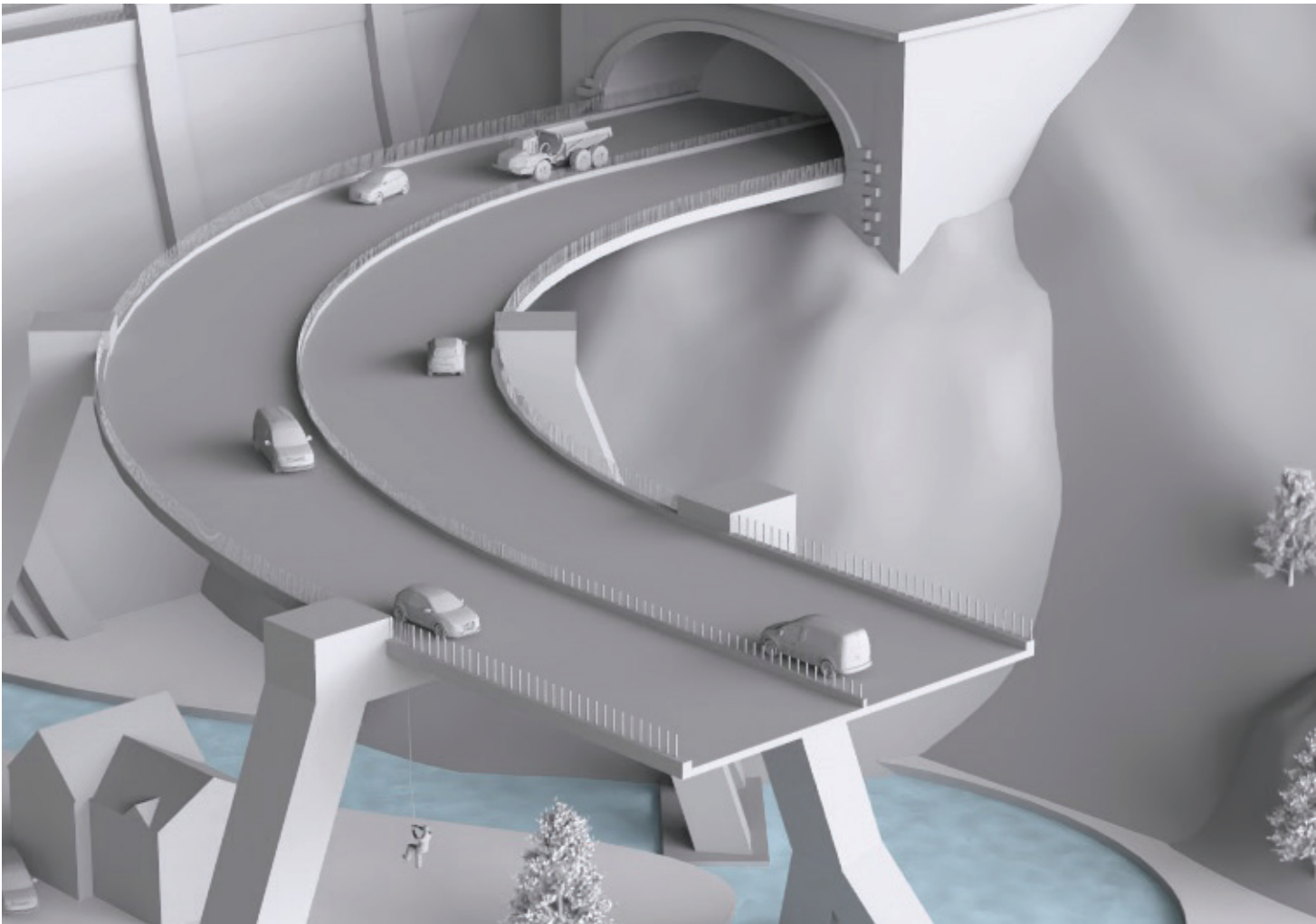


Structural Health Monitoring Services and Products

Surveys | Sensors | Intelligent Data

Contents

Future-proofing the UK's infrastructure	3
Infrastructure Intelligence	4-5
INSAR technology	6
Surveys	7
Rail monitoring solutions	8
Bridge monitoring solutions	9
Construction monitoring solutions	10
Infrastructure monitoring solutions	11
Rope access	12-13
Robotic inspection and maintenance	14
Other products and services by DYWIDAG	15
About DYWIDAG structural health monitoring	16



Future-proofing the UK's infrastructure

Innovative technologies for structural health monitoring

The UK's infrastructure faces multiple challenges of ageing, fatigue, and adapting to climate change. For engineers, infrastructure managers, and construction professionals, the task is daunting: ensuring safety, optimising resources, and integrating new technologies amidst budget constraints and regulatory pressures.

Structural health monitoring emerges as the key to navigating these challenges, offering an understanding of the lifespan of structures, ensuring public safety, and maintaining trust. Our brochure presents advanced monitoring strategies tailored for the UK, empowering stakeholders to safeguard the nation's infrastructure against current and future adversities.



Infrastructure Intelligence: The premier cloud-based sensor monitoring platform

Infrastructure Intelligence (II) revolutionises the management and monitoring of sensor data in real time. Designed for tracking a wide array of metrics including temperature, weather conditions, and environmental changes.

Key advantages of Infrastructure Intelligence

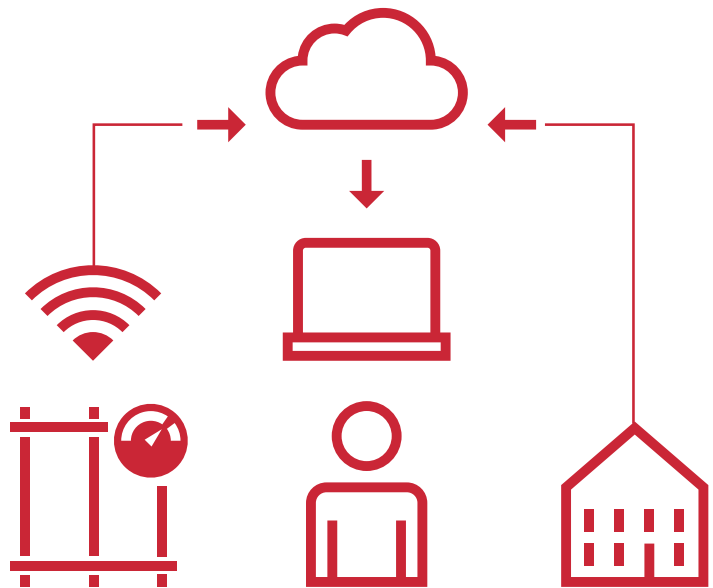
- Customisable access: Multi-layered user profiles with adjustable permissions enhance data accessibility.
- Remote data access: Users can input and retrieve data conveniently via any web-enabled device.
- Streamlined data management: The platform features a project breakdown structure that simplifies complexity.
- Enhanced project oversight: An intuitive dashboard provides a comprehensive overview.
- Automated notifications: The platform ensures users are promptly informed via email or SMS alerts.
- Advanced technology integration: Digital twins, Internet of Things (IoT), artificial intelligence (AI), anomaly detection, and smart alerts are seamlessly integrated, offering a leading monitoring solution.

Scalable and secure solution:

Powered by Microsoft Azure, II automatically scales to meet demand, supporting billions of transactions securely through its cloud-native PaaS architecture. With single sign-on via Microsoft work accounts and granular access control, it guarantees both scalability and security.

Effortless configuration and monitoring

Setting up monitoring parameters is straightforward, enabling users to track vital metrics and effectively anticipate and mitigate project risks.



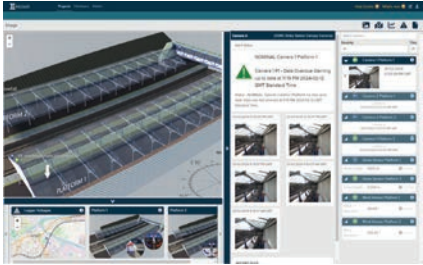
Integration and compatibility:

II seamlessly integrates data into third-party solutions and is fully compatible with Network Rail RADAR. As a secure software application developed by DYWIDAG, Infrastructure Intelligence complements all DYWIDAG services and products, offering a robust data management and analysis solution.

Proactive asset management with Infrastructure Intelligence

Real-time contextualised data

- Continuously process thousands of data points from high-tech sensors and third-party data sources.
- Gain insights to make informed decisions.



Intelligent reporting

- Generate real-time reports on any device.
- Track reactive and proactive mitigation issues with personalised stakeholder views and adjustable charts and tables.



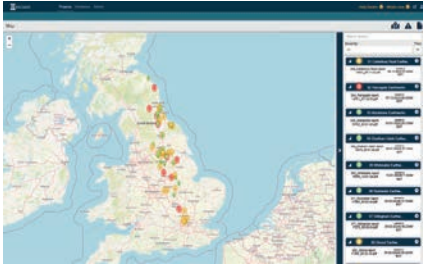
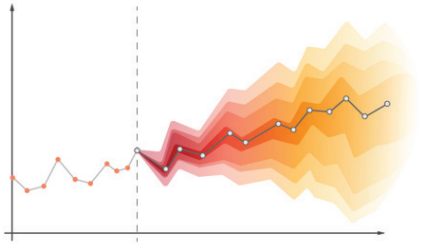
Early response alarm system

- Implement clear alerts and an escalating alarm system based on agreed protocols.
- Receive real-time updates to respond promptly to potential issues.



Smart alerts and anomaly detection

- Predictive technology alerts you before events occur.
- Proactively plan maintenance work and mitigate issues.
- Detect anomalies in asset performance with AI techniques.
- Reduce false alerts and identify real changes effectively.



06 Geospatial monitoring using InSAR technology

Integrating Interferometric Synthetic Aperture Radar (InSAR) technology with data from automated monitoring systems provides a comprehensive view of asset performance, enhancing the scope of monitoring capabilities. DYWIDAG introduces InSAR technology, transforming the landscape of geospatial monitoring.

This innovative approach utilises radar satellite imagery combined with sophisticated algorithms to deliver unmatched accuracy in monitoring ground deformation and ensuring structural integrity from a global perspective.

DYWIDAG's InSAR technology integrates vast amounts of data and advanced processing methods to produce millions of precise measurement points. This wealth of data facilitates accurate and efficient construction and maintenance activities.

Throughout the lifecycle of projects, our technology offers in-depth maps of terrain behaviour and structural analysis, providing stakeholders with essential insights for strategic decision-making. Its autonomous operation reduces the need for physical site visits, streamlining workflow and presenting a cost-effective solution for managing risks.

DYWIDAG's InSAR technology excels in monitoring the effects of both natural and man-made ground movements, guaranteeing stability and operational effectiveness in various settings.

Key features include:

- Millimetre-level accuracy in measuring ground deformation.
- Bi-weekly updates for timely and relevant data.
- Capability for historical displacement analysis.
- Effective monitoring of both anthropogenic activities and natural phenomena.
- Tailored solutions for areas with vegetation.



Surveys

Our team comprises highly skilled surveyors and monitoring technicians employed directly by us, allowing us to serve a wide range of industry sectors.

We provide services in any environment and are available around the clock to meet the needs of our clients. Our operational flexibility allows us to collaborate seamlessly to the unique requirements of each project. This adaptability ensures that we can provide customised solutions tailored to the specific demands of every job.

