



DRIVING THE OFFSHORE RENEWABLES INDUSTRY

Proven and innovative marine solutions

ACTEON

www.acteon.com

LEAN DELIVERY
INDUSTRIALISATION
OPTIMISATION **COST EFFICIENCY**
FLOATING FUTURE

Acteon drives down costs for operators by optimising design and installation and improving scheduling and resource utilisation. Alongside our extensive track record in fixed renewables, we have the expertise to support the development of large structures, including floating installations, in deep water. Our baseline environmental surveys mean projects can establish appropriate controls for protection of the surrounding ecosystem.

YOUR MARINE SOLUTIONS PARTNER FOR THE OFFSHORE RENEWABLE ENERGY INDUSTRY

Cross-disciplinary expertise in design, engineering, installation and operations enables Acteon to integrate services and industrialise project delivery.

Drive down the costs of wind farm installation

Acteon's integrated engineering solutions optimise capital and operating expenditure to lower the life-cycle levelised cost of energy (LCoE) for wind farms. Our experts optimise scheduling and resource utilisation while reducing project risks through:

- Optimised designs
- Creative, fit-for-purpose geo-services and installation solutions
- Vessel-agnostic procedures.

Minimise environmental impact

We understand the importance of minimising environmental impact during installation. We offer a wide range of services that:

- Establish baseline levels of marine flora and fauna, water quality, salinity, heavy metals and other key components
- Establish appropriate project controls to protect the environment from the outset
- Feature industry-leading noise mitigation technology to minimise the effects of construction noise on marine ecosystems.

ACTEON'S INTEGRATED ENGINEERING SOLUTIONS OPTIMISE CAPITAL AND OPERATING EXPENDITURE TO LOWER THE LIFE-CYCLE LCOE FOR WIND FARMS.

Install larger turbines in challenging conditions

Acteon has experience designing and manufacturing subsea drilling equipment capable of drilling up to 9.5 m in diameter. Our solutions include hydraulic pile-driving equipment and hammers that:

- Are equipped for use in ultra-deep water
- Use a modular design enabling easy transportation, assembly and maintenance
- Are being developed to install the next generation of monopiles.

For floating turbines, we provide a single interface and a holistic approach for equipment and services including:

- Front-end engineering design (FEED) to mooring services
- Other marine operations from quayside operations to towing, offshore mooring and cable laying
- Maintenance strategy, monitoring solutions and digital twins.

Employ less invasive and more efficient technologies

Disruptive innovation is how we reduce cost and deliver value over the life cycle of our customers' projects. Investing in research and development is essential to driving this approach. We offer market-leading technology and an extensive equipment inventory, including:

- Mooring ropes, connectors and hydraulic hammer hardware – limiting noise and equipment size is important in offshore construction
- Customised anchor designs engineered from geotechnical data and fully coupled mooring analysis, to ensure cost-efficient and reliable floating wind turbine installation
- Cost- and time-efficient procurement and logistic solutions to provide industrialised solutions for developments.

ACTEON RENEWABLE ENERGY SOLUTIONS

Comprehensive, complementary services integrated to lower the LCoE



Site characterisation

- 1/ Remotely operated vehicle (ROV) and autonomous underwater vehicle (AUV)
- 2/ Geotechnical and geophysical surveys
- 3/ Geotechnical consultancy

Engineering

- 4/ Foundation design
- 5/ Mooring and anchor system design
- 6/ Global performance analysis
- 7/ High-voltage cable specification, design and integrity
- 8/ Pre-construction and route surveys
- 9/ Installation engineering
- 10/ Logistics and cost analysis

Installation

- 11/ Pile hammers
- 12/ Pile drills
- 13/ Pile cleaning
- 14/ Pile grouting
- 15/ Lifting and handling equipment
- 16/ Piling templates
- 17/ Floating platform towing and installation
- 18/ Cable installation
- 19/ Surveying and positioning
- 20/ Pre-lay mooring installation

Operations

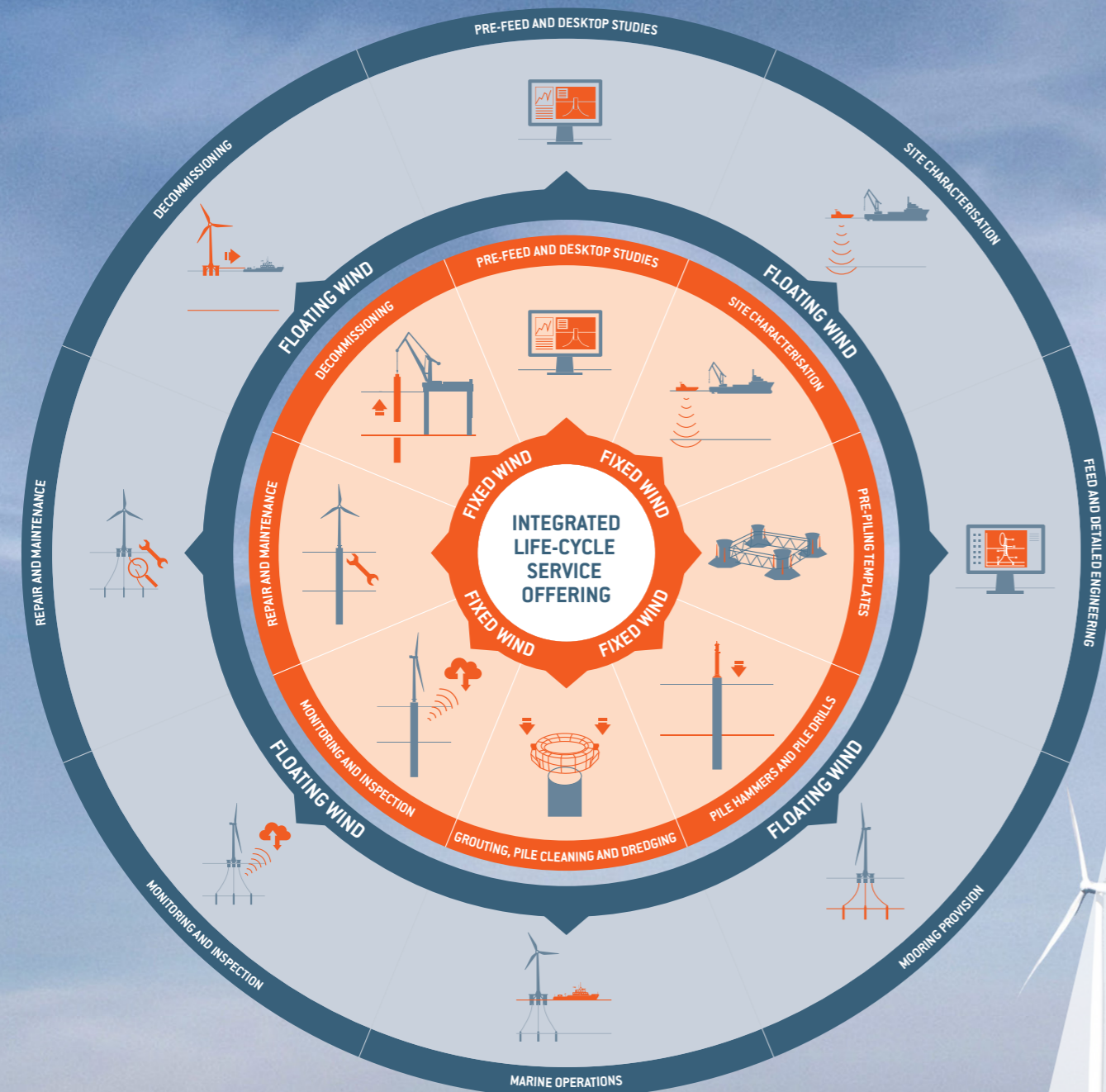
- 21/ Asset integrity and digital twins
- 22/ Structural monitoring
- 23/ ROV and AUV surveys
- 24/ Mooring and cable inspection, maintenance and repair

Decommissioning

- 25/ Sectioning and recovery
- 26/ Mooring line disconnection
- 27/ Towing
- 28/ Final site surveys

ORGANISED ACROSS ALL PHASES OF THE PROJECT LIFE CYCLE

Whether projects need foundations, towing and mooring, or cable configuration, our ability to work from the engineering phase all the way to logistics and installation enables us to bring significant economies of scale and cost efficiencies to the most complex projects.



PROJECTS IN FOCUS



INSTALLATION OF 72 MONOPILES IN RECORD TIME

Customer challenge

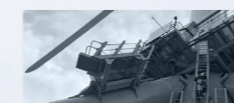
Van Oord wanted to install the 72 monopiles that make up Vattenfall's Kriegers Flak offshore wind farm, as quickly as practicable.

Our solution

Provided a MENCK MHU 3500S hammer, including power packs, an ancillary hose spread and a pile sleeve, and personnel and services to optimise installation frequency.

The result

With Van Oord, the 72 monopiles were installed in record time and without notable hammer downtime.



STRUCTURAL MONITORING MEASUREMENT CAMPAIGN ON THE TETRASPAN FLOATING WIND DEMO

Customer challenge

Install monitoring units for a five-month measurement monitoring campaign on the TetraSpar Demonstration Project, the world's first full-scale demonstration of an industrialised floating foundation.

Our solution

Provided and installed three INTEGRIpods at seven measurement points on the TetraSpar demonstrator, for a total of 21 sensors. The sensors were installed on the internal and external columns.

The result

The customer had full access to the cloud-based infrastructure platform, enabling digital visualisation of the captured data of the structure being subjected to large waves and typical harsh autumn/winter North Sea conditions.



INTEGRATED SOLUTION FOR INSTALLATION OF MORE THAN 300 PILES

Customer challenge

Support throughout the design and installation phases was required with piling hammers, pre-piling template design and structural health monitoring equipment as part of a complete solution for jacket installation.

Our solution

An integrated solution for the monitoring and installation of 339 piles, 111 wind turbine generator (WTG) jackets and two offshore substation (OSS) jackets, offshore South East Asia. Support and equipment included: abrasive cutting and recovery services to support the test installation phase of six piles; hammers; design and supply of pre-piling template; and design, fabrication, yard installation and commissioning of market-leading monitoring instrumentation.

The result

A reliable solution to install 339 piles on the wind farm, data and insight on the development, as well as corrosion and anode monitoring to enable the digital measurement data required.

OPERATIONS, MAINTENANCE AND INTEGRITY SERVICES FOR OFFSHORE WIND

A unique combination of services and in-house domain knowledge ensures safe, efficient operations and enables the life extension of offshore wind infrastructure.

We help customers simplify processes and streamline operations by offering a single point of contact for subsea balance-of-plant operations and maintenance (O&M) and integrity services for fixed and floating wind farm developments.

O&M strategy development

Engineering assessments

Asset life extension planning

Digital response twin

Mooring and dynamic cable inspection

CP drop-cell survey

Cable and scour-protection survey

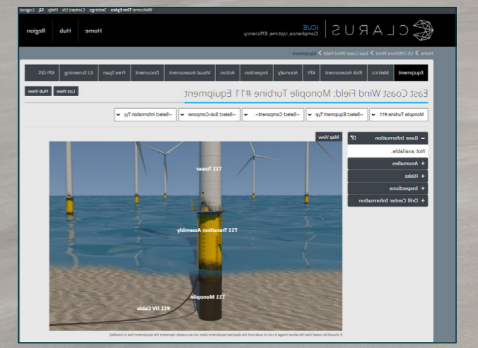
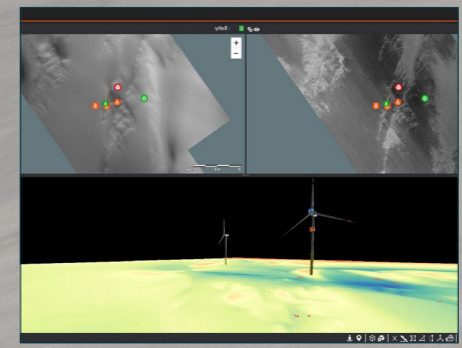
External and internal GVI and CVI

Corrosion / CP monitoring

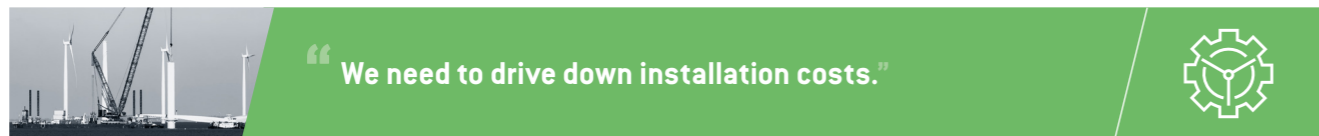
Remediation solutions

Structural monitoring

Data management and integrity insight



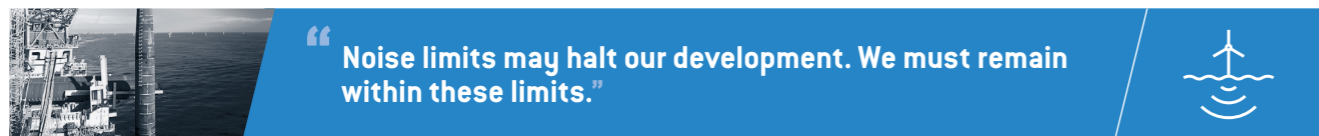
SOLUTIONS FOR FIXED AND FLOATING INFRASTRUCTURE



Acteon solution

Getting Acteon foundation experts involved early can help to reduce costs through optimising designs, reviewing constructability and identifying issues.

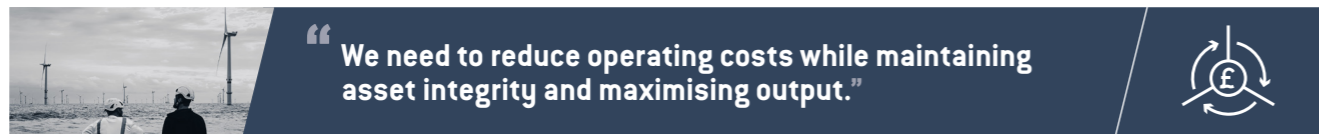
Proof point. For example, optimising monopile designs to hammer properties and geotechnical conditions can engineer out some of the installation noise, thereby enabling more efficient driving and thus reducing installation time. Optimised designs also use less steel.



Acteon solution

The MENCK noise reduction unit has become an integral part of the hammer during operations. By precisely influencing the force-generation characteristics of the single impact during pile-driving, the unit reduces the noise-generating attributes of the impact while ensuring continuous drivability for the pile.

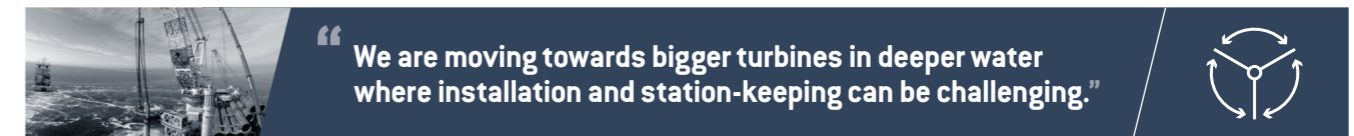
Proof point. MENCK's patented topside noise reduction skirt can reduce above-water sound-energy emission around a pile by up to 65% – important for those projects close to noise-sensitive areas.



