



PENSTOCK SOLUTIONS





CONTENT:



PENSTOCK SOLUTIONS	4
MARKET SEGMENTS	5
FEATURES AND BENEFITS	6
PENSTOCK RANGE	7 - 9
APPLICATION	10
INSTALLATION	11
STAINLESS STEEL VS CAST IRON	12
ACCESSORIES AND OPERATING EQUIPMENT	13
PENSTOCK REPAIR, REFURBISHMENT AND REPLACEMENT	14
WHY CHOOSE GLENFIELD INVICTA	15

GLENFIELD INVICTA PENSTOCK SOLUTIONS



Penstock undergoing factory leakage and function testing.

Market leaders distinguished by industry expertise and experience, Glenfield Invicta have rapidly become the 'go to' solution provider for penstock supply and installation throughout the UK.

At Glenfield Invicta, our reputation has been earned 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.

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.

The Penstock Supply and Installation Service Offering Includes:

- Design Input/Production Selection
- Site Audit
- Associated Ancillaries
- Installation
- Actuation
- Commissioning
- Testing
- Maintenance
- Extended Warranties

Dedicated Member of the **AVR** group



GLENFIELD INVICTA MARKET SEGMENTS

CLEAN WATER



WASTE WATER

**ENVIRONMENTAL &
FLOOD PROTECTION**



**DAMS AND
RESERVOIRS**

HYDROPOWER



PORTS AND DOCKS

FEATURES AND BENEFITS

MINIMAL LEAKAGE RATE

Our penstock leakage rates are significantly lower than those required by BS7775:2005.

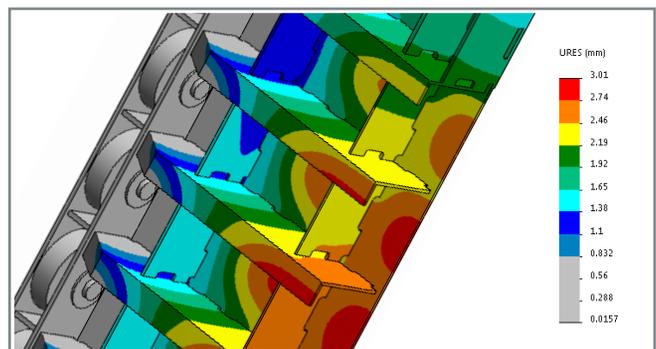
Upon request, we offer factory leakage and function testing of our penstocks, to verify this.



HEAVY DUTY CONSTRUCTION, ROBUST DESIGN AND EXCEPTIONAL QUALITY

Our penstock range is designed using Finite Element Analysis (FEA) to ensure optimum rigidity and allow any undesirable deformation to be designed out pre-production.

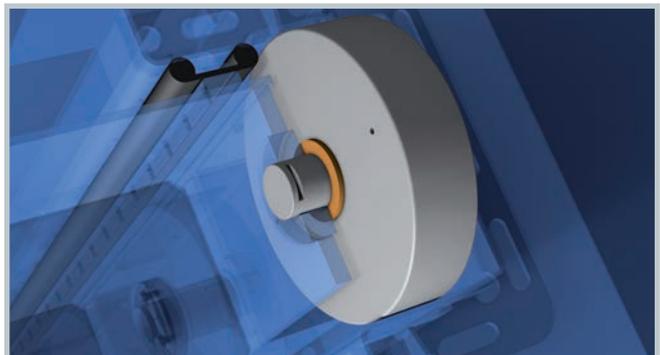
The minimum thickness of our penstock's frame sections is 5mm and 6mm for the door. All of our penstock designs are optimised by means of FEA, to achieve the optimum balance between strength, rigidity, weight and cost. Robot cutting and welding is used for consistently high quality.



UNIQUE SEAL AND GUIDE DESIGN

Our unique seal design allows low leakage rates, whilst at the same time, minimising the required actuator torques or thrusts. Self-cleaning HMWPE guides reduce friction during operation resulting in easy operation and extended product lifetime.

Self-adjusting lip-seals provide effective sealing without the need for wedges. This ensures that the excellent sealing performance is factory set, and consistently achieved with no adjustment required throughout the lifetime of the penstocks.



CORROSION PROTECTION

All penstocks are produced in stainless steel to ensure a 35+ year design life. Depending on the application, different stainless steel grades are used, from the more frequent AISI 304 and AISI 316, to the more special duplex (2205) and super duplex (2507).

All stainless steel surfaces are fully shot-blasted to passivate them and guarantee protection against corrosion.



WRAS APPROVED MATERIALS

Each of our penstocks and stop logs are available with WRAS approved materials for use with potable water.



PENSTOCK RANGE



DESCRIPTION

WALL MOUNTING PENSTOCK ORBINOX MU

CHANNEL MOUNTING PENSTOCK ORBINOX CC

WEIR PENSTOCK ORBINOX RB

MAIN FEATURES

- 4 sided sealing
- Stainless steel construction
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for wall mounting over circular or rectangular aperture
- Leakage allowance - lower than allowable by BS7775:2005
- Easily replaceable seals

- 3 sided sealing
- Stainless steel construction
- Sized to suit exact channel dimensions and water levels
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for mounting in open channels
- Leakage allowance - lower than allowable by BS7775:2005
- Easily replaceable seals

- 3 or 4 sided sealing
- Stainless steel construction
- Suitable for wall mounting
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for mounting in open channels
- Leakage allowance - lower than allowable by BS7775:2005
- Easily replaceable seals

MAIN OPTIONS

- Non-rising or rising spindle
- Open or closed frame
- Stem extensions and wall brackets
- Variety of actuator pedestals
- Manual, pneumatic, electric or hydraulic actuation
- Rebate mounting for larger sizes
- WRAS approved materials available for potable water applications

- Non-rising or rising spindle
- Manual, pneumatic, electric or hydraulic actuation
- Rebate or face mounting configurations
- WRAS approved materials available for potable water applications
- Safety guards for motorised applications

- Non-rising or rising spindle
- Open or closed frame
- Stem extensions and wall brackets
- Variety of actuator pedestals
- Manual, pneumatic, electric or hydraulic actuation
- WRAS approved materials available for potable water applications
- Twin spindles

SIZE

Up to 4000mm x 4000mm

Up to 4000mm x 4000mm

Up to 4000mm x 4000mm

MAX WORKING PRESSURE

10m on/off seating as standard up to 1000mm x 1000mm, otherwise as required.

Equal to gate height.

As required.

CONSTRUCTION MATERIAL

Stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507.

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APPLICABLE STANDARDS

Designed and manufactured in accordance with BS7775:2005.

WIMES 8.10 compliant.

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WIMES 8.10 compliant.

Designed and manufactured in accordance with BS7775:2005.

WIMES 8.10 compliant.

PENSTOCK RANGE



DESCRIPTION

ALUMINIUM STOP LOGS ORBINOX SA

STAINLESS STEEL STOP LOG ORBINOX SL

HANDSTOP OR STOP GATE ORBINOX AG

MAIN FEATURES

- 3 sided sealing
- Stainless steel frame with aluminium logs
- Fixed individual log heights; 300mm, 225mm or 150mm
- Auxiliary external lifting device required
- Sized to suit exact channel/aperture
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for mounting in open channels or face mounting to walls
- Easily replaceable seals

- 3 sided sealing
- Stainless steel construction for frame and logs
- Any size and combination of log heights available
- Auxiliary external lifting device required
- Sized to suit exact channel/aperture
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for mounting in open channels or face mounting to walls
- Easily replaceable seals

- 3 sided sealing
- Stainless steel construction
- Auxiliary external lifting device required
- Sized to suit exact channel/aperture dimensions and water levels
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for mounting in open channels or face mounting to walls
- Easily replaceable seals

MAIN OPTIONS

- Manual lifting poles or lifting beam for use with crane
- Rebate or face mounting configurations
- WRAS approved materials available for potable water applications
- Log storage racks

- Manual lifting poles or lifting beam for use with crane
- Rebate or face mounting configurations
- WRAS approved materials available for potable water applications
- Log storage racks

- Rebate or face mounting configurations
- WRAS approved materials available for potable water applications

SIZE

Up to 4000mm x 4000mm

Up to 4000mm x 4000mm

Up to 4000mm x 4000mm

MAX WORKING PRESSURE

Equal to total log height.

Equal to total log height.

Equal to gate height.

CONSTRUCTION MATERIAL

Frame in stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507. Logs in aluminium EN-AW 6063 T6

Stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507.

Stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507.

APPLICABLE STANDARDS

Designed and manufactured in accordance with DIN 19569.

WIMES 8.10 compliant.

Designed and manufactured in accordance with DIN 19569.

WIMES 8.10 compliant.

Designed and manufactured in accordance with DIN 19569.

WIMES 8.10 compliant.

PENSTOCK RANGE



DESCRIPTION

ROLLER GATE ORBINOX MV

RECTANGULAR FLAP VALVE ORBINOX RR

ROUND FLAP VALVE ORBINOX RC

MAIN FEATURES

- Custom made solutions for large apertures and high pressure
- 4 sided sealing
- Stainless steel or painted carbon steel construction
- Wheel design for opening and closing operation, minimises thrust
- Bi or uni-directional sealing
- Self-adjusting, factory set EPDM seals
- Self-cleaning HMWPE guides
- Suitable for wall mounting over circular or rectangular aperture

- 4 sided sealing
- Stainless steel construction
- Opening and closing by seating and unseating differential pressure
- Double hung to allow proper seating and minimal leakage
- Self-adjusting EPDM seals, ensuring watertight performance
- Factory set sealing
- Leakage allowance lower than allowable in DIN 19569-4 (Class 3)
- Easily replaceable seals

- All round sealing
- Stainless steel construction
- Opening and closing by seating and unseating differential pressure
- Double hung to allow proper seating and minimal leakage
- Self-adjusting EPDM seals, ensuring watertight performance
- Factory set sealing
- Leakage allowance lower than allowable in DIN 19569-4 (Class 3)
- Easily replaceable seals

MAIN OPTIONS

- Stem extensions and wall brackets
- Variety of actuator pedestals
- Manual, pneumatic, electric or hydraulic actuation
- Rebate mounting for larger sizes
- Fail-safe systems

- Rectangular design
- Wall or flange mounting

- Round design
- Wall or flange mounting

SIZE

Up to 6000mm x 8000mm

Up to 4000mm x 4000mm

Up to 4000mm x 4000mm

MAX WORKING PRESSURE

Up to 100m

Typically 5m, higher upon request.

Typically 5m, higher upon request.

CONSTRUCTION MATERIAL

Stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507.

Stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507.

Stainless steel AISI 304, AISI 316, duplex 2205 or super duplex 2507.

APPLICABLE STANDARDS

Designed and manufactured in accordance with DIN 19704-1 & AWWA C561.

Designed and manufactured in accordance with DIN 19569.

WIMES 8.09 compliant.

Designed and manufactured in accordance with DIN 19569.

WIMES 8.09 compliant.

PENSTOCK APPLICATION



There are many options that should be considered when assessing a penstock application.

At Glenfield Invicta we take all of these into consideration when assessing your penstock enquiry, as each one can influence the type and design of penstock required for your project.

- Location
- Liquid or fluid to be controlled
- Mounting; Wall, Weir or Channel
- Rising or non-rising spindle
- Head of water (in metres)
- Manual or actuated
- Isolating or modulating duty

PENSTOCK INSTALLATION

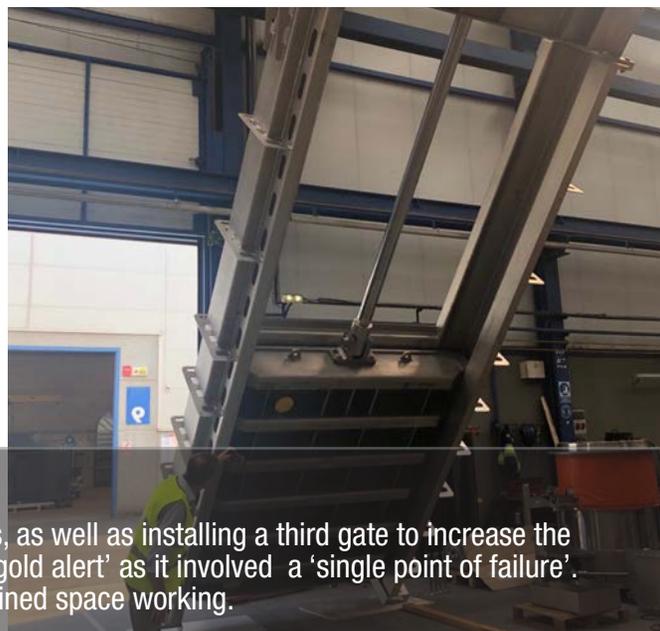
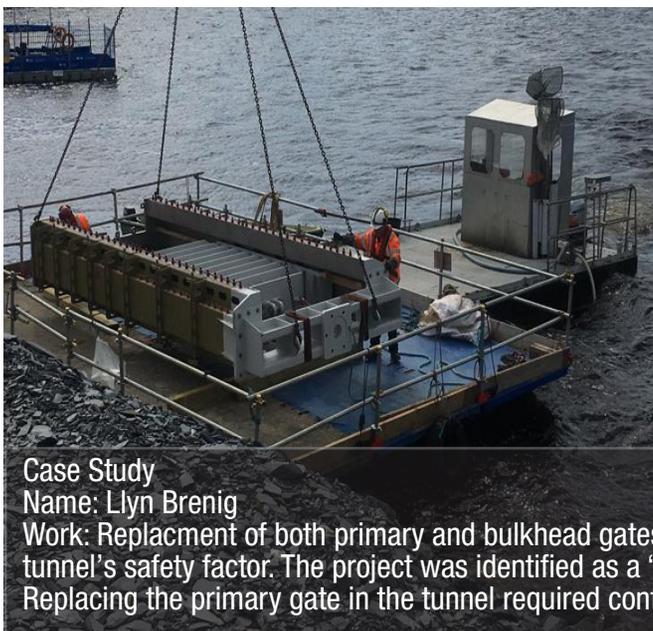
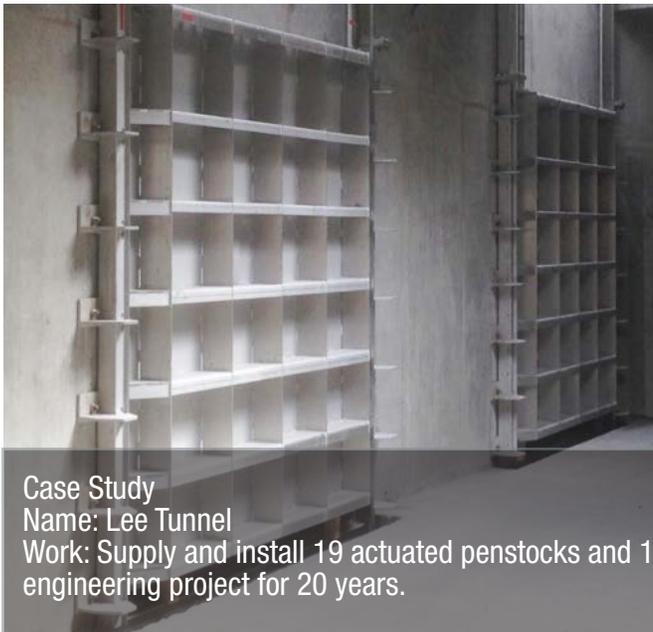
Although one of the simplest types of valves used in the UK Water Industry, penstocks are notoriously difficult to install.

All of our penstock installations are carried out safely with site specific risk assessments tailored to each individual installation.

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.

This wealth of capability ensures unrivalled competence at all phases of a project ensuring 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 the confidence that you will be left with a high quality installation from a company that stands behind its products.



STAINLESS STEEL VS CAST IRON

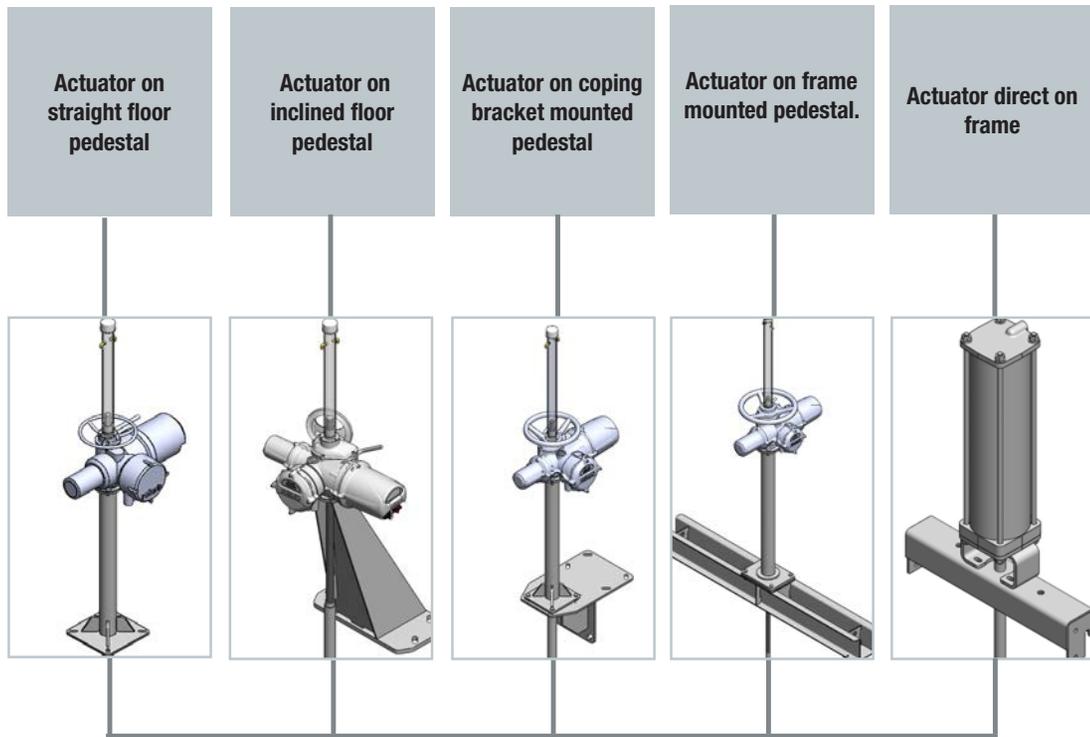
The advantages of stainless steel penstocks vs cast iron:

- Bespoke fabrication, tailored to suit each unique application and civil structure. Cast iron penstocks are typically available in a range of standard sizes only.
- For channel mounting applications, stainless steel penstocks are designed for mounting into rebates, to leave the frame flush with the channel invert and side walls. Cast iron penstocks are designed for face mounting only.
- Much lighter than cast iron, making installation simpler, safer and more economical.
- Less prone to corrosion.
- Vastly superior sealing performance.
- Seals are easily replaceable with penstock frame in-situ. Not possible with a cast iron penstock's bronze sealing faces.
- Adjustment of wedges is required with cast iron penstocks to maintain original sealing performance. No adjustment to sealing required throughout the lifetime of the penstock.
- Lower torque requirement – cheaper actuation and less wear, meaning longer lifetime.
- Generally much shorter delivery lead time. Cast iron penstocks > 600mm are generally cast from new.
- Lower carbon foot print.



ACCESSORIES AND OPERATING EQUIPMENT

Main actuation options

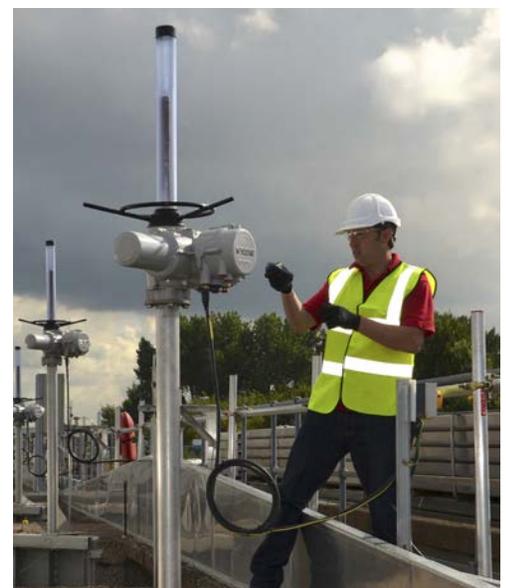


Other options available upon request

With a 30+ team of design engineers, our local workshop facilities and our dedicated site service personnel, we can deliver a limitless range of dependable actuation solutions.

From periodic manual isolation to round-the-clock flow control or fast acting fail-safe applications, we have an individual actuation solution for every penstock.

Our cost effective, pre-configured, operating equipment solutions cater for all penstock installations, be it a deep chamber or shallow channel. We are always ready to provide bespoke solutions for the most unusual and challenging operations.



PENSTOCK REPAIR, REFURBISHMENT AND REPLACEMENT



Glenfield Invicta has successfully repaired and refurbished penstocks on numerous projects, our reputation is such that we are considered 'specialists' in this field.

We are frequently called upon to inspect and recommend a resolution for a whole range of penstock related issues including defective installation, operational failure, obsolescence issues and leakage.

We often find that repair and refurbishment solutions are more cost effective for our clients than replacement. Using our in-house expertise and skilled engineers, we can bring a new lease of life to ageing assets so that they give decades more dutiful service.

We can provide this service on or off site depending upon the circumstances. Where complete replacement is necessary we will preferentially select from our own AVK Group range of high quality penstocks. Actuators and related ancillaries are included within the scope of our service offer.

The penstock repair, refurbishment and replacement service offering includes:

- Feasibility studies
- Bespoke ancillaries and actuation Solutions
- Condition reports
- Servicing
- Reverse engineering of obsolescent parts
- Actuator retrofit
- Product upgrades



Penstock before.



Penstock after replacement.

WHY CHOOSE GLENFIELD INVICTA

Complete Penstock Solutions

Specialists in the UK Water Industry with a proven track record spanning over 160 years. Glenfield Invicta are part of the AVK Group of companies. ISO Certified.

Industry Expertise

Penstock design and manufacture

Our penstocks are designed and manufactured in house by our sister company Orbinox, an AVK Group company since 2011. With more than 50 years of global experience in the water industry, Orbinox offers a world class range of penstocks and stop logs.

Market Leaders

Installation

Electrical, pneumatic and hydraulic installations. On-site repairs with nationwide coverage. Construction equipment ready with a team of certified engineers (confined spaced trained).

Minimal Plant Shutdown

Engineered Solutions

Valve and actuator selection with flow control valve sizing, design of extension spindles & valve operating kits. Modifications to pipework if required by valve installation and general valve/actuator troubleshooting.

Quality of Workmanship

Repair and Refurbishment

Repair and refurbishment of all valve related equipment, both on and off site repairs. Site surveys to assess your requirements, carried out free of charge.

Extended Warranties

Fabrication of Ancillaries

- Extended valve spindles
- Actuator/gearbox pedestals
- Actuator/gearbox drive bushes
- Actuator/gearbox mounting kits
- Spindle guide and support brackets

Long Term Solutions

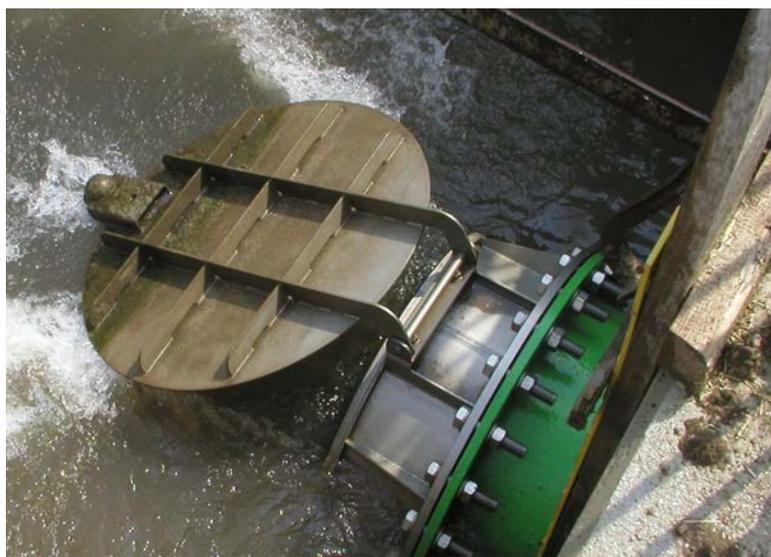
CUSTOMER FEEDBACK

'The team put the hours in and were **good to work with**, the Glenfield Invicta guys did a **great job** – they had everything with them that they needed, they executed the installation works in a **very efficient** and **professional manner**, AND they **cleaned up** after themselves, something you rarely find these days! **Laing O'Rourke**

Please pass on my thanks to Vince and Tom for all their **hard work** and endeavours and going that **'extra mile'** to complete the Penstock & FFT Drop Pipe installation it was much **appreciated** by the AGT site team.' **Aecom Galliford Try**

EXAMPLE CLIENT LIST





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A dedicated member of the **AVR** Group