We are committed to adopting the latest survey technologies, enhancing safety, and delivering exceptional value to our clients.

Core surveying expertise:

- Sub-millimetre precision levelling, achieving accuracy better than 0.5mm.
- Advanced topographical surveys utilising GNSS and GPS technology.
- Comprehensive rail infrastructure and track alignment assessments.
- Detailed platform gauging and clearance analysis.
- High-definition 3D laser scanning and point cloud surveys.
- Thorough condition and dilapidation evaluations.
- Precise setting out services for construction accuracy.
- Cutting-edge digital imaging correlation techniques.
- Structured deflection surveys to assess structural integrity.
- Accurate overhead line (OHL) height and stagger measurements.
- Extensive drainage system inspections.
- Meticulous deformation monitoring to detect structural changes.
- Targeted patch scanning for focused analysis.



Advanced monitoring solutions for the rail sector

DYWIDAG stands at the forefront of technical innovations in the rail sector, offering an integrated approach to structural health monitoring. Our unique position as both the manufacturer and integrator of cutting-edge sensor systems allows us to deliver unparalleled monitoring solutions. Tailored specifically to meet the demands of rail infrastructure, our systems represent a new standard in precision, reliability and effectiveness. Holding a Principal Contractor's licence affords us the flexibility to operate independently across the network or to work as a subcontractor, adapting to the bespoke requirements of each project.

With DYWIDAG, stakeholders in the rail environment gain access to a suite of comprehensive monitoring tools designed to enhance operational safety, efficiency, and longevity. Our commitment to technical excellence ensures that every solution we provide is not only tailored to the specific needs of the rail sector but also incorporates the latest advancements in monitoring technology.

1 Specialist access

Rope access trained installation technicians provides a safe, cost effective and versatile alternative to traditional methods of access.

2 Void monitoring

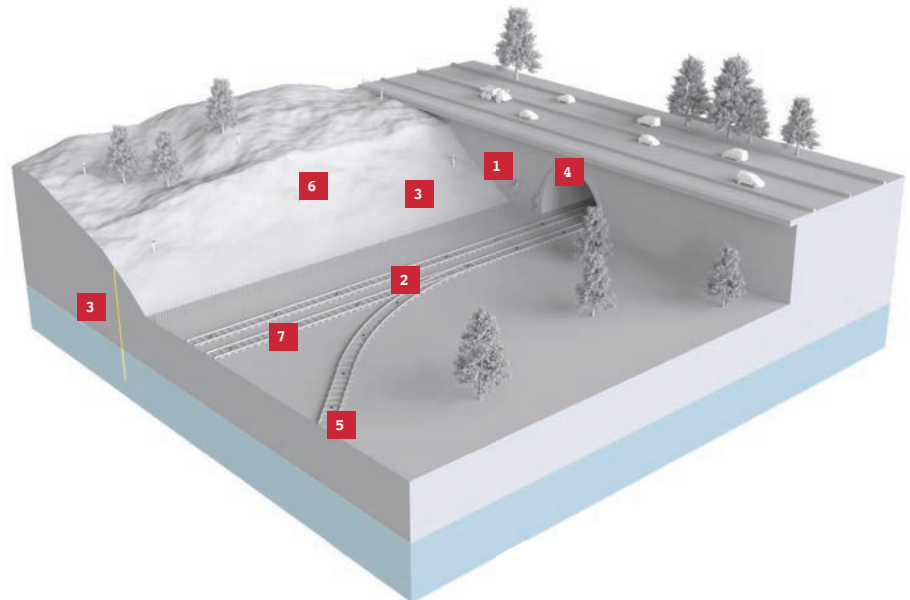
Void monitoring involves detecting sudden changes in the ballast beneath the railway line, giving early detection warnings about potential ground movement.

3 Ground monitoring

Ground monitoring for assessing soil and rock stability in geotechnical engineering. These methods involve measuring ground inclination, pore water pressure and ground deformation to detect movements and ensure the safety and stability.

4 Tunnel monitoring

Railway tunnel monitoring can give insight into the internal cross-sectional movement of the tunnel's kinematic envelope. Portal face monitoring of cracks or rotation gives added information on potential strengthening works required.



5 Track geometry

Monitor track for variations in alignment of Cant, Tilt and Twist.

6 Slope monitoring:

Install integrated cameras and Smart Tilt on ground posts to monitor subsidence over time or to respond to a dynamic event

7 Rail temperature monitoring

Monitoring rail temperature variations can help in identifying areas prone to thermal expansion or contraction, which may lead to deformations or even buckling.

Advanced bridge monitoring solutions

DYWIDAG specialises in providing monitoring solutions for bridge infrastructure. As both creators and integrators of advanced sensor systems, we are uniquely equipped to offer comprehensive monitoring strategies tailored to the specific needs of bridge management and maintenance.

Our approach focuses on essential structural health indicators, including strain on cable stays, bridge deck and pylon acceleration, and the monitoring of joint expansion and contraction.

These measurements are critical for ensuring bridges adhere to safety standards and maintain their functional integrity over time.

With a commitment to utilising the latest in sensor technology, DWYDAG delivers accurate, dependable data to bridge operators. This enables informed decision-making regarding maintenance and compliance, ensuring the longevity and safety of bridge structures through precise monitoring solutions.

1 Environmental monitoring

Tracking weather fluctuations provides essential insights into the causes of movement in infrastructure. Factors such as wind speed, rainfall, and temperature variations can significantly impact infrastructure stability and performance.

2 Specialist access

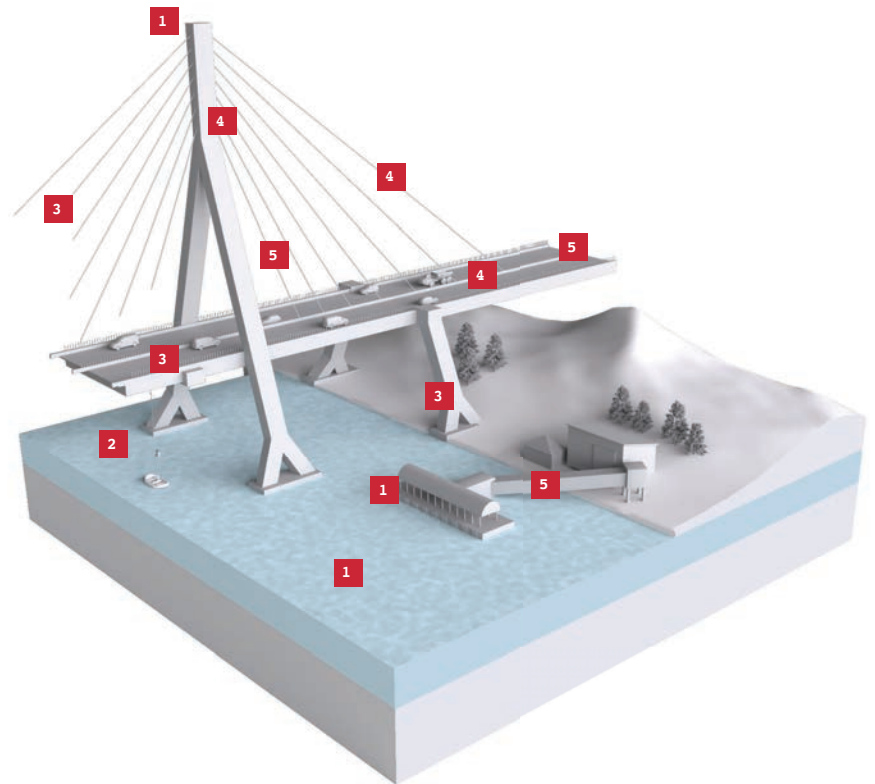
Rope access trained installation technicians provide a safe, cost effective and versatile alternative to traditional methods of access.

3 Vibration monitoring

This involves measuring the dynamic response of a structure to external forces such as wind, traffic, or seismic activity. Vibration monitoring helps in understanding the structural behaviour and identifying anomalies or changes that may indicate damage or degradation.

4 Bridge monitoring

Monitoring solutions improve bridge functionality by assessing various factors such as strain on cable stays, acceleration on the bridge deck or pylon, and expansion and contraction of bridge joints to ensure compliance with safety standards.



5 Displacement monitoring

Displacement monitoring involves measuring the movement or displacement of structures relative to their original positions. In assessing and detecting any displacement, may give insight into unwanted movement therefore compromising structural integrity.

10 Monitoring solutions for construction and mining

DYWIDAG presents a suite of specialised monitoring solutions designed to meet the diverse needs of the construction, demolition, and mining sectors. Our expertise encompasses a broad range of applications, from ensuring the structural integrity of existing infrastructure to the precise measurement of concrete temperatures, and from monitoring tunnel convergence to assessing environmental impacts.

Our advanced solutions also extend to anchor monitoring, facade engineering, and basement construction, providing a holistic approach to safeguarding projects and environments in these challenging industries. With DYWIDAG, stakeholders gain access to tailored monitoring technologies that enhance safety, efficiency, and compliance across all phases of construction and mining operations.

1 Existing infrastructure monitoring

Existing infrastructure monitoring during construction involves assessing potential movement of nearby structures like retaining walls and perimeter buildings. Rotation, vibration, displacement, and crack monitoring help detect any structural deformations or damage, ensuring the safety and stability of surrounding infrastructure.

2 Facade engineering, basement construction and temporary works

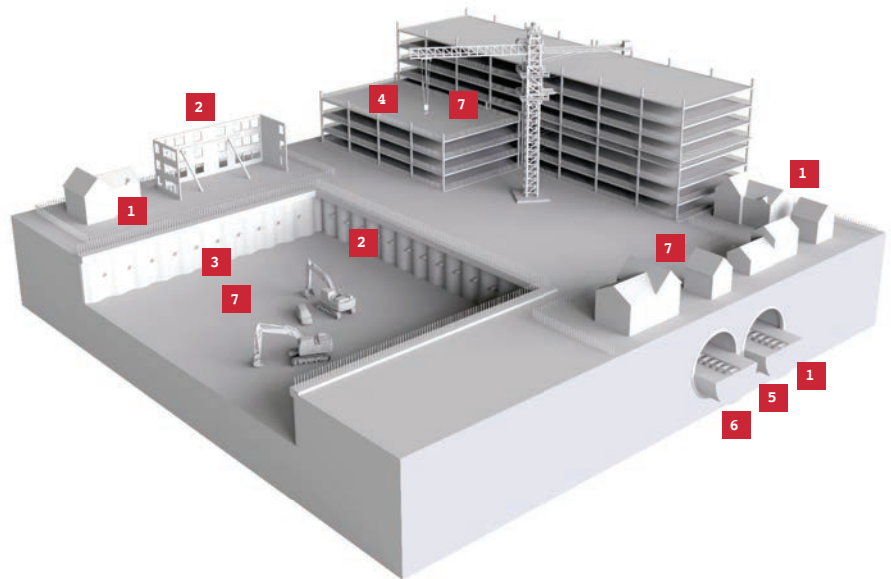
Monitoring instruments and sensors are deployed to provide real time data identifying any movement during critical phases of construction.

3 Anchor monitoring

Retaining walls within construction sites may have anchors installed, these can then be monitored for load applications. Monitoring loads help in ensuring that structures are not subjected to excessive stresses beyond their design capacities.

4 Concrete temperature monitoring

Monitoring temperature variations in setting concrete can help in identify areas prone to thermal expansion or contraction, which may lead to structural deformations or material degradation over time.



5 Tunnel convergence

Monitoring of tunnel convergence is vital for ensuring the ongoing stability and safety of underground structures. Monitoring can give information on known/potential issues such as ground settlement, structural deformation or lining deterioration such as cracks within the tunnel lining.

6 Mining

Mine construction and operations can be remotely monitored to provide a comprehensive overview of the integrity of the structures and monitor noise, vibration and dust levels.

7 Environmental monitoring

Environmental monitoring involves the assessment and management of noise, dust, and vibration levels to mitigate potential impacts on surrounding communities and ecosystems.

Infrastructure monitoring solutions

DYWIDAG not only manufactures its own sensor systems but also offers a comprehensive monitoring solution that sets new industry standards.

DYWIDAG provides tailored monitoring solutions to meet the specific needs of infrastructure projects. Whether it involves structural health monitoring, geotechnical instrumentation, or environmental monitoring, DWYDAG's comprehensive range of solutions ensures the accurate and reliable monitoring of critical infrastructure assets.

Through its commitment to innovation and customer satisfaction, DWYDAG empowers project stakeholders with valuable insights and data-driven decision-making capabilities, ultimately enhancing the safety, efficiency, and performance of infrastructure projects across various sectors.

1 New and existing infrastructure monitoring

Existing and new infrastructure monitoring during construction involves assessing potential movement of nearby structures like retaining walls and perimeter buildings. Rotation, vibration, displacement, and crack monitoring help detect any structural deformations or damage, ensuring the safety and stability of surrounding infrastructure.

2 Load monitoring

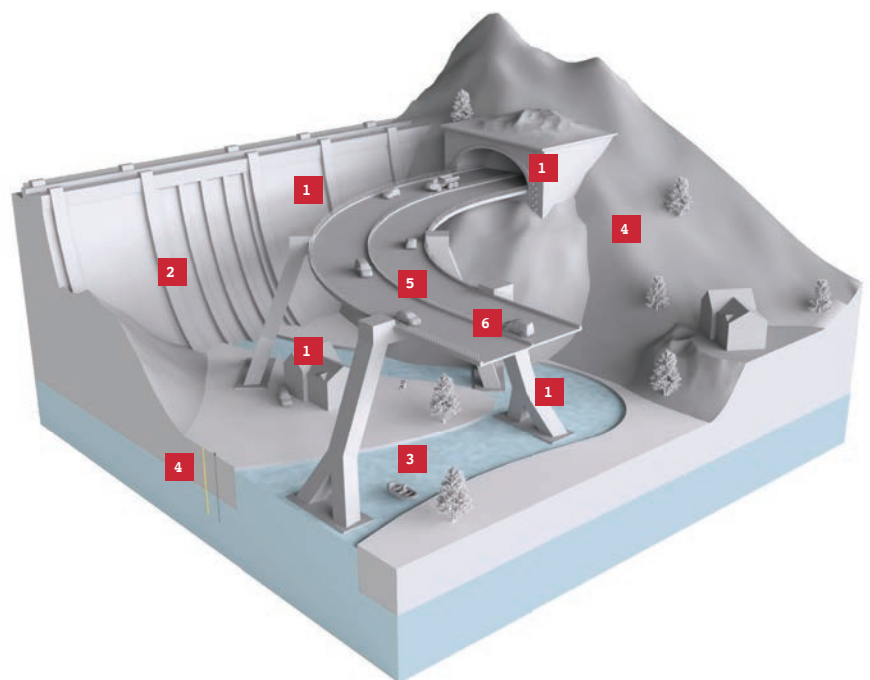
Load monitoring ties in with our geotechnical offering with applying monitoring solutions to ground anchors or in other areas where localised load is required. Monitoring loads help in ensuring that structures are not subjected to excessive stresses beyond their design capacities. Survey, patch scanning and automated total station solutions.

3 Specialist access

Rope access trained installation technicians provide a safe, cost effective and versatile alternative to traditional methods of access.

4 Ground stability monitoring

Ground monitoring for assessing soil and rock stability in geotechnical engineering. Measuring geotechnical slipping through boreholes to detect movements within the terraform.



5 Bridge monitoring

Monitoring solutions improve bridge functionality by assessing various factors such as strain on cable stays, acceleration on the bridge deck or pylon, and expansion and contraction of bridge joints to ensure compliance with safety standards.

6 Pollution monitoring

Assessing environmental impacts from human activities, including noise, dust, air quality to mitigate potential effects on surrounding communities and ecosystems.

Enhanced accessibility with rope access and confined space techniques

Rope access is a safe method of working at height that encompasses speed of access, minimal impact on other operations, reduced number of operatives on site and is ideally suited to the installation and maintenance of sensors used for remote structural health monitoring.

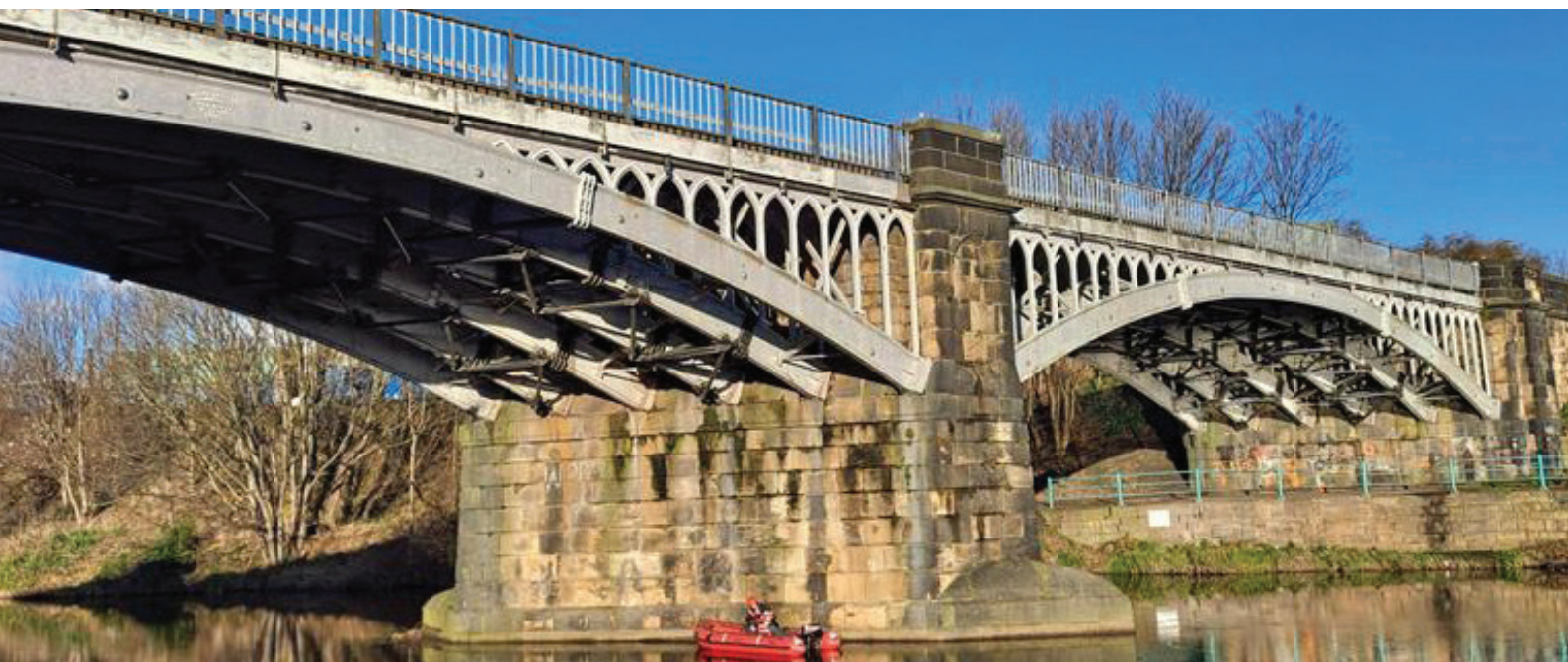
In addition to their instrument installation training, our highly skilled technicians are also qualified to use rope access equipment to gain access to the work area. DYWIDAG provides both access and monitoring, reducing interface management and enhancing value. Rope access is ideally suited to installations with multiple sensors in different locations on a structure.

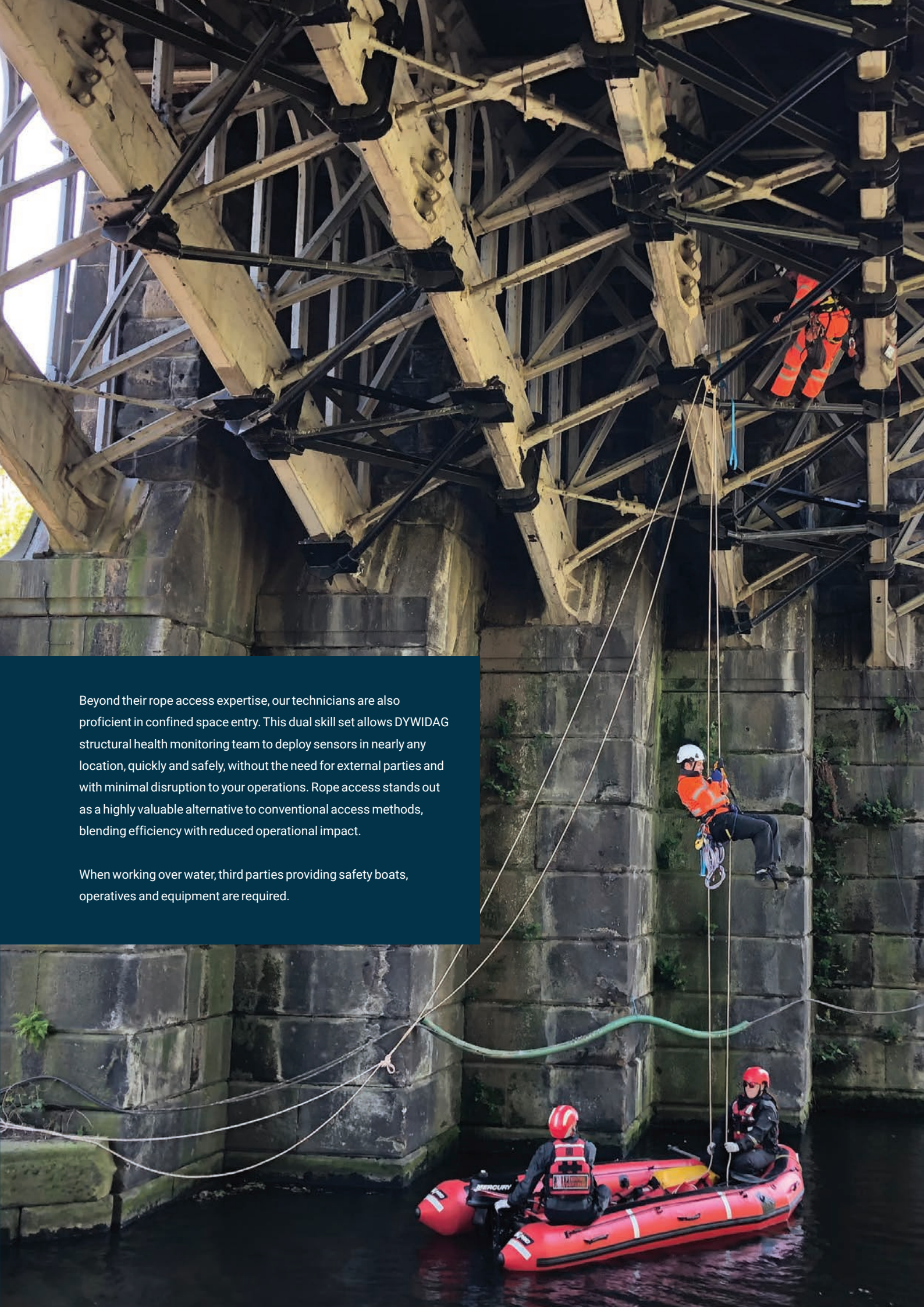
Large structures can be completed quickly with the minimum of interruption to operations and can be completed outside of operating windows. Rope access trained installation technicians can relocate quickly from one sensor location to another, reducing the need for complex scaffolding, road rail vehicles or other mechanical access solutions.

