Reliable partner for efficient offshore solutions

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The technology innovator.
Royal IHC – Offshore

Reliable partner for efficient offshore solutions

Market segments

- Oil and gas
- Renewable energy

Product groups

- Pipelaying
- Cablelaying
- Module handling and well intervention
- Offshore support
- Diving support
- Offshore wind farm installation
- Pile-driving
- FPSO installation and offloading
- Handling, lifting and deep-water lowering
- Hydraulic systems
- Electrical power and automation systems

IHC Life-cycle support
Reliable partner for efficient offshore solutions

Royal IHC’s offshore division strives to deliver the best value to its customers. It is a partner of choice for innovative, sustainable and integrated offshore vessels and equipment. IHC’s offshore solutions are reliable, efficient and flexible to the demands of challenging seabed-to-surface oil and gas projects, and the renewable energy market. With its extensive knowledge and in-house design capabilities, IHC ensures compliance with the latest technological developments, strictest safety regulations and most stringent environmental standards.

Reliable
IHC excels at managing the complexity inherent within the development of vessels. Each project is approached with care, creativity and adaptability, so that customers can depend on delivery within the terms of the agreement.

It has an impressive track record of delivering innovative solutions to major subsea construction companies, ship owners and oil companies. IHC is one of the leading global players in its field. Besides its production locations in The Netherlands, it can accommodate the construction of vessels and equipment in other locations worldwide.

Partnership
Specific demands result in bespoke designs. IHC provides cost-effective products, not only when newly acquired, but also throughout their working lives. The IHC team works closely with the customer and becomes an extension of their organisation, so that they complement each other’s expertise.

It can, for example, advise on the design, regulations and structure of the project. This reduces risk and cost to create a smoother process, which leads to better results. Support can also be provided throughout the working life of the vessel.

Efficient solutions
IHC constructs custom-built vessels and mission-specific equipment – to meet customers’ requirements – or more standard vessels with a ready-to-build design, the IHC Supporter® class, IHC Packhorse™ and IHC Packhorse™ Maxi. Conducting business in an offshore environment is often turbulent. Technical and financial risks are significant, and margins are fluctuating. World oil prices are sensitive to political and monetary events.

The difference between profit and loss for an owner or operator of offshore support ships is greatly influenced by the productivity of these long-term investments. Efficiency, reliability and durability are key factors to success. IHC understands its customers’ needs and has the ability to provide innovative and efficient solutions for a variety of projects, such as pipe- and cablelaying, diving support and pile-driving.

Innovative vessels
Advanced equipment
IHC Life-cycle support

Reliable partner for efficient offshore solutions

Royal IHC – Offshore

SAPURA DIAMANTE
As a result of global economic and political developments, oil and gas prices are fluctuating. Therefore, energy companies are investing in the optimisation of existing wells while searching for new reserves. However, because easily accessible resources are already used for production, these searches are focused on less accessible areas, such as the polar regions and deep oceans.

In response to these developments, Royal IHC has expanded its offshore activities. It has gained a respected position in the market as a supplier of innovative equipment and complex integrated offshore vessels.

Safety and regulations
After oil spills in recent years, regulations have become more stringent than before. This has consequences for all parties involved in the oil and gas industry. As a reliable supplier of offshore solutions, IHC is well aware of how its customers have to comply with legislation. Due to its vast experience in this field, IHC has become an authority on this area, and can advise on the best and safest solutions to meet specific regulations.

Research and development
IHC invests significantly in research and development (R&D) programmes to provide customers with equipment of the highest standard. In-depth knowledge of the different stages of offshore operations and the potential design issues, results in IHC products that are designed to meet the challenges of the job, and also provide optimum performance levels and a lower total cost of ownership.

Several new products are the result of IHC’s successful R&D, such as the Hi-Traq trencher, which was specifically designed for burying inter-array cables; and the IDsis, a dedicated deployment system for handling fibre rope.

Building on its vast experience of delivering complex vessels, R&D has also enabled IHC to offer fully integrated solutions to customers. It can design and build a pipelaying vessel with a custom-control system that integrates all aspects of the pipelaying operation. The integration of the pipelaying tower’s lay-out with the vessel requirements at an early stage of development results in an optimal tower orientation, allowing for maximum deck space. Overall, such integration ensures excellent performance, safety and reliability.

IHC engineers work closely with its customers to ensure the equipment maintains an optimum level of performance and meets their requirements. The company also collaborates with universities and industry specialists to develop new technologies, benefitting from their knowledge and experience, to provide efficient, safe and environmentally responsible solutions.

Our climate is changing. The world needs more and different energy sources. With the oceans covering over 70% of the Earth’s surface, they are the largest collector and retainer of renewable energy – and the largest powerhouse on the planet.

IHC supplies specific solutions in the production chain for new sources of energy at sea. That includes equipment for installing offshore wind turbines and the technology for tidal energy. Given market demand, it is expected that these activities in particular will expand further.

Driven by international demand for green energy, IHC uses the knowledge and experience gained in the offshore oil and gas market to develop innovative turnkey solutions for the renewable energy market. IHC provides a wide range of vessels and equipment suitable for the difficult conditions associated with the installation and maintenance of offshore wind farms.

Offshore wind energy
Offshore sites are particularly suitable for wind farms, due to stronger and more constant winds. However, construction costs are considerably higher, and with a growing demand for wind energy, the offshore farms are increasing in size and located further away from the coast. This presents several challenges for the transportation, installation and maintenance of the wind turbines.

Countries have set goals for obtaining renewable energy. Governments have made strict rules for installing turbines offshore to protect the environment. Limiting the noise levels during pile driving is an example. IHC develops and supplies advanced equipment and innovative vessels as reliable solutions to meet all of the aforementioned challenges.

New foundation installation vessel
IHC’s mono-hull concept is the best solution for the installation of jackets, monopiles, tripods or completely assembled wind turbines. Its design enables it to work in deep water and offers high levels of availability, because it is suitable for use in wide weather windows. The vessel is supplied with a heavy-lifting crane, advanced skidding and pile-handling systems, enabling fast and efficient installation – even in the most challenging of environmental conditions.
Integrated offshore solutions

The installation of pipelines for oil and gas transport is an important part of the construction of offshore infrastructure. These interconnect oil and gas wells to production centres, which are in turn linked to clusters of population and industry. The increasing demand for oil and gas has driven the industry to deeper waters, which makes the installation of the pipelines and infrastructure even more challenging. The totally integrated solutions offered by IHC ensure the delivery of reliable equipment.

With a track record of multiple innovative pipelaying vessels, the company has already demonstrated its expertise in this field. IHC is renowned for delivering pipelaying vessels within the agreed schedule.

It is responsible for the design, build and commissioning of five identical fully integrated 550 tonnes pipelaying vessels and their mission equipment for Sapura Navegação Marítima, a joint venture between SapuraKencana and Seadrill. These are the world’s first pipelaying vessels that will be fully integrated by one supplier.

Innovative vessels
IHC’s innovative pipelaying vessels are custom-built for pipelaying and field development work. They are powerful and reliable, as well as multi-functional, due to the capacity for deep-water offshore construction, rigid-reeled pipelaying, Flex-Lay, J-Lay and ROV work for the infrastructure of oilfields.

All IHC pipelaying equipment is fully integrated into the structure of each vessel. The pipelay installation is planned into the design, so that a significant load of flexible pipe and umbilical can be accommodated.

Advanced equipment
IHC designs, engineers, builds and commissions complete integrated pipelaying spreads. Its specialist business units, IHC Engineering Business and IHC SAS, deliver advanced equipment that provides a commercial and technical advantage, working in partnership with customers on projects ranging from fully integrated vessel systems to the rapid supply of subsystems. IHC is a leading supplier of innovative, high performance equipment, and has delivered efficient solutions to several major companies in the offshore industry.

The pipelaying spread is supplied by IHC for the Sapura Navegação Marítima pipelaying vessels. It is designed to maximise operational efficiency as a result of complete integration with the vessel. In addition, IHC Drives & Automation will deliver the integrated automation system, full electrical installation and complete electrical machinery package.
Despite its compact design, the SEVEN OCEANS has a high payload and good seakeeping characteristics. All equipment is fully integrated into the design of the vessel, in the sