



SITE
SOLUTIONS





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WHO WE ARE



FROM CONCEPT TO COMPLETION, GLENFIELD INVICTA'S END-TO-END PROJECT SOLUTIONS PROVIDE MARKET LEADING VALVE AND PENSTOCK ENGINEERING EXCELLENCE, ACROSS A MULTITUDE OF WATER AND NON-WATER INFRASTRUCTURE PROJECTS.

Supported by the vast product portfolio from AVK UK and its sister businesses. Glenfield Invicta combines together the strength and unique proposition of Invicta's site solutions, penstocks and environmental expertise, and Glenfield's experience and expertise in specifying and managing large Dams, Reservoirs, and Hydropower schemes.

We are market leaders distinguished by our industry expertise, we have been designing and manufacturing specialist engineered valves and penstocks for more than 160 years and we stand behind every product we install for life, offering some of the best extended warranties in the industry.

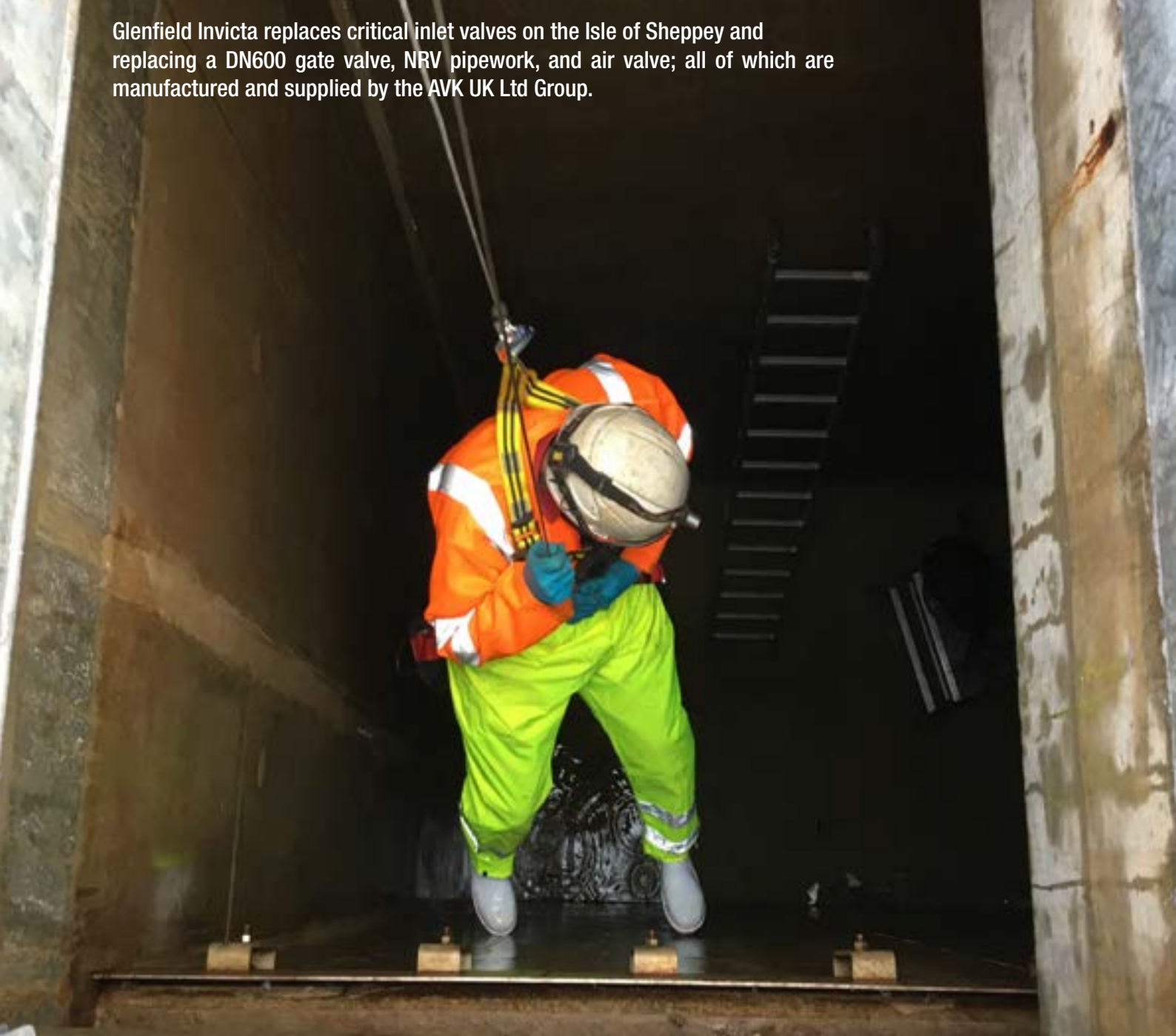
Our historical record for the design, supply and installation of engineered valves and pipeline equipment projects delivered safely, on time, and to the highest standards in arduous conditions are what set us apart. This specialist capability has made the Glenfield Invicta and AVK brands synonymous with engineering excellence worldwide.