Once a rope access solution is devised, it can be repeated as often as necessary. Whilst temporary anchorages are the norm, some asset owners will permit permanent discreet anchorages to be installed to reduce set up times where multiple repeat visits are known to be a requirement from the outset. The anchorages are tested annually to facilitate a rapid redeployment. This is especially important where sensors are providing data that is critical to maintaining operations.



Rope access solutions are streamlined and flexible, necessitating only an anchorage point above the work area or at a minimum, on the same level. This approach enables rope access technicians to reach even the most challenging locations with ease, ensuring that virtually no structure is beyond accessibility.





Beyond their rope access expertise, our technicians are also proficient in confined space entry. This dual skill set allows DYWIDAG structural health monitoring team to deploy sensors in nearly any location, quickly and safely, without the need for external parties and with minimal disruption to your operations. Rope access stands out as a highly valuable alternative to conventional access methods, blending efficiency with reduced operational impact.

When working over water, third parties providing safety boats, operatives and equipment are required.

14

Safer infrastructure through robotic inspections and technology

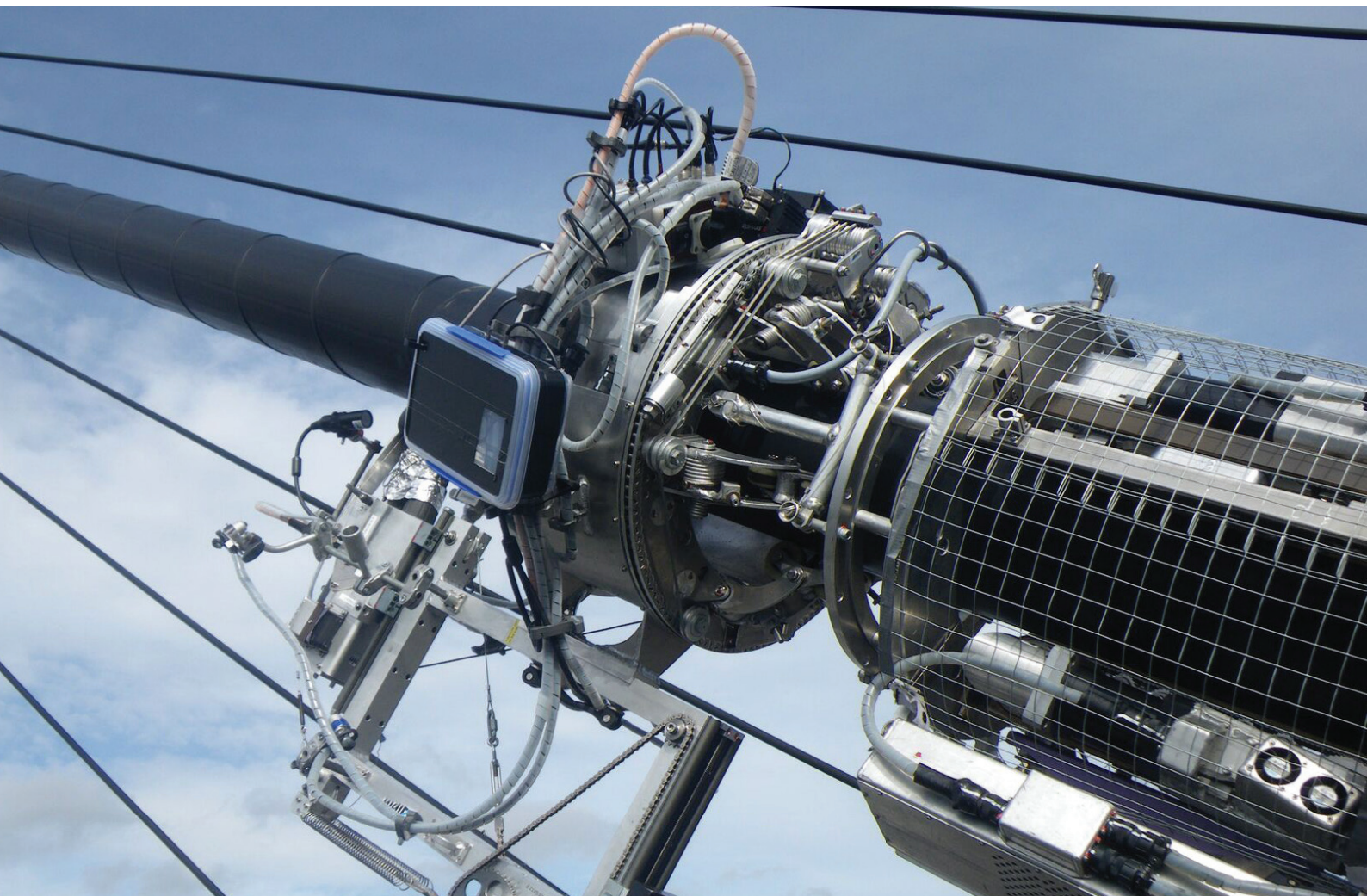
We conduct inspections, evaluate conditions, and carry out maintenance across diverse civil engineering projects, industrial facilities, and infrastructure globally.

Our engineers utilise proprietary access methods and employ testing and repair technologies, enhanced by robotic devices. Through the interpretation of asset data, we offer objective, coherent, and dependable information.

Safety is paramount, particularly for bridges. We employ robotic inspections for stay cables and advanced monitoring systems for the entire bridge structure to monitor and analyse structural and environmental factors. This is complemented by a built-in 24/7 alert system and escalating alarm system for enhanced safety.

Our capabilities include:

- Camera based Inspection of stay cables.
- Camera based Inspection of tunnels.
- Inspection of tower walls of wind towers.
- Inspection of cable anchoring of masts and roofs.
- Magnet inductive testing of stay cables.
- Magnet inductive testing of cable anchoring of masts and roofs.
- Rope access for inspection.
- Visual and magneto inductive robotic inspection.



Other products and services by DYWIDAG



Geotechnical

Specialist supplier of ground engineering products including ground anchors, tension piles, soil nails and mesh, rock bolts, smart anchors, marine tie bars and associated accessories.



Concrete technologies

Permanent formwork systems and slab edge forms, form ties, reinforcement technologies - stop ends & starter packs, concrete accessories, sealing and chemical solutions.



Stay cables including monitoring and inspection

Design and installation of stay cable systems plus the monitoring and inspection using robotic inspection methods.



Post-tensioning systems

Manufacture and installation of bonded and un-bonded post tensioning systems.

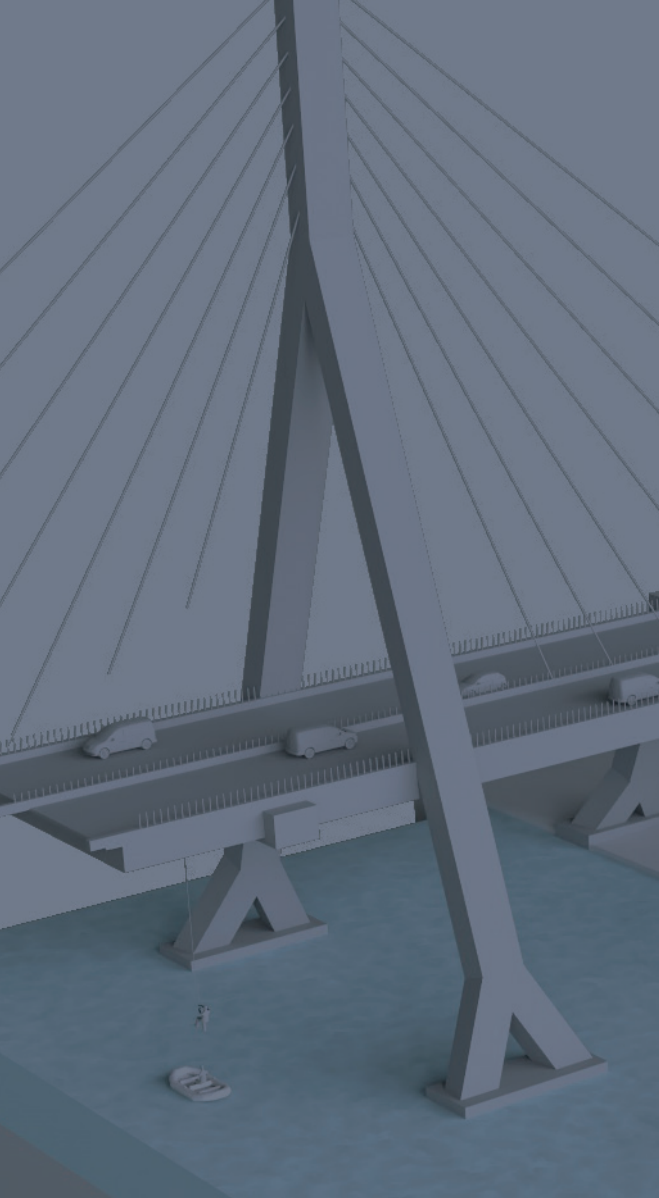


Repair and refurbishment

Testing and repair of existing ground anchors, refurbishment of post-tensioning systems to existing structures, rope access and wrapping of stay cables.

About DYWIDAG

structural health monitoring



We offer an extensive array of monitoring solutions, starting from the initial identification of scope and design through to installation. Our services encompass automated monitoring, survey systems, testing, and project management tailored for essential assets such as earthworks, structures, buildings, and beyond.

Whether tackling long-term projects, engaging in strategic planning, or swiftly responding to emergencies, our team consistently excels, especially in demanding circumstances. While we frequently collaborate with specialised contractors for installations, we also possess in-house rope access capabilities, enabling rapid response when necessary.

DYWIDAG has invested in research and development aimed at minimising human interventions, bolstering product reliability, and pushing the boundaries of our technology. Our dedication to delivering a comprehensive monitoring service is exemplified by our Infrastructure Intelligence platform (II), which serves as the hub for hosting and managing data, demonstrating our commitment to innovation and efficiency.

Get in touch.



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