN THE PRODUCTION OF GREEN HYDROGEN THROUGH WATER ELECTROLYSIS.



DATA LOGS PROVIDE TORQUE, TEMPERATURE, VIBRATION AND EVENT LOG INFORMATION.

HOW DATA ANALYSIS DRIVES IMPROVED PERFORMANCE AND SITE UPTIME

The availability of flow control assets is essential for a site to achieve its core objectives. Asset failure, obsolescence or inefficiency can result in reduced output, damage to reputation and financial loss.

The day-to-day availability of flow control assets is important enough that they must be carefully managed by dedicated maintenance services. Sites with a life cycle asset management programme can see a decrease in unplanned maintenance costs, improved performance and increased uptime.

A proactive and dynamic service/maintenance plan must offer management of assets in a way that provides a holistic view of the life cycle of an asset, using innovative technology to assist with the increases in availability and reliability which will lead to improvements in operational performance. Performance data from flow control assets can be analysed to understand what actions must be taken to

extend lifespan and ensure optimum performance. The existence of such predictive maintenance systems, based on data, is part of the phenomena of the Industrial Internet of Things (IIoT). Information technology and operational technology combine to monitor, collect, exchange and analyse data. Intelligent electric actuators are flow control assets that are valuable because of their reliability, efficiency, ease of use and their ability to capture vital historical data. Rotork has included a data logger within IQ actuators since 2000, making them ideal for use within asset maintenance systems that are part of the IIoT.

Intelligent actuator technology provides a large amount of data, such as the number

of valve operations, alarms, valve torque profiles and unauthorised operation attempts. Analysis of torque in particular is of critical importance in valve and actuator operation. This information can be used by Rotork's Intelligent Asset Management. Data is presented in easy-to-understand visuals, with summary views and colour coded maps. Complex information is translated into simple and accessible reports. Operators are then informed and able to make proactive decisions. Intelligent Asset Management removes the need to manually review key data, saving time and reducing the likelihood of missing seemingly minor issues that could develop into serious and costly problems. It results in predictive maintenance that plays a key role in prioritising service requirements, increasing plant availability and reducing unplanned downtime. Early identification of anomalies can save future extensive and expensive repairs.

Asset management systems of this kind provides customers with the information they require to understand the health of their flow control assets and to act to increase uptime. For example, at a power station in India, 36 critical IQ actuators were monitored by Intelligent Asset Management. Monitoring for causes of drive bush degradation or failure was used to identify early signs of potential failure of valve stems.



ROTORK LIFETIME MANAGEMENT SERVICES

Lifetime Management changes the way that Rotork Site Services (RSS) operates, with an increased focus on ensuring the most appropriate response based on the criticality of the customer’s application.

THE FOUR TIERED APPROACH IDENTIFIES THE UNIQUE NEEDS OF A CUSTOMER AND PROVIDES APPROPRIATE SUPPORT.

The four tiered approach identifies the unique needs of a customer and provides appropriate support. These tiers are Health Check, Planned Maintenance, Enhanced Warranty and Predictive Maintenance.

A **Health Check** is an assessment of actuator asset condition relative to design specification and operational use. Through this, we help the customer to identify the condition of their current assets and suggest an appropriate maintenance plan.

The **Planned Maintenance** tier encompasses thorough, intrusive product inspections and pro-active repair management. The data logger and configuration will be benchmarked, environmental O-rings and batteries may be replaced (if necessary) and functional tests

(manual, remote and local) will be carried out. Additionally, Planned Maintenance provides access to spare parts as part of our obsolescence programme.

Enhanced Warranty provides an extended warranty period and condition-based monitoring. This encompasses at least two Health Checks a year and a review of historic performance, obtained through data logger interrogation.

The final tier, **Predictive Maintenance** encompasses everything that the previous tiers provide, with the added provision of identifying potential problems before they are able to manifest. Data logger records are analysed and the patterns which occur prior to failures are identified. If these patterns are later identified within

functioning actuators, we work with customers to proactively implement mitigation plans.

Dave Godfrey, Rotork’s Services & Aftermarkets Product Manager, commented: “Lifetime Management centres around maximising process uptime and asset availability for our customers. The different levels of support on offer allow our customers to mix and match in order to design a truly bespoke level of support to best match their individual site needs. Having Rotork involved in the management of their assets will allow them to keep up to date with product support and service as their installation base matures.”



BACKWARDS COMPATIBILITY OF 60 YEARS WITH THE LAUNCH OF ROTORK'S IQ3 SET ACTUATOR

Rotork Lifetime Management, the innovative service and maintenance programme from Rotork, has been enhanced by the launch of IQ3 SET, offering backwards compatibility to the 1960s.



SEAMLESS INTEGRATION INTO EXISTING PLANT ARCHITECTURE AND NO NEED TO CHANGE EXISTING CABLES OR CONTROL SYSTEMS.

The backwards compatibility offered by the IQ3 SET is appropriate for legacy actuators on sites that have non-integral starters (known as "SyncroSET"). This backwards compatibility for SyncroSET actuators is part of our commitment to working with our customers to understand the full life cycle of their assets. The IQ3 SET feature facilitates obsolescence management and future-proofs plants without affecting the plant infrastructure. It is a bridge between legacy products (stretching back to Rotork A-Range actuators) and investment in the latest actuation technology. It is compatible with existing site cabling and control systems, so there is no need for new cabling and associated costs. There is minimal downtime during upgrades.

Ageing plant infrastructure and equipment plays an important role in the consideration of risk management, proving increasingly difficult to maintain as parts become obsolete, or difficult and expensive to source. To ensure continued operation and effective performance, site operators may need to consider updating technology to future-proof their sites. Customers can manage obsolescence concerns by replacing legacy actuators with the latest intelligent actuator platform by installing IQ3 SET.

The IQ3 SET option works with and supports the features of older versions, with seamless integration into existing plant architecture and no need to change existing cables or control systems.

Rotork understands the importance of supporting the continuing high performance of legacy products for our customers and the value in making upgrades or changes simple, convenient and economical. IQ3 SET allows access to the many benefits an IQ3 brings to modern plant and network design, operation and maintenance, ensures continuous reliability, connectivity and performance, and offers advanced IQ3 functionality.



IMPROVED YT-3400 VALVE POSITIONERS FROM ROTORK DELIVER ENHANCED HARDWARE AND DIAGNOSTICS

Rotork has improved its range of smart positioners to offer enhanced diagnostic and operating abilities.

SUITABLE FOR ALL MARKETS, THE ENHANCED YT-3400 SMART POSITIONERS CAN BE USED FOR BOTH PROCESS CONTROL AND ON/OFF VALVE APPLICATIONS WHERE DETAILED DIAGNOSTICS ARE REQUIRED.

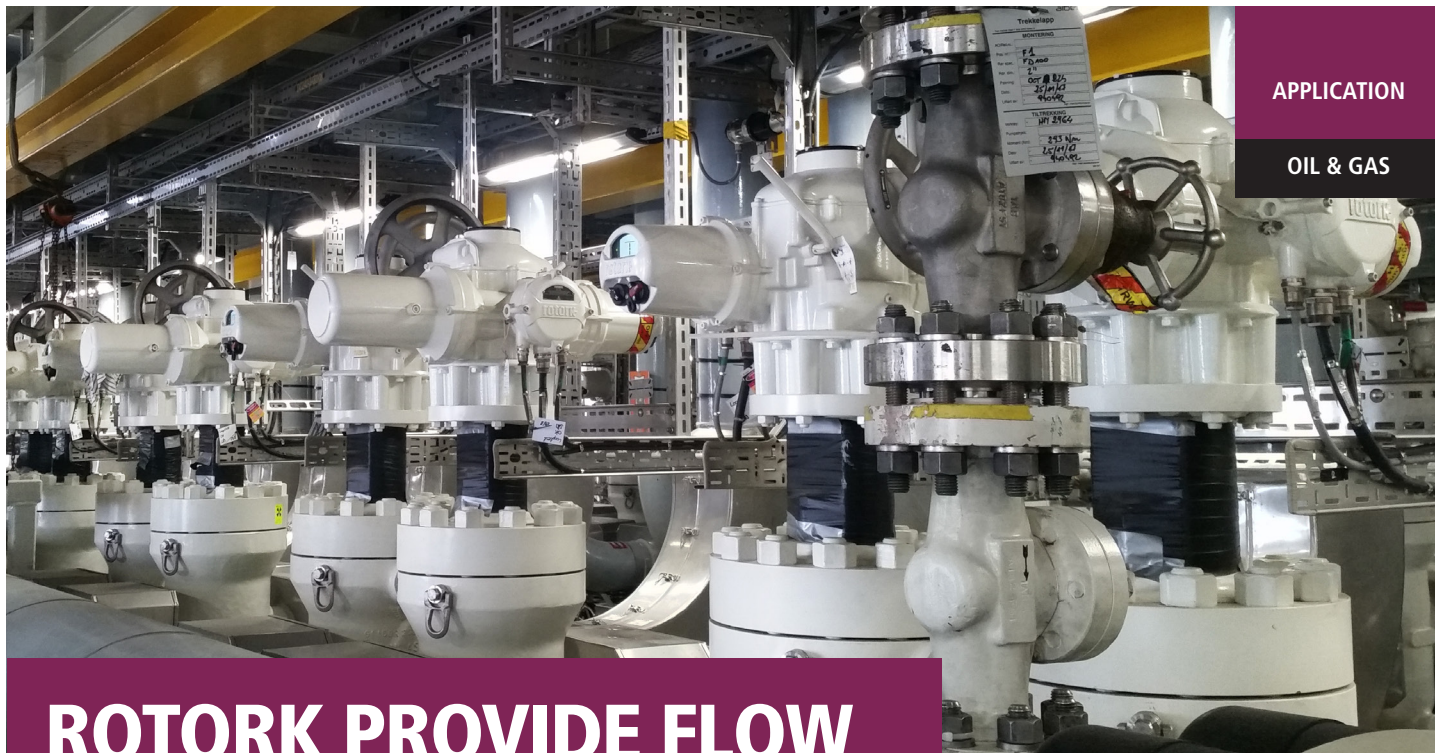
Valve positioners adjust an actuators position based on a control signal to meet specific process parameters (such as flow, pressure or temperature). This precise control of a valve actuator's position makes Rotork's smart positioners ideal for process control applications. The addition of enhanced diagnostic capabilities makes these positioners a great asset for on/off valve applications where detailed diagnostics are required.

The YT-3400 smart valve positioner has undergone extensive hardware and software development to extend and enhance Rotork's range of smart explosionproof pneumatic positioners. The YT-3400 range is available in multiple housing options (aluminium and stainless

steel) for different regional certification requirements, making it highly versatile and ideal for a broad range of applications.

The YT-3400 now has improved diagnostic information and alarm monitoring, as well as offline diagnostic capabilities. Valve signature, advanced step tests and Partial Stroke Test (PST) can be operated from local or remote positions. Local display and push buttons allow fast setting and commissioning operations. The internal non-contact sensor (NCS) has been developed to increase stability and performance, reducing possible movement around the set point in extremely fast control systems. It no longer uses gears, reducing mechanical hysteresis and potential wear, resulting in more precise

positioning around the set point. The printed circuit board, chip and electrical components have been updated to increase calculation speed, reactivity and dynamic performance. Auto-calibration, tests and automatic mode analysis have been enhanced, reducing downtime and operating time. These digital valve positioners are well-suited for use with control valves, operating valve modulation inside various production processes. They are also ideal for critical on/off applications in oil and gas processes, such as Emergency Shutdown (ESD) isolation systems.



ROTORK PROVIDE FLOW CONTROL SOLUTION AT JOHAN SVERDRUP, GROUND-BREAKING NORWAY OIL FIELD

Rotork provided intelligent electric actuators to the Johan Sverdrup oil field in the North Sea, aiding in its electrification project.

THIS ELECTRIFICATION PROJECT IS TO REDUCE THE LEVELS OF CARBON DIOXIDE CREATED DURING THE OIL PRODUCTION PROCESS.

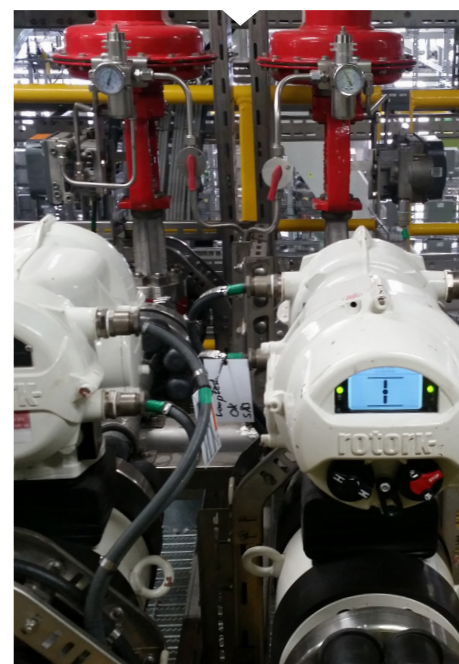
The Johan Sverdrup oil field is operated by energy company Equinor. Known as the North Sea Giant, the Johan Sverdrup oil field is set to be one of the most important industrial projects in Norway during the next 50 years. Equinor ordered in excess of 700 of Rotork's IQ multi and part-turn actuators for the oil field which is located approximately 150 km away from the coast of Stavanger. At peak production, Johan Sverdrup will produce 25% of all Norwegian petroleum.

Using electric flow control aimed to reduce the levels of carbon dioxide created during oil production. Rotork's IQ multi and part-turn intelligent electric actuators now provide an extensive range of flow control services across the drilling, riser, process and living quarters. They control everything from the supply of water to engineers in

their living quarters on the platform, to the precise control of flow needed for the extraction of oil. The choice of intelligent electric actuators assisted Equinor in the goal of a platform that produces oil in a way that creates a reduced level of emissions; IQ actuators have no need for compressors, no leakage, low inactive energy use and no need for gas venting.

The electric actuators are linked using Rotork's leading Pakscan™ network bus system controlled by 17 Rotork Master Stations.

Six more have been ordered for Phase Two of the Johan Sverdrup project. Rotork Site Services (RSS) are providing ongoing asset management and condition-based maintenance for all actuators installed on the platform.



APPLICATION

OIL & GAS



ROTORK ASSIST BELGIAN GAS TRANSMISSION OPERATOR WITH REDUCTION OF GREENHOUSE GAS EMISSIONS

Part-turn intelligent electric actuators from Rotork have been installed at several gas pressure reducing stations in Belgium to provide reliable flow control without the release of undesirable greenhouse gas emissions.

Rotork has a long-standing history with Fluxys Belgium, which operates 4,000 km of pipeline, a liquefied natural gas terminal and an underground storage facility in Belgium. The IQT actuators ordered by Fluxys Belgium operate butterfly valves on boilers in unmanned gas pressure reducing stations that reduce the pressure of natural gas so that it can flow through a network which operates at a lower pressure or be transferred to an end customer's facilities. This operation brings about a cooling of the natural gas and therefore requires natural gas to be pre-heated by boilers to keep the downstream temperature within a certain range.

The existing actuators on these sites used gas in the pipelines as the control medium, resulting in undesirable venting of greenhouse gas emissions into the atmosphere. To avoid these emissions and to reduce Fluxys Belgium's environmental footprint, Rotork Site Services and local agent Prodim installed electric actuators, retrofitting them onto existing valves. The valves regulate the flow of gas within this process.

The boilers will now provide a more precise regulation duty, are reliable and prevent any emissions that the previous actuators created.

ELECTRIC ACTUATORS INSTALLED AT GAS PRESSURE REDUCING STATIONS.



The installation of IQT actuators has allowed for extremely accurate flow control, no emissions, easy set-up, diagnostics and reliable operation. Rotork Site Services retrofitted IQTs onto existing valves on the multiple sites, with design and execution of mounting kits, site installation, commissioning and training supplied in partnership with Prodim.



HUNDREDS OF ROTORK ACTUATORS TO BE USED ON SOUTHERN INDIAN PIPELINE

The pipeline stretches across southern India and transport supplies from a key refinery. Due to the large scale of the project, a large number of actuators are required and Rotork's CMA, IQ and SI ranges have all been specified.

OVER 300 ROTORK ACTUATORS HAVE BEEN SPECIFIED FOR USE ON AN INDIAN PIPELINE ALMOST 700 KM IN LENGTH.

The customer selected the CML-1500 and CML-3000 actuators primarily for fail-safe motor operated valve (MOV) and modulating globe valve operation. They will be installed at remote locations along the 695 km pipeline, where manual operation would not be practical. Additionally, they are a low power consumption solution (less than 1 Watt at standby) which makes them ideal for remote applications.

Electro-hydraulic SI actuators will also be installed to provide safety critical fail-safe duties on the pipeline. These were selected due to requirement of SIL3 certification and their high torque output, meaning that they are able to provide fail-safe solutions on the larger valves on the pipeline. With a linear torque output of up to 4,580 kN

(1,029,625 lbf) and a part-turn torque output of up to 500,000 Nm (368,781 lbf.ft), these actuators are designed to meet today's control and safety needs.

Rotork's IQ range of intelligent electric actuators will be installed on ball valves and plug valves along the length of the pipeline. These will be providing vital isolation duties, ensuring that the supplies of oil and gas can be cut off in the event of an emergency, therefore helping to eliminate the risk of fire or explosion.

These actuators are explosionproof and continue to provide position tracking even on loss of power, making them appropriate for pipeline applications.

The actuators will all be linked by Rotork's leading Pakscan™ network bus system and connected via Rotork *Master Stations* installed at substations along the pipeline. Up to 240 field devices on a 20 km 2-wire loop can be controlled by a single *Master Station*, making them ideal for applications where remote control of actuators will be essential. The Rotork *Master Station* is available in single or dual configuration, while a hot standby option provides a replica unit to assume network control and ensure reliability.

APPLICATION

WATER & POWER



ROTORK IQ ACTUATORS CONTROL WATER AT GRAND COULEE DAM IN WASHINGTON STATE, USA

The Grand Coulee Dam Washington State, USA, is the largest producer of hydroelectric power in the United States.