In addition to our proactive programme of strategic acquisitions, we continually invest in our product and service offering. Glenfield Invicta Project Solutions has the people, processes and systems to support optimised operational efficiency when meeting the needs of our partners.

We have recently invested over £2m in a new

120,000 sq. ft. Learning Academy; which includes an interactive visitor centre, as well as, an advanced manufacturing & distribution centre. Glenfield Invicta is committed to training the apprentices and engineers of the future.

All products and service solutions are provided in accordance with all the relevant UK, European and International standards.



Glenfield Invicta replaces critical inlet valves on the Isle of Sheppey and replacing a DN600 gate valve, NRV pipework, and air valve; all of which are manufactured and supplied by the AVK UK Ltd Group.

Glenfield Invicta has a clear vision, 'To provide market leading valve and penstock engineering excellence across water and non-utility infrastructure projects'

SITE SOLUTIONS

AN INTRODUCTION

WHATEVER YOU MAY NEED, WE CAN PROVIDE

Within our vast range of capabilities **GLENFIELD INVICTA** can provide a comprehensive range of engineering and site solution packages. Engineers and Project Managers are available to support in the design, procurement, installation, and planned maintenance of the complete range of AVK products.

Our highly-skilled technicians are experts in their field and have undergone extensive product, application, and controls training and are qualified to resolve any problem, such as repacking or freeing seized valves or complete refurbishment of potable, raw and sewage mains, valve pipelines, and penstocks.

Our service teams are qualified for the following operations:

- Confined Space Working
- Scottish water distribution operations maintenance strategy (doms) scheme
- CSCS
- Water Hygiene – Blue Card
- First Aid
- Safety Harness
- Slinger/Signaller
- Pasma
- All team supervisors hold an IOSH in Health and Safety for Middle Management

We have the ability to produce real-time, detailed engineering reports, through a state of the art & bespoke service management system; keeping our customers informed of the status of their assets.

Our Site Solutions offering includes:

- **Valve & Penstock Installation (including FOC Extended Warranty)**
- **Valve Release**
- **Valve Repacking**
- **Valve & Penstock Maintenance and Refurbishment (in situ)**
- **Equipment Health Check & Monitoring**
- **Fittings & Ancillary Parts**
- **Training & Technical Support**



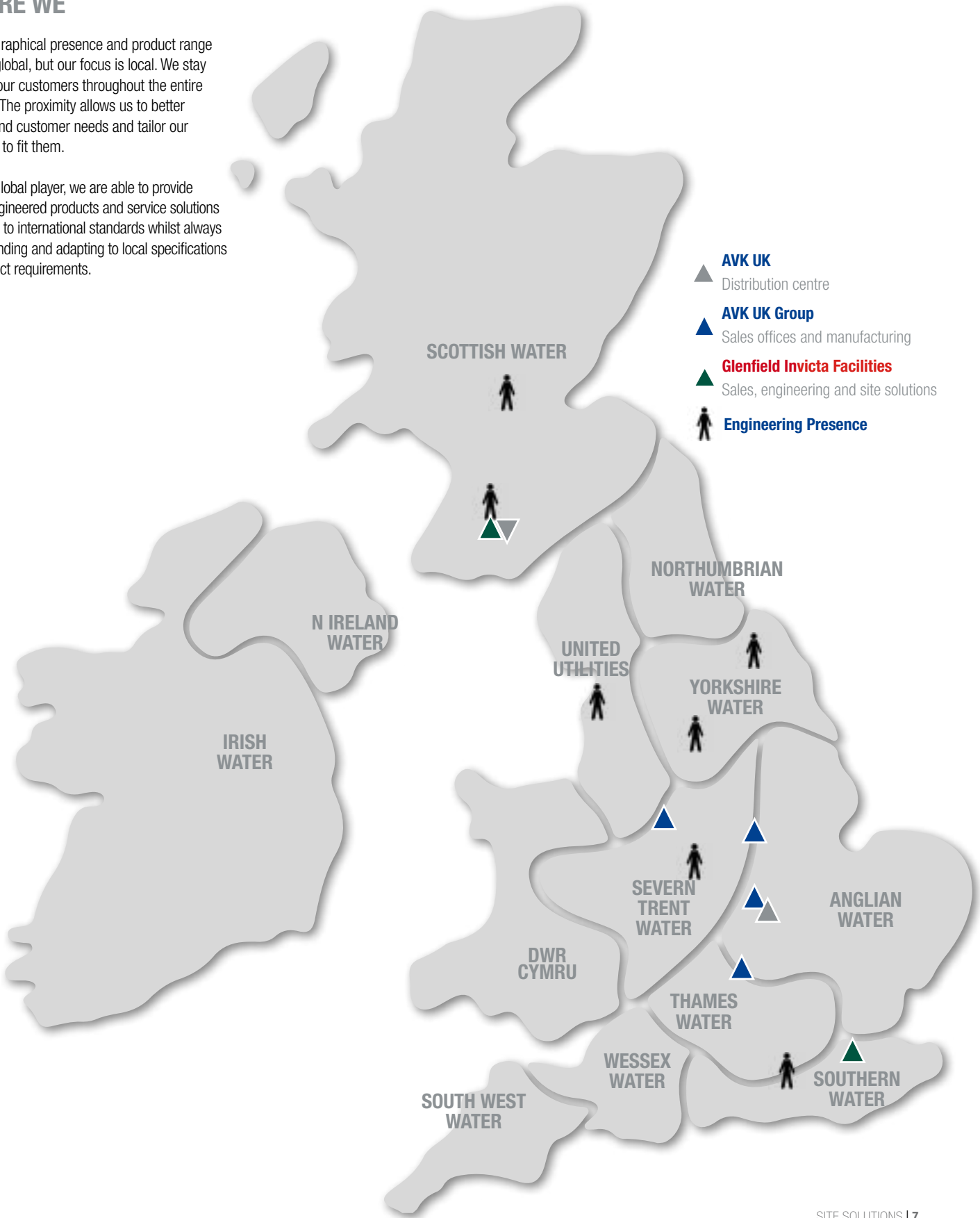
SITE SOLUTIONS

WHERE WE ARE

WHEREVER YOU ARE, SO ARE WE

Our geographical presence and product range may be global, but our focus is local. We stay close to our customers throughout the entire process. The proximity allows us to better understand customer needs and tailor our solutions to fit them.

Being a global player, we are able to provide highly engineered products and service solutions approved to international standards whilst always understanding and adapting to local specifications and project requirements.



SITE SOLUTIONS

VALVE INSTALLATION

GLENFIELD INVICTA PROVIDES A COMPLETE SUPPLY AND INSTALLATION SERVICE FOR BOTH OUR OWN RANGE OF VALVE PRODUCTS AND THOSE OF AVK GROUP.

This provides our customers with a single source solution that offers numerous benefits, such as considerable cost savings, minimal plant shutdowns, reductions in site programmes, long term solutions, and extended warranties. We offer installation on a wide range of valve products including gate, butterfly, check, knife gate, and plug, to name a few. Our Site Engineers are fully certified, qualified and experienced and with our team you can expect solutions, not only products.

INSTALLATION AND COMMISSIONING

Our site installation team is comprised of highly qualified, certified and experienced engineers of various disciplines including design, installation, valve and penstock application, and production.

This wealth of capability ensures unrivalled competence at all phases of a project, meaning that your assets are perfectly designed, manufactured, installed, tested and commissioned.

Our “right first time” approach to all aspects of a project cycle will give you confidence that you will be left with a high quality installation from a company that stands behind its products.

The valve supply and replacement service offering includes:-

- Site Surveys
- Design Input
- Ancillaries
- Supply and Installation
- Commissioning
- In-house Fabrication Service
- Service and Maintenance



We build on and invest in long-term partnerships because our customers are much more valuable than a single transaction

SITE SOLUTIONS

VALVE INSTALLATION - CASE STUDY

PROJECT: DRY DOCKS PUMPING STATION (SCOTLAND)



BEFORE

LOGISTICS

The logistics of the project were far from straightforward, as the pumping station is 8m below ground, in line with the base of the dock, with entry to the pumping station was via a 2.6m² access hatch at ground level, with materials having to leave and enter this way.

The pipework reached DN1500 diameter at one point, so great care was needed to ensure the work was completed without damage, both to the structure and to the live 11kV powercable located very close to the hatch. A further complication was that no welding was allowed on site and burning gear could not be used.



AFTER

BACKGROUND

Today, the Clyde remains a centre of shipbuilding excellence and recently a significant sum of money has been invested in upgrading the facilities at 2 of the shipyards, Glenfield was awarded the contract to manage the refurbishment of the pump discharge. The project required the removal of the existing steelwork access platform, valves and pipework and the supply and installation of a modern equivalent replacement.

The work focussed on refurbishing the Dry Dock, also referred to as a 'graving dock' and now provides the UK with the operational capacity to compete for ship refurbishment contracts in the global market.

COMPLETION

Site work was carried out under strict Health & Safety guidelines by a team service engineers from Glenfield Invicta Valves, all personnel had to undergo a strict vetting process, in addition to completing confined spaces training, with an emergency response team available at all times.



SITE SOLUTIONS

PENSTOCK INSTALLATION

GLENFIELD INVICTA HAS ESTABLISHED A REPUTATION WITHIN THE UK WATER INDUSTRY OF BEING THE ‘GO TO’ SOLUTION PROVIDER FOR PENSTOCK MANUFACTURING, SUPPLY AND INSTALLATION.

This deserved reputation has been achieved by ensuring that not only is the right solution chosen at inception stage, but that the right product is installed correctly, avoiding costly delays and frustrating call backs for problems with leakage or faulty operation.

Although one of the simplest types of valves used in the UK Water Industry, Penstocks are notoriously difficult to install.

Our fully certified Site Engineers have the expertise and knowledge to deliver an installation and maintenance service for any Penstock, but will preferentially select from AVK Group's range of high quality penstocks should a supply and installation package be required.



Our Penstock Supply and Installation Service offering includes:

- Design Input
- Site Audit
- Product Selection
- Commissioning
- Associated Ancillaries
- Installation and Actuation
- Testing
- Maintenance
- Extended Warranties
- Product Selection



SITE SOLUTIONS

PENSTOCK INSTALLATION - CASE STUDY

PROJECT: MOGDEN SWT



BACKGROUND

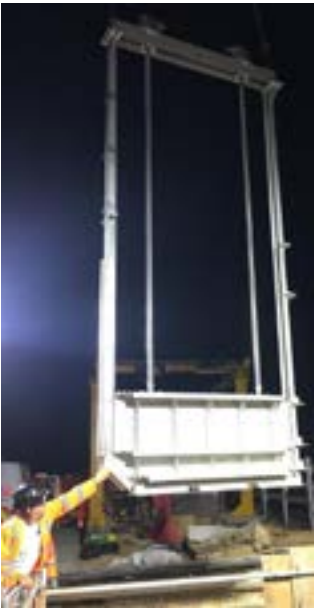
Skills required included the design and manufacture of an entirely unique penstock, servicing, repair and upgrade of existing penstock assets which was complicated by the need for both low effluent levels and low tides, all under confined space working conditions.

The penstocks were fabricated from stainless steel, which enabled Glenfield Invicta to create a highly bespoke penstock design that met the customer's exacting requirements and the precise channel dimensions, but could also be manufactured within a tight eight-week timescale.

INSTALLATION

Installation was carried out by Glenfield Invicta's in-house installation team and took place at night during seven 4-hour windows, each of which was determined by congruent low effluent flow levels and low tides. Each MFEC measured 4.6m wide by 4.7m deep and was only accessible using confined space techniques including winching. A dedicated safety and rescue team was on hand at all times.

This was an exciting, diverse and high-profile project in one of the UK's largest sewage treatment plants; meeting timesclaes whilst maintaining the highest quality at all times was critical. It was extremely rewarding to play an important part in implementing such an innovative solution to a significant environmental issue.



BESPOKE DESIGN

All of our penstock expertise and experience in bespoke design, working with antiquated assets, and confined space installation was truly put to test. That being said, we apply the same skills, attention to detail and commitment to all of our penstock projects, large or small.

The installation phase required some really detailed logistics planning as work could only proceed at night when effluent flow rates were low and there was also a low tide in the Thames. This aspect of the scheme definitely reinforced the value to the client and principal contractor of us having our own full-time specialist penstock installation team

SITE SOLUTIONS

VALVE RELEASE

GLENFIELD INVICTA ARE SPECIALIST IN WATER MANAGEMENT AND LEAK DETECTION, PROVIDING AFTERSALES SUPPORT TO THE UK'S WATER COMPANIES AND INDUSTRIAL CUSTOMERS FOR MANY YEARS.

Utilising a state-of-the-art designed technology, Glenfield Invicta has developed solutions for every situation that allows its engineers to release seized valves, operate difficult to open valves and seat passing valves, where other systems fail.

Our valve-friendly solutions apply different levels of controlled torque to suit each situation and is monitored at all times by our engineers to ensure there is no damage to the valve during the freeing process.

Using a portable actuator or compression vibration tooling and bespoke specialised valve adaptations, we are able to apply forces in a way that operates the valve but does not cause lasting damage.

The systems are small, light and easily manoeuvrable into most installation and locations. It also allows for valves to be operated without being isolated, allowing for a fast and effective solution with zero downtime.

Features & benefits:

- Highly skilled team of OEM trained Engineers
- Process releases valves of any size, age, or level of seizure
- We guarantee to release your valve and restore it to working order



We're so confident in our Freeing Service that we operate on a 'No Fix – No Fee' basis and only invoice if the valve is successfully released.



SITE SOLUTIONS

VALVE REPACKING

OUR INNOVATIVE UNDERSTANDING OF THE HEALTH OF ASSETS, SUCH AS VALVES, PENSTOCKS, AND ACTUATORS, IS HOW WE SUPPORT THE WATER UTILITY COMPANIES TO MANAGE THEIR BUSINESS.

It underpins the ability to deliver services to their customers, plan maintenance spend, protect the environment whilst minimising the investment requirements in replacement equipment.

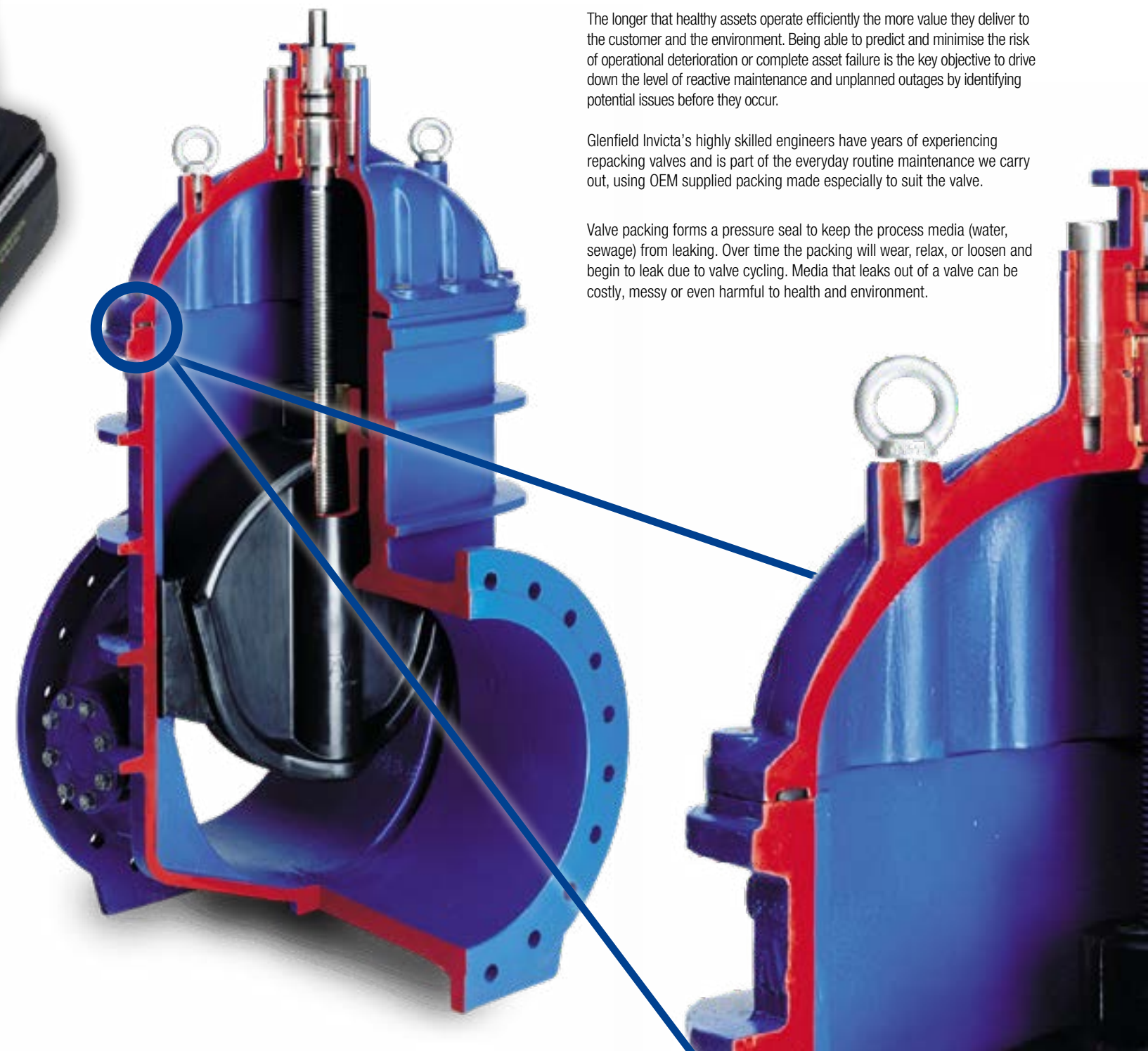
Many assets require more intensive attention as they get older, with more frequent inspection and replacing of components to help manage the risk of failure.

By understanding the health of an installed asset and its leading-edge performance, our customers are able to focus their maintenance investment into assets of poor health and with the largest risk of failure, as well as plan a resilient and proactive service programme for both now and future operation.

The longer that healthy assets operate efficiently the more value they deliver to the customer and the environment. Being able to predict and minimise the risk of operational deterioration or complete asset failure is the key objective to drive down the level of reactive maintenance and unplanned outages by identifying potential issues before they occur.

Glenfield Invicta's highly skilled engineers have years of experiencing repacking valves and is part of the everyday routine maintenance we carry out, using OEM supplied packing made especially to suit the valve.

Valve packing forms a pressure seal to keep the process media (water, sewage) from leaking. Over time the packing will wear, relax, or loosen and begin to leak due to valve cycling. Media that leaks out of a valve can be costly, messy or even harmful to health and environment.



SITE SOLUTIONS

VALVE & PENSTOCK REFURBISHMENT

ESTABLISHED IN 1852 GLENFIELD INVICTA HAS BEEN DESIGNING AND MAINTAINING SPECIALIST ENGINEERED VALVES FOR MORE THAN 160 YEARS. OUR PRODUCTS ARE INSTALLED IN COUNTLESS WATER UTILITY AND INDUSTRIAL APPLICATIONS.

As well as the supply of new products and on-site maintenance or repair of the complete range of AVK Group products, we offer a full valve refurbishment and pressure testing service. The refurbishing of valves is performed in our strategically located, fully equipped workshops, enabling us to rectify and recalibrate all types of valves.

Our valve refurbishment program is designed to extend the life of existing valves, generally off-site refurbishment is carried out in one of our fully accredited specialist workshops.

A variety of options or level of refurbishment are available, where customers can decide what's right for their budget or who appreciate the cost benefit of

GATE VALVE REFURBISHMENT

Five gate valves with actuators all requiring a complete refurbishment, which had to be carried out while the valves were still 'in-situ' and within a very tight deadline.

Adding to the challenge, the valves had table "D" flanges because of their very tight installation conditions.

The work involved:

- Stripping down the valves
- Removal of the actuators
- New bonnet bolts
- New nuts/bolts
- Machined & replaced damaged spindle
- Machined new stem nut
- Installing manual gearboxes

The valves were also converted from electric to manual actuation to improve the ease of operation and increase effectiveness



BEFORE



AFTER



SITE SOLUTIONS

REFURBISHMENT - CASE STUDIES

PENSTOCK REFURBISHMENT

Glenfield Invicta supplied, refurbished three new DN1000 replacement penstocks on the Kinlochleven hydroelectric scheme, which also included the electric actuators to enable the penstocks to be controlled remotely.

The Alvanee Aluminium smelting works is the last one in the UK and draws the majority of its power from two hydroelectric schemes. The Lochaber hydroelectric scheme commissioned in 1929 and built specifically for the works and is fed by the Black Water chain of lochs, which is located in almost inaccessible terrain.

Access and potential exposure to extreme weather events were two of the key challenges facing the customer and Glenfield Invicta. Secondly the penstocks being in three separate locations and a short manufacturing time from design approval to start on site, compounded by Covid-19 lockdown.



BEFORE



AFTER

SITE SOLUTIONS

EQUIPMENT HEALTH CHECKS

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SITE SOLUTIONS

EQUIPMENT HEALTH CHECKS

THE POWER OF PREDICTIVE ANALYSIS

Glenfield Invicta can collect vital valve and actuator health data from the field and provide a realistic performance information that can generate predictive failure modelling. This approach enables us to review diagnostic health data from multiple sources, including condition history to determine trends and predict impending valve deterioration, which means maintenance can be scheduled and performed well before an operator alarm is triggered.

DO YOU KNOW THE HEALTH OF YOUR VALVES?

Prioritising maintenance, reliability, and performance of valves and actuators is crucial. Valves are critical elements to process availability. By knowing when they need attention can mean the difference between unplanned costs or unplanned downtime. By carrying out on-site equipment health checks Glenfield Invicta can minimise downtime, reduce cost variability, and integrate technology upgrades into daily work practices, increasing return on investment.

VALVE HEALTH CHECK

To ensure that valves maintain their operability, they should be exercised and monitored on a regular basis, Glenfield Invicta Ltd now offer valve operational and performance checks to manage the assets in a pipeline network. Using a specially adapted lightweight, handheld tool we can operate or free off hard to operate valves and assists with everyday valve maintenance and emergency valve shutdowns.

- Efficiently, reduces the risk of water leaks and involuntary system shutdown
- Quickly exercises valves of all sizes, rather than manually use the handwheel & gearbox.
- Capture and analyse information on the location & health of valve.
- Diagnose potential problems before they become critical, reducing the risk of water leaks and involuntary system shutdown
- Data saved for analysis and historical tracking.



AN ELECTRIC ACTUATOR IS A DEVISE THAT CONVERTS ELECTRICAL ENERGY INTO ROTARY TORQUE.

It is used to drive a valve, typically an electrical actuator consists of an electric motor or motors, which produce low torque at high speed.

They are often connected to a gearbox that decreases the motors speed, as it does, the torque increases.

Actuators have two main methods of achieving an electric opening and closing of a valve one relates to a quarter-turn valve only, the other to either a part-turn or multi-turn electric actuator.

Due to their environmental installation, infrequent use and lack of maintenance, actuators are prone to early failure, therefore Glenfield Invicta offer a comprehensive health check to ensure they will operate when needed.

Actuators are designed and built to carry out many operations in all environments, however, like all industrial plant, they are often exposed to hostile environments or at times can be stressed or damaged by unpredictable events.

Health Checks are the first step of a preventative maintenance regime, we can provide a detailed in-situ assessment of all makes of actuator and assist customers by updating their asset register of MOVs (including both actuator and valve data). If an asset register doesn't currently exist, we can create one.

Health check features and benefits:

- **The reliability of the actuators is increased**
- **Problems are found before they affect operation**
- **Overall maintenance costs reduce**
- **Repairs can be carried out on the spot avoiding the need for intrusive shutdowns**
- **Overhaul repairs can be scheduled at a convenient time, limiting the impact on site operations**
- **Costs can be controlled and confidently predicted to allow for realistic budgeting.**



SITE SOLUTIONS

FITTINGS & ANCILLARIES

LEADING MANUFACTURER OF FITTINGS AND REPAIR CLAMPS FOR THE UK AND EXPORT MARKET.

The AVK UK Group of Companies provides the Water, Gas and Waste Water Utility sectors with a complete range of pipe work fittings from bespoke fabrications to simple repair clamps, through a variety of flexible service offers ranging from products supplied for emergencies in a matter of hours to programmed supply for major capital projects.

Our modern dedicated manufacturing facility near Manchester in the UK, has a full team of skilled personnel from CAD designers to welder/platers all of whom are dedicated to providing quality products to the customers requirements in line with our Expect... AVK promises.

EMERGENCY REPAIR CLAMP SERVICE

AVK in the UK has a 24/7 emergency same day leak repair clamp service for water mains. We offer either a same day, next day, 2 to 3 day service or a delivery to suit your requirement.

Via our dedicated hotline 0800 202 8228, we can supply:

- Couplings
- Flange Adaptors
- Dismantling Joints
- Repair Clamps
- T Clamps
- Encapsulation Collars



At Glenfield invicta, we pride ourselves on our business ethics, technical knowledge, high standards of quality, and satisfaction. We supply a range of manual, mechanically assisted and powered valve operating equipment developed for the remote operation of a wide selection of valves, penstocks and actuators. These items are engineered to suit both multi and quarter turn valves and those with either rising or non-rising spindle configurations.

Our strategically located, purpose built workshops have the facilities and stock to manufacture all types of accessories to meet all our customer's needs, made from 316 or 304 stainless steel or mild steel, we can design and supply.

- Valve or Floor Mounted Pedestals
- Extension Spindles
- Guide Brackets
- Couplings (Bottom/Muff)
- Mounting Kits

SITE SOLUTIONS

TECHNICAL PRODUCT TRAINING

AS BUSINESS LEADERS, WE HAVE A COMMITMENT TO SERVICE THAT GOES ABOVE AND BEYOND THE DAY-TO-DAY ACTIVITY.

We have a responsibility to ensure customers receive the best from our products and solutions, and as such we offer free training and insights into our manufacturing processes, product application and operation.

Our training sessions are tailored to your requirements and held at any of our offices across the UK, or, at your convenience, at your site. Any number of delegates can be catered for and training is suited to the various levels of experience and product knowledge – from new employees through to refresher courses for advanced engineers.

YOUR TRUSTED ADVISOR

Our mission is to deliver a framework in a smooth and efficient way, utilising our technical expertise and group specialists.

Adopting a collaborative and integrated approach Glenfield Invicta aspire to collaborate with you and be a key part in project delivery and design, enabling all dams and reservoir projects to be delivered on time, in full and to budget, offering ongoing support and additional services throughout.



VALVE SELECTION AND SIZING.

We assist in the early stages of projects to provide technical support and endeavour to ensure that the optimal valve and system solution is used.

Key information required to determine the correct valve includes:

- Application (isolation, flow control, terminal discharge etc)
- Flow rates (minimum, normal and maximum)
- Pressure heads (static, transient, net)
- Medium (raw water, screened, unscreened)
- Valve material trim
- Actuation (manual, electrical, hydraulic, pneumatic)
- Civil structure / system design

INCORRECT VALVE SELECTION AND SIZING IMPLICATIONS; POTENTIAL PITFALLS OF USING THE WRONG VALVE.

If the wrong valve is used for a particular application, the results can be disastrous!

Apart from valve failures, civil damage, nearby surrounding damage can occur as well as various health and safety issues!

Also, incorrect system information and poor quality products can be equally problematic.

PLEASE CONTACT GLENFIELD INVICTA FOR YOUR PROJECT REQUIREMENTS.



Glenfield Invicta

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