Acteon solution

Acteon asset monitoring systems provide real-time data, thus enabling remote asset performance monitoring and, thereby, reducing operating costs.

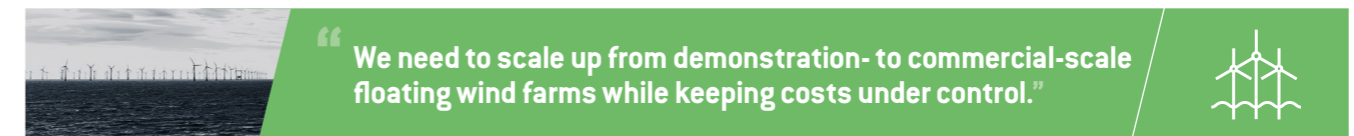
Proof point. Acteon has designed and installed market-leading monitoring instrumentation on offshore wind turbine foundations. This integrated digital solution includes high-quality structural and corrosion monitoring.



Acteon solution

Acteon has worked on the most complex offshore projects involving the heaviest equipment in water depths to 2800 m. Its extensive towing and mooring record extends from the quayside to remote offshore locations, and from shallow to ultradeep water.

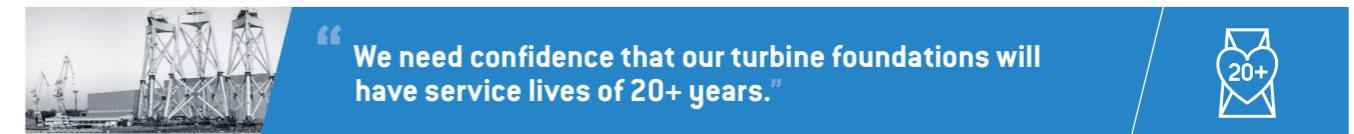
Proof point. Acteon has towed and moored hundreds of floating assets ranging from experimental wave energy converters to immense floating production, storage and offloading vessels.



Acteon solution

Experienced Acteon engineers can perform coupled analysis of floating assets that accounts for hydrodynamic and aerodynamic loading to provide complex projects with optimised designs that help to reduce costs. Because Acteon's activities are not tied to specific vessels, we are free to propose creative, fit-for-purpose, cost-effective installation solutions.

Proof point. Acteon has a record of delivering disruptive back-deck solutions that create value by driving vessel optimisation and reducing dependence on heavy-lift vessels.



Acteon solution

Acteon's deep domain experience in mooring integrity and corrosion protection systems enables it to solve existing problems and to future-proof your assets.

Proof point. Whether it is corrosion prevention for fixed jackets or mooring changeouts for large floating assets, Acteon has provided and installed the tools to ensure the integrity of many ageing assets worldwide.

DO YOU HAVE A QUESTION? Contact us at info@acteon.com

ACTEON | DATA AND ROBOTICS

ELECTRONICS AND TOOLING

 **seatronics**

GEO-SERVICES

 **Benthic** |  **TERRASOUND** |  **UTEC**

STRUCTURAL MONITORING

 **PULSE**
Structural Monitoring

ACTEON | ENGINEERING, MOORINGS AND FOUNDATIONS

ADVANCED SYSTEMS ENGINEERING

  **CLARUS**

MARINE FOUNDATIONS

  **MENCK**

MOORINGS AND ANCHORS

 **BRUCE ANCHOR** |  **INTERMOOR**

ACTEON | ENERGY SERVICES

CORROSION MANAGEMENT

 **DEEPWATER**

CUTTING AND DECOMMISSIONING

 **claxton** |  **PROBE**

ENERGY RESOURCING

 **TEAM**
Energy Resources

FLEX-LAY AND RETRIEVAL

 **aquatic**

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