Advanced systems engineering to meet tomorrow's energy needs

2hoffshore.com

2H delivers industry-leading advanced systems engineering for the offshore energy sector. As a trusted, independent partner, we help our clients achieve their goals across the most challenging engineering projects.

Why work with us

2H has an independent and highly skilled engineering team with the knowledge, drive and creativity to solve complex challenges and deliver commercially feasible solutions for the offshore energy sector. We assess, simulate and evaluate engineering scenarios to establish the most effective and beneficial option for our clients.

We are leaders in structural dynamics, complex system design and integrity management. Our focus is on technical innovations and leading-edge solutions that increase commercial value, and our multidisciplinary engineering teams have complete system expertise.

Expert solvers with a wealth of experience

With more than 30 years of experience in the offshore energy business, we consider ourselves experts in our field. We have mastered marine structure dynamics, worked with all types of offshore systems and components, and gained comprehensive experience in every aspect of offshore installation.

Our highly skilled engineers cover a wide variety of disciplines. Each has a strong record in problem solving and can apply unparalleled domain expertise, excellent analytical skills and a practical understanding of hardware and installation to design innovative solutions for energy infrastructure. These skills have been used to enhance operations in late-life oil and gas projects, to create efficiencies in fixed and floating wind projects, and to pioneer leading-edge initiatives to support decarbonisation.

Global reach, proven systems and leading-edge solutions

We have a presence in most of the world's major offshore energy hubs, and our offices are set up to enable seamless operation across all locations. This means we can offer clients access to all our talent and experience globally, a resource pool of more than 200 engineers. We build the optimal project team with the right mix of local and technical expertise for each job.

Three decades' experience in the energy business has given us the opportunity to work on a wide range of offshore structures around the globe. We have delivered everything from basic analysis to the design and implementation of pioneering offshore systems. We are innovative engineers with the knowledge and drive to help solve the most complex challenges our clients face. Our mission is to conceive, develop and deliver offshore engineering solutions that will meet global energy needs, now and in the future.

Accelerating the development of energy transition technology

Technology innovation is what drives 2H. We have been finding new, commercially viable solutions to industry challenges for decades. We are using our expertise to develop technologies that address the threat of climate change and can help secure a more sustainable energy future.

Transferable expertise

We believe that technological innovation is the key to accelerating the energy transition. The world is moving away from fossil fuels, but there is plenty that can be learned from organisations that originally established themselves in the oil industry.

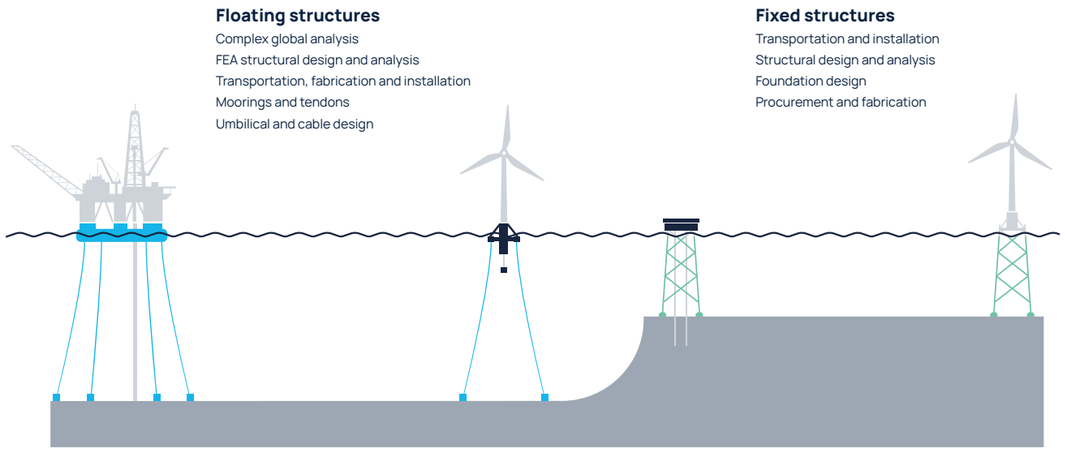
2H understands the offshore environment. We understand how structures behave in it - and we know how best to build, fabricate and install structures for it. What makes 2H special is that we use advanced engineering techniques to optimise design, components, materials and processes to help make offshore structures even more robust and cost-effective.

We apply this domain-leading expertise to develop top-quality technical and commercial solutions for offshore wind and decarbonisation projects.

Energy transition initiatives

As part of an initiative to help support and enable the energy transition, 2H is making contributions in three key areas of engineering and technology:

- Applying novel engineering methods for fixed wind foundations: we use advanced analysis to develop novel fixed wind foundation designs optimised for transportation and installation.
- Developing new solutions for floating wind: we use coupled dynamic analysis to develop optimised mooring and anchor systems and components, and power cable configurations.
- Creating technology to lower carbon: we are developing and optimising solutions for water cooling, carbon capture, gas storage and hydrogen utilisation.



^ 2H supports clients across the full range of environments and offshore energy projects

How we are driving decarbonisation

2H helps clients accelerate their path to net zero by applying proven system design and combining it with new technology to prevent, reduce and remove carbon emissions. Our team makes comprehensive assessments of carbon reduction opportunities and provides the innovative solutions that will deliver them.

Outside-the-box engineering

Lowering carbon emissions and decreasing their impact are the greatest challenges that we face today. At 2H, we are helping clients to rethink their offshore energy operations and enabling them to lower their carbon impact through innovative system design and new technologies.

Exploring every opportunity

We help our clients assess all available options and technologies to deliver the maximum carbon dioxide reduction, and we devise the most economical and efficient way to execute these strategies.

Preventing

Future carbon emissions by enabling and optimising clean sources of energy and replacing fossil fuels.

Reducing

Carbon emissions by improving the efficiency of existing conventional energy production and operations.

Removing

Carbon dioxide and greenhouse gas emissions by developing innovative solutions for gas capture and long-term storage.

A multi-talented team

2H offers a range of offshore engineering expertise to help delivery the most challenging projects to reduce carbon emissions.

- Environmental
- Site feasibility and remediation
- Geotechnical surveys and engineering
- Permitting and regulatory
- Wells and reservoirs
- Onshore/offshore system layout
- Subsea, drilling and conductors
- Concept feasibility
- Risers, pipelines and flowlines
- FEED and detailed system design
- Pipeline, riser and platform integrity
- Procurement
- Installation
- Operations monitoring and integrity

Renewables Engineering

2H is helping clients bring tomorrow's renewable technologies to life through innovative system design, advanced analysis and a fresh approach to fabrication and installation. We have extensive global experience of fixed wind and floating wind projects.

An established leader in marine structure dynamics

Fixed and floating offshore wind developments are complex systems that can be subject to extreme loading from their environments. Developing robust and cost-effective structures that will stand up to environmental conditions and perform optimally requires a clear understanding of how these structures will behave under such dynamic conditions.

We understand the offshore environment from the platform to the seabed and, with 30 years of sector experience, we know how structures will behave. We also know how best to build, fabricate and install these structures and are applying that expertise to bring leading-edge technology solutions to offshore renewables projects.

Novel engineering to maximise efficiency and minimise cost

We are an innovative team of engineers from a variety of disciplines. We apply advanced engineering techniques to reduce conservatism and optimise design, components, materials and processes. This makes our solutions more robust and more cost-effective, while ensuring that they deliver outstanding performance.

An extension of your project team

Unlike other contractors, we do not favour a particular concept design, equipment manufacturer or installation contractor. Think of us as your technical experts working collaboratively as part of your project team to help you meet your objectives. Our engineering solutions are independent,unbiased and optimised for the specific needs and budget of each project.

Tackling the big challenges in fixed and floating wind

Our expertise lies in using engineering to find new avenues for innovation.That means we are looking at the big picture and are focused not only on solving today's problems, but also on helping develop the next generation of offshore wind technology.

The challenges are great, but 2H is already active in many of the key areas:

- Bigger wind turbines
- Novel fixed foundation designs
- New mooring and anchor systems
- More sophisticated cable designs and configurations
- Smarter fabrication and installation techniques
- Turbine torque and dynamics
- High thrust loads
- Turbine-to-turbine shielding and interaction
- Energy efficiency under dynamic and high floating foundation pitch and roll
- Cable integrity and failure rates
- Mooring footprint and cable routing design.

2H is helping develop the next generation of offshore wind technology.

Oil and Gas Engineering

Riser systems

2H designs and delivers robust, fit-for-purpose riser systems for all locations, water depths, vessels and configurations.

Marine structural dynamics, subsea riser design and technology

Dynamic analysis of risers can present complex challenges. Our core strengths are calculating and understanding riser response and developing optimal designs. We apply unrivalled domain knowledge to practical aspects such as materials selection, fabrication, delivery and installation.

We have pioneered the design and development of many riser technologies in use today, from the STRIDE joint industry project for steel catenary risers and the AMJIG drilling riser guidelines to the free-standing riser concept. We have also worked with groups of operators through the 2H-led STREAM and Wellhead Fatigue joint industry projects to optimise fatigue assessments, reduce design conservatism and enable safer and more efficient riser operations.

We provide support throughout the project life cycle and have developed an engineering feedback loop that enables us to enhance design practices and optimise riser performance.

Subsea systems

Our holistic systems engineering approach, coupled with sophisticated analysis capabilities, enables us to design the most effective subsea solutions.

A multidisciplinary team with a comprehensive systems approach

Our engineers understand all the components and interfaces involved in subsea systems and consider all aspects of the project from design and delivery, through to installation and operations.

We have developed innovative analytical processes to increase accuracy and enable subsea solutions that were previously not feasible. We are working on projects that use measured data to better understand subsea system response and improve the accuracy and efficiency of our analysis and design. This helps eliminate conservatism in loads, meaning we are not over-engineering unnecessarily costly solutions.

Using machine learning for the design, integrity management and life extension of subsea structures helps mitigate risk and improves performance while keeping costs down. Innovative technologies such as our subsea jumper digital twin offer improved visibility of production operations.

Platforms

2H's minimum facility platforms are a versatile, low-cost, shallow-water solution for early production, marginal field development and the expansion of existing infrastructure.

Versatile, modular and custom designed

2H engineers work with clients to design and deliver the best solution for each offshore project, whether the requirement is for a stand-alone facility, a platform extension or a wellbay module for a mobile offshore production unit. The versatility of our modular design makes it easy to configure to project requirements and to accommodate varying water depths, environments, topsides and wells.

Cost savings of 30–50%

Our platform design delivers significant cost savings in two ways. First, through a minimised design that means minimal materials, which keeps weight and costs low. Second, installations are handled by jack-up rigs or crane barges, avoiding the much more costly use of heavy lift vessels.

Full EPCI project management

We handle all phases of fast-track engineering, procurement, construction and installation (EPCI) projects, ensuring that everything from concept development and engineering to fabrication and installation is completed cost-effectively and within the project schedule.

Online within 12 months

We draw on our experience to iterate designs and maximise efficiencies. We leverage local supply chains and fabrication yards to streamline procurement and construction, and we eliminate delays by doing this in parallel with drilling operations. Transportation and installation are simplified by using crane barges and jack-up rigs instead of heavy lift vessels.

Most platforms are operational within 12 months, but we have delivered some in as little as 6.

Optimising every stage of the project life cycle

Our capabilities cover a full range of engineering disciplines, which enables us to offer complete project life-cycle support for complex offshore projects. We apply unparalleled domain expertise, advanced analysis and a practical understanding of hardware and installation to find efficiencies and opportunities to streamline and optimise in all phases of a project.

We enable clients to increase commercial value and get the most out of their offshore assets in these key areas:

- **Geoconsulting:** High-quality geoengineering and site characterisation consultancy services delivered by a team of skilled and experienced geotechnical engineers. We provide technically robust, commercially efficient solutions for offshore wind foundations.
- **Planning and environmental:** Comprehensive planning, project management, permitting and environmental engineering services. We help energy clients working in strictly regulated locations achieve their project goals safely and in compliance.
- **System design and engineering:** Innovative and advanced system design and engineering for a variety of systems for the offshore oil and gas and renewable energy sectors. We leverage unrivalled engineering expertise in marine structure dynamics and knowledge of practical implications such as delivery, fabrication, transportation and installation.
- **Delivery, hardware and fabrication:** Detailed engineering, specification, testing, and package and procurement support for system hardware and components to ensure delivery of a reliable, fit-for-purpose and cost-effective system.
- **Transportation and installation:** Independent engineering and analysis for all installation and transportation activities. We help clients select optimal methods, create schedule efficiencies and optimise costs of their oil and gas platforms, and fixed and floating offshore wind projects.
- **Integrity, life extension and monitoring:** Advanced engineering services and tools to provide operational data, simplify asset operations and maintenance, minimise risk of failure and prolong asset life.
- **Decommissioning and end-of-life services:** A holistic approach to decommissioning to maximise operations, optimise logistics and schedules, minimise risk, reduce costs and protect the environment.

We consider every project holistically to optimise processes and reduce the overall cost.

Holistic support through all phases of the project life cycle

We have an extensive track record that covers everything from early-stage feasibility studies and conceptual work through to detailed design, transportation and installation engineering, third-party verification, integrity management, monitoring and life extension. This breadth and depth of experience means we can support clients through all project phases.

We draw on our experience across every part of the project life cycle. This means that we consider the project holistically, optimising designs, processes and schedules to maximise value from investment, minimise risk during operations and reduce the overall cost of energy.

Digital solutions

As domain experts, we have developed numerous digital solutions to solve real-life challenges encountered in the field. These complement our engineering services and create efficiencies in our design and integrity processes. Our digital solutions centre around our proprietary cloud-based digitalisation platform iCUE. iCUE enables clients to effectively manage all asset life-cycle data and provides integrity insights that maximise operational efficiency and reduce costs.

iCUE and our digital apps and services are custom designed to clients' requirements and can be integrated to work with existing systems.

System benefits

- Prevent risks by having integrity insight at fingertips
- Efficient data mining – access all data in 3-5 clicks
- Eliminate loss of data during the project life cycle
- Faster onboarding of personnel
- Improved value for asset sale
- Achieve regulatory compliance
- Digitise inspections
- Real-time monitoring of critical threats using a digital twin
- Integrates with other digital systems and data sources, e.g. EDMS Open Text, SAP ERP, ESRI Geodatabase, ROV video software, Wonderware/PI Historian, video servers

Integrity applications

- Risk assessment
- Inspections
- Anomalies
- Equipment
- Visual assessment
- Metrics
- Inspections

Engineering applications

- Spans assessment
- ILI screening
- Fitness for service
- DP drilling vessel drift off

Digital twin

- Flowline thermal fatigue
- Riser strength and fatigue
- Jumper strength and fatigue
- Power cable strength and fatigue
- Mooring integrity
- Pile driving installation fatigue

AI & machine learning

- Anomalie auto detection
- Chemical injection optimisation

2H Offshore is a global engineering contractor specialising in the design, structural analysis and integrity management of systems used in the offshore energy sector. Our capabilities and experience cover a huge range of solutions and environments. By working together in partnership, we will help you get the best results for your project smoothly, efficiently and within budget.

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