It is a gravity dam, with three hydroelectric power generating plants and a pump generating plant (which works to create energy from a back-up reservoir at a higher elevation when demand is high) which provide a total generating capacity of 6,809-megawatts. The site has a total of 33 hydroelectric generators. IQ actuators have been installed as part of an overhaul project to operate cone valves.

The third power plant at the Grand Coulee Dam is the newest plant on site, but over the last decade has been overhauled to ensure efficiency and long term, dependable service. This has meant the

overhaul of six hydroelectric generators, plus turbines, shafts, and auxiliary equipment.

IQ actuators have been installed on site at the Nathaniel Washington Powerplant to operate cone valves, which allow precise control of water through penstock systems. The gradual opening of the valves, controlled by the IQ actuators, allow for penstocks to be gradually filled. The accurate control provided by the IQs is central in preventing "water hammer", or hydraulic shock, which is a damaging pressure surge which occurs when a fluid stops or changes direction suddenly,



**IQ ACTUATORS PROVIDE
ACCURATE CONTROL.**

The huge amount of water being controlled at the Grand Coulee Dam means this is a genuine concern; precise and gradual control of valves by IQ actuators prevents any risk of pipe collapse or other damage. The customer chose IQ actuators because of their automation, precise control, compact size and integral motor starters. They are watertight and suitable for use in hazardous areas, making them ideal for use within the overhaul of the Grand Coulee Dam.



ROTORK PROVIDE ELECTRIC ACTUATION TECHNOLOGY AT NEW ZEALAND WATER TREATMENT PLANTS

Rotork IQ and IQT actuators have been fitted on several water treatment plants in New Zealand.

The Matamata (home of Hobbiton in the Lord of the Rings movies) Piako District Council, of New Zealand's North Island, have chosen to upgrade multiple sites from pneumatic to electric actuators.

The flow control of three large water treatment sites in Morrinsville, Matamata and Te Aroha, as well as smaller sites in Te Poi, Hinuera and Te Huna, will be upgraded when existing pneumatic actuators are replaced with actuators from Rotork's IQ range.

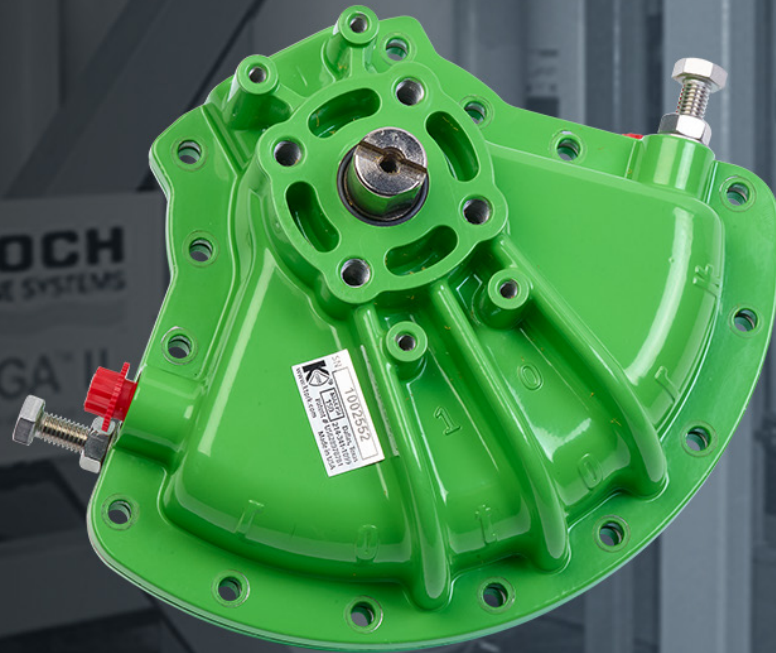
Rotork will supply these with stainless steel pedestals where required.

The Matamata Piako District Council wished to upgrade to the benefits of electric actuators because of concerns with the previous set-up; the old actuators had continual problems with sticking. This was caused in part because of the damp, chlorinated atmosphere in which they were operating. This caused degradation to the aluminium actuator body. The sites are also operated remotely, so engineer safety when dealing with any breakdowns was a prime concern. The supplied IQ actuators provide control of filters, as well as the chemical dosing and storage of potable water. The use of electric actuators will reduce the

USING ELECTRIC ACTUATORS WILL REDUCE THE MATAMATA PIAKO DISTRICT COUNCIL'S ENERGY BILL.

Matamata Piako District Council's energy bill, as they will no longer have to power compressors to provide an air supply to the pneumatic actuators.

Actuators across the IQ range were ordered, including IQT and IQS variants. These reliable and robust actuators provide an innovative electric flow control solution, with an intuitive user interface (HMI), absolute position sensor, water ingress protection and detailed data logging.



TEXAS WATER TREATMENT PLANT BOOSTED BY ROTORK'S K-TORK ACTUATORS FOR ULTRAFILTRATION PROCESSES

A water treatment plant in Texas, USA has ordered hundreds of Rotork's K-TORK rotary vane actuators for its ultrafiltration system.

San Felipe Springs Water Treatment Plant is based in the City of Del Rio, Texas. It is supplied by water from the nearby East and West San Felipe Springs and uses an ultrafiltration system to process the water. The centre has an incoming flow of 18.2 million gallons per day. The treated water serves the population of Del Rio and the nearby Laughlin Air Force Base.

The primary process used is ultrafiltration, which removes unwanted particles from the water. Membrane systems such as this provide treated water that has been pushed through a thin membrane that removes

solids and contaminants, resulting in water suitable for drinking.

Nearly 400 K-TORK rotary vane actuators were ordered for the San Felipe Springs Water Treatment Plant to aid in the ultrafiltration process. These highly accurate and reliable units are to replace existing actuators to ensure reduced maintenance and replacement costs. The client chose Rotork and K-TORK actuators because of the benefits of reduced maintenance and lower replacement costs compared to their previous units, as well as the reliability of its products and support that Rotork can offer.

NEARLY 400 K-TORK ROTARY VANE ACTUATORS HAVE BEEN ORDERED FOR THE SAN FELIPE SPRINGS WATER TREATMENT PLANT TO AID IN THE ULTRAFILTRATION PROCESS.

Kevin Froneman, Gulf Coast Sales Manager – Municipal Water & Power, Rotork, said: "We worked very closely with our local channel partner WWaterTech, Inc. on this project to provide continuous support. We advised on processes changes and initially installed a demonstration K-TORK actuator for a period of eight months to demonstrate its abilities, before the large order was placed. There was a great working relationship between the client and our Dallas office."

ROTORK ELECTRIC ACTUATORS INSTALLED TO UPGRADE CHICAGO WATER PURIFICATION PLANT

Hundreds of Rotork multi-turn and part-turn IQ electric actuators and gearboxes have been installed as part of a US water filtration plant upgrade.

The City of Chicago Department of Water Management specified over 300 Rotork intelligent IQ actuators combined with IW quarter-turn worm gearboxes and over 200 IQT part-turn actuators to replace water hydraulic cylinders at the Eugene Sawyer Water Purification Plant. Formally known as the South Water Purification Plant, the site was renamed in 2016 in honour of Chicago's former mayor, Eugene Sawyer, and supplies drinking water to the population of Chicago.

The Rotork actuators will operate 12 to 30 inch butterfly valves to provide improved flow control for water travelling into and out of the facility's sand filters. Water from Lake Michigan is collected from a crib, a structure which serves as an offshore water intake away from pollution closer to shore, and transported to the Eugene Sawyer Purification Plant.

The water will be allowed to flow into the Eugene Sawyer plant's sand filters via a 30 inch valve controlled by Rotork's intelligent IQ actuator. The actuator will also carry out modulating duties to ensure the filter is kept full. The water will then seep through the sand bed and supporting gravel material before it is controlled by a 12 inch valve operated by a part-turn continuous modulating IQTM actuator to be sent to the clear water well and distributed to the public. IQ actuators will also handle backwash and drain processes while the IQT actuators will carry out surface wash flow control.

Rotork's actuators were specified by the Department of Water Management due to their user friendly control interface. The actuators feature an advanced backlit display protected by a toughened glass window allowing for large segment position displays in temperatures down to -50 °C (-58 °F). The matrix display can show detailed setting, status and diagnostic multilingual screens. These screens can be navigated using non-intrusive local controls or remotely via Bluetooth using an intrinsically safe Rotork *Bluetooth*® Setting Tool Pro.

The availability of Rotork Site Services (RSS) support for actuator maintenance was key in securing the IQ3 and IQT3 order, and RSS carried out initial set up of all the actuators. RSS also installed custom brackets complete with weldments, structural tubing and couplings for valves ranging from 40 to 70 years old. Many of these valves had been changed during the plant's history and did not conform to modern standards so the team was required to make further modifications to the custom brackets after they arrived on site to make sure they fit.

Rotork's IQ3 multi-turn electric actuators provide a direct torque output range from 10 to 3,000 Nm (10 to 2,200 lbf.ft). They offer reliable valve control and position sensing using a contactless absolute encoder capable of measuring up to 8,000 output turns. The IQT redundant absolute encoder is contactless and has self-checking



HELPING SUPPLY CLEAN DRINKING WATER TO THE CITY OF CHICAGO.

ability to increase position sensing reliability. The watertight protected IQ3 is double-sealed and certified to IP66/68 standards. Possessing many common features to the IQ3, Rotork's IQT3 part-turn actuator is available in 1-phase, 3-phase and DC power supply versions and can carry out isolation or regulating duties of up to 1,200 starts per hour. The modulating variant designated IQTM can achieve up to 1,800 starts per hour and both IQT variants offer an output torque range of 50 to 3,000 Nm (37 to 2,214 lbf.ft).

APPLICATION

WATER & POWER



OVER 700 CK MODULAR ACTUATORS INSTALLED AT CHINESE WASTEWATER TREATMENT PLANT

Rotork has installed over 700 CK modular electric actuators at the Shantou wastewater treatment in Guangdong, southern China facilities, where they enable sewage treatment to be carried out in accordance with new environmental regulations.

In order to comply with these new regulations, three new sewage treatment plants and 300 sewage intercepting wells will be built in Chaonan district, Shantou city. The installation of the CK actuators was a critical part of this enhancement. They have been installed on gate valves around the new sewage treatment plants, where they will be controlling the flow of raw sewage in and out of the sewage interceptors, where contaminants are separated from the wastewater, which can then continue the purification process until it is safe to return into the environment.

100,000 tonnes of wastewater will be processed every day.

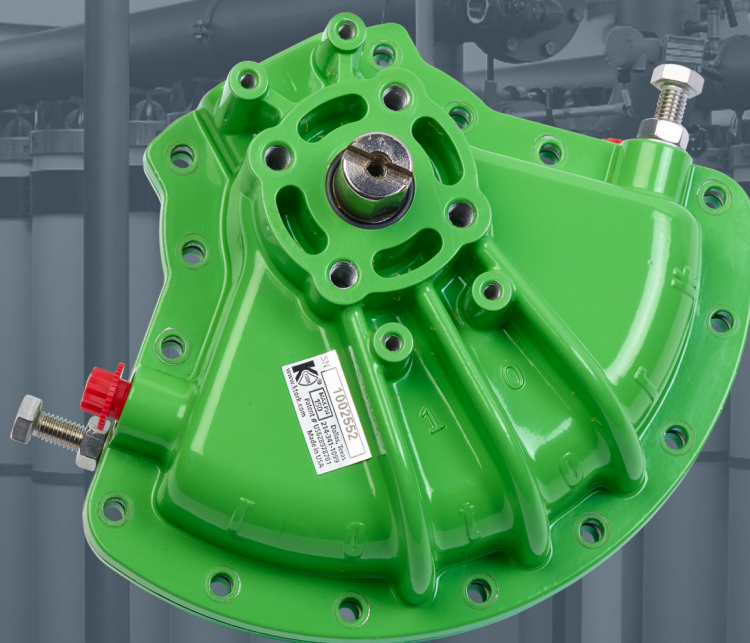
The CK actuators were selected due to their performance and economical price reliability. Rotork Site Services were able to have the actuators commissioned within the tight timeframe specified for this project and will continue to provide maintenance services following the installation.

Rotork's CK range of actuators is ideal for valves in the water industry and the modular nature of the actuators means that they can be configured to meet the needs

100,000 TONNES OF
WASTEWATER PROCESSED
DAILY.



of many different applications. With a multi-turn output torque of up to 10,800 Nm (8,000 lbf.ft), these actuators can provide continuous valve position indication, even on loss of power. They have a secure handwheel fully independent of the motor drive train and have an IP68 rating.



K-TORK PNEUMATIC ACTUATORS USED IN BIGGEST PLANNED ULTRAFILTRATION RETROFIT IN US HISTORY

The plant treats water from two separate sources, one for surface water from the surface of a lake and the other for groundwater from the well fields.

It is the only municipal drinking water plant owned and operated by the county and has the capacity to process of 84 million gallons per day (mgd) for over 350,000 residents, with up to 30 mgd treated in the separate groundwater treatment basin.

The actuators control the flow of surface water in and out of the membrane system. This includes water coming in to be filtered, clean water flowing out to be used for drinking water supplies and clean water flowing in order to clean the membrane. The UF process removes particles from the water in order to make it fit for human consumption. It has the capacity to process 52 million gallons of water per day.

The installation is a marked success for Rotork, as it holds the distinction of being the largest planned UF retrofit project in US history. The project includes refinements to the existing pre-treatment system, the addition of pre-screens, replacement of media filters with 12 immersed UF trains, and addition of ancillary systems including Clean in Place (CIP) system, neutralisation system, backwash system, air system, and chemical feed and storage systems.

Rotork's actuators were selected for this project due to their high duty modulating cycles. K-TORK actuators have a torque output of up to 18,300 Nm (155,000lbf.in) and provides precise modulating control for

OVER 300 ROTORK K-TORK PNEUMATIC VANE ACTUATORS HAVE BEEN INSTALLED AT ONE OF FLORIDA'S LARGEST LOW-PRESSURE ULTRAFILTRATION (UF) MEMBRANE PLANTS.

quarter-turn control valves with an accuracy of 0.25%. Capable of millions of operations at fast cycle times, their low friction, dual opposed lip seals ensure an extremely long operating life.

Rotork's long-standing history with UF membrane installations made them an ideal choice for this project.



PRODUCTION OF CARBON-FREE HYDROGEN WITH CVL ACTUATORS

Rotork CVL linear process control actuators were provided to French equipment manufacturer AREVA H2Gen where they play a critical role within a hydrogen generator.

Hydrogen is a fuel source that is carbon free when burnt because it releases no emissions. A process that creates hydrogen is electrolysis, running an electric current through water. If the energy used in this process is surplus from renewable sources, the hydrogen produced is known as “green hydrogen”. The carbon-free hydrogen that is produced can replace fossil fuel-based hydrogen and is easy to store in a way in which electricity isn’t. It is therefore easily transportable and can be injected into existing gas networks or used in transport networks.

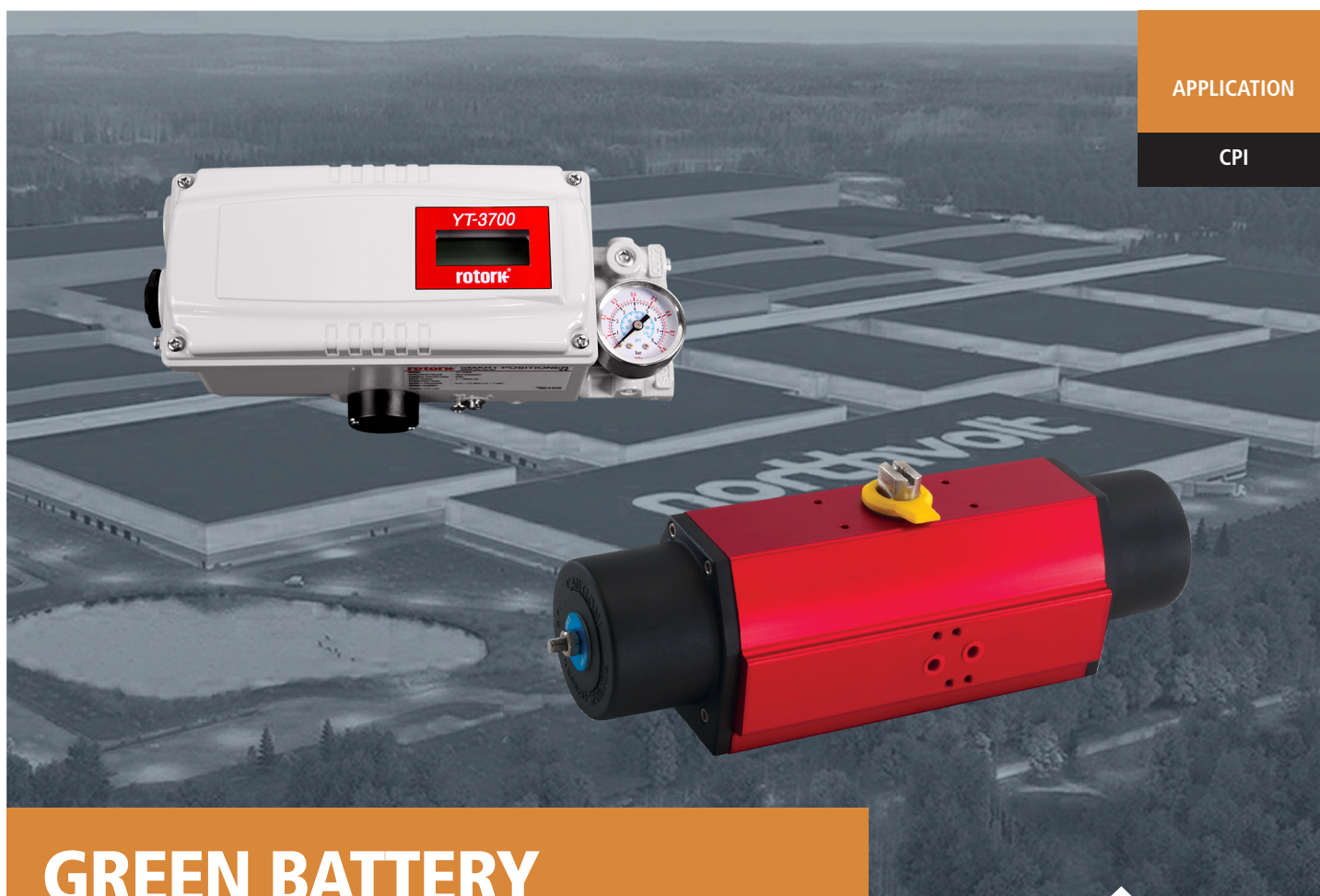
Hydrogen production through electrolysis requires extremely precise control; any

actuator installed would need to provide accurate control, a fail-safe action and a high-duty cycle.

AREVA H2Gen use a water electrolysis process which involves the use of proton exchange membrane (PEM) technology. In order for the process to be completed successfully, very precise control is needed. CVL-500 actuators were chosen for their high movement frequency and their quick reactivity. Each electrolysis skid has three CVL actuators mounted on globe valves to regulate the pressure and level of the water used for electrolysis. CVL-500 actuators were chosen for their high movement frequency, quick reactivity, fail-safe

CVL-500 ACTUATORS CHOSEN FOR THEIR PRECISE CONTROL, FAIL-SAFE ACTION AND HIGH-DUTY CYCLE.

functionality (using built-in supercapacitors) and ATEX and IECEx certification (this is essential in an environment where hydrogen is present). They offer a highly accurate and responsive method of automating control valves, with resolution figures of better than 0.1% and the ability to eliminate position overshoot.



GREEN BATTERY FACTORY IN SWEDEN SUPPORTED BY ROTORK ACTUATORS

Rotork products, including pneumatic actuators and digital smart positioners, have been ordered by an innovative Swedish battery manufacturer.

Northvolt specialise in the production of lithium-ion batteries for electric vehicles and have working collaborations with new technical battery programmes at Luleå University of Technology in north Sweden. Northvolt are working to create the “world’s greenest battery” and Rotork’s products will play a key role in their development.

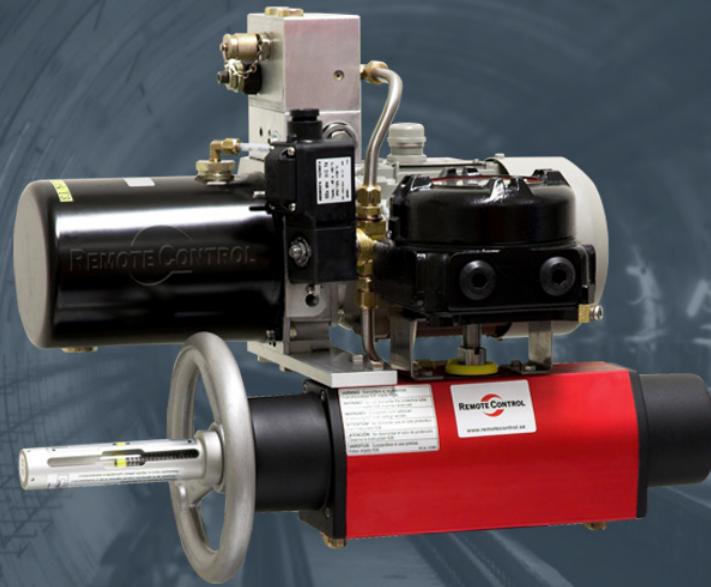
Northvolt Ett is a factory in Skellefteå, northern Sweden, that is due to begin production in 2022. It will be Northvolt’s primary site for manufacturing, cell assembly and recycling. Precise control of the processes involved is key. Rotork have currently provided 1,250 valve actuators (RC200) to Northvolt Ett, working alongside

valve supplier Onninen. It is anticipated that the total number of actuators supplied will top 1,400. The actuators will be operating valves on the battery production line. RC200 units are compact pneumatic actuators. They are available in both double-acting and spring-return configurations (both have been ordered for the Northvolt project), providing high start and end torque output. Additionally, 50 of Rotork’s YT-3700 digital smart positioners have been ordered for the water and heating systems of the state-of-the-art building.

Northvolt chose Rotork’s RC200 actuators in part because they are manufactured at Rotork’s site in Sweden (easy access

OVER 1,250 VALVE
ACTUATORS (RC200)
AND 50 DIGITAL SMART
POSITIONERS (YT-3700)
HAVE BEEN ORDERED.

to spares and service was considered desirable). A reputation of quality, specialised solutions and fast delivery to the Northvolt factory were also relevant factors in the choice of RC200s. Northvolt needed fast control and fail-safe capability, both which actuators within the RC200 range can supply.



ROTORK ELECTRO-HYDRAULIC ACTUATORS PROVIDE CRITICAL SAFETY FUNCTION IN MALAYSIAN RAIL NETWORK

More than 50 Rotork electro-hydraulic RCE actuators have been installed for an ongoing enhancement to the Malaysian rail network infrastructure.

The Klang Valley Integrated Transit System serves the areas of Klang Valley and Greater Kuala Lumpur. The Klang Valley Mass Rapid Transit project will see the addition of three new subway lines integrated into this network.

The project is part of the Malaysian Government's Economic Transformation Programme. The RCE-240, 250, 260-SRM actuators have been installed on fire dampers throughout the rail network. These are not visible to commuters, but control vents up to four or five metres wide which open in the event of a fire to prevent smoke from filling the tunnels and posing a threat

to the lives of those inside. They are also used for air ventilation, ensuring that cool air reaches those who are underground to ensure that temperatures do not get too high and that there is a safe circulation of oxygen. Their use ensures the level of air pollutants do not reach dangerous levels in an underground environment where air movement is naturally limited.

Rotork electro-hydraulic RCE range of actuators are ideal for on/off and positioning, producing high output torques in relation to size. They are manufactured using high quality corrosion resistant materials for a long working life and

ACTUATORS ENSURES THAT THE DAMPERS WILL RELIABLY OPEN/CLOSE WHEN REQUIRED.

optimum corrosion resistance. These features are essential in this application as corrosion in the fire damper system could present a risk to the safety of all who use the rail network. The long-life cycle of the actuators ensures that the dampers will reliably open/close on the spot when required, in emergency situations such as fire, explosions and instances of smoke, for many years to come.



ROTORK ASSISTS BAE SYSTEMS IN UPGRADES TO PORTSMOUTH ROYAL NAVAL BASE

Rotork has worked with BAE Systems to upgrade a series of A-range actuators to IQ3 actuators at Her Majesty's Naval Base Portsmouth (HMNB Portsmouth).

UPGRADE FROM ROTORK A RANGE ACTUATORS TO INTELLIGENT IQ ACTUATORS.

HMNB Portsmouth is one of three naval bases in the UK that is run by the Royal Navy. It hosts the strategic logistic and support facilities that ensure constant availability for operational requirements, such as ship maintenance, repair and upgrades. Electric actuators operate penstocks that allow movement of the ships from the sea to the transitional locks and dry docks.

A series of A-range actuators had reached the end of their operational life after many years of service in a challenging environment and required replacement. IQ3 actuators were specially adapted to

overcome problems around confined spaces and difficult access. IQ3 actuators and IS gearboxes were mechanically adapted with a solution which meant that both actuator and gearbox could be manually operated without entering the confined space. Special hand auto levers and through drive mechanisms for the actuator and gearbox were designed to offer a solution to limit the need for confined space access.

Rotork have an existing service agreement in place and were perfectly suited for this project, with a proven record of reliability with BAE Systems. BAE were keen to retain the advantages of working with the Rotork

Site Services team, continuing with planned service support which guaranteed reliability and availability while maximising product life.

Simon Taylor from BAE Systems said: "This transit lock and dry dock facility is vitally important to the defence output of the Royal Navy of the United Kingdom. Rotork's equipment is pivotal to the reinstatement of this facility. We have been really impressed by the teams that have been on site; the engineers have been brilliant throughout the challenge we set, overcoming issues and even drilling in the rain to get the job done."

APPLICATION

CPI



ACTUATOR CONTROL NETWORK SOLUTION PROVIDED AT SPANISH CHEMICAL PROCESSING PLANT

Almost 150 intelligent electric actuators on Rotork's Pakscan™ control network have been ordered for the Quimica Puente Mayorga chemical processing plant in Cádiz, Spain.

The Quimica Puente Mayorga plant is one of the world's biggest producers of linear alkyl benzene, with paraffins, sulphonic acid and heavy alkylate among the other chemicals produced at the plant.

The actuators were installed on gate valves and control the flow of unprocessed fluids, as well as providing Emergency Shutdown (ESD) functionality. In an emergency, they release the fluids into suction and discharge pumps for isolation. The actuators have been installed on a double loop system with a Rotork Master Station on a Pakscan control network. The installation of this control network has enabled CEPSA to reduce their wiring costs at the Quimica Puente Mayorga plant. This was achieved using a single twisted pair, rather than having to depend upon an expensive multicore cable. This was also

a cost-efficient solution due to the short commissioning time of the product and the increased plant productivity that Pakscan can provide. Additionally, with one cabinet acting as an access point to over 240 field devices within a 20 km loop, it helps to prevent the spacing issues which control cabinets might otherwise create.

Rotork also manufactured a bespoke cabinet to be installed with the Rotork Master Station. While the Rotork Master Station is accessible to senior staff, the cabinet provides an additional access point which has been designed to give site operators the ability to open or close valves in the event of an emergency. Pakscan was essential for this application, as the space taken up by wiring would have made it impossible to implement via other means.

ACTUATORS INSTALLED AT MODERNISED SPANISH COKING PLANT.





OUR SERVICE SOLUTIONS INCREASE PLANT EFFICIENCY AND REDUCE MAINTENANCE COSTS, WHILE WORKSHOP SERVICES RETURN EQUIPMENT TO AS-NEW CONDITION.

Experience and understanding of the flow control industry means we have extensive insight and ideas of what we can do to provide significant value to our clients and their operations. Rotork products are recognised as the best-in-class for reliability, safety and value adding technology in extremely demanding applications.

We are committed to helping clients maximise the continuous, fault-free operation and working life of all their actuators. We provide asset analytics by utilising OEM-quality knowledge with industry leading analytical technology to give our customers the greatest insight possible into the health and usable life of their valuable assets.

Worldwide Support Centres enable us to offer same-day or next-day service to the majority of our customers. Our engineers have skills in both multi-purpose and industry specific applications and carry spare parts and specialist test equipment with them. We use a documented Quality Management system established in accordance with ISO9001.

In addition to Lifetime Management, Rotork Site Services provide the following products and services:

MAINTENANCE AND CERTIFICATION COMPLIANCE

Rotork provide tailored packages of maintenance; we cover regular servicing through to refurbishment and end of life replacement. These add significant value to our customer’s assets, by maximising the working life of an actuator and minimising or eliminating unplanned downtime.

On sites where providing evidence of valid asset certification is a legal requirement, Rotork engineers can carry out the necessary OEM level inspections and provide the statutory paperwork to comply with regulations.

GLOBAL SERVICE AND SUPPORT

Rotork understand the importance of prompt and punctual customer service. To add continuous value to our customer’s business, we supply them with superior flow control solutions by providing high quality, industry leading products and complete service solutions.

Whether a customer has an actuator requiring on-site servicing, a custom design service requirement or a new actuator

installation, we have the complete solution capability to deliver the fastest turnaround possible with the least plant disruption, maximising the value added support we provide.

- Actuator Workshop Overhaul
- Field Support
- Planned Shutdown Support
- Valve Automation Services
 - On-site – Manual Valve Automation and Actuator Replacement
 - Off-site – New Valve Automation Accreditation and Assurance

Rotork is world renowned as a safe and reliable operator, providing our customers with reassurance and peace of mind. Rotork’s engineering teams are experts in the design and implementation of actuation solutions for all circumstances and environments. Our extensive global knowledge base draws upon previous installations and environmental situations.

For further information, or to arrange a consultation, please contact one of our dedicated Customer Service teams via the locator tool available on our website.

See [PUB056-023](#) for further details about Rotork Site Services.



Rotork plc
Brassmill Lane, Bath, UK
tel +44 (0)1225 733200
email mail@rotork.com

PUB000-307-00
Issue 03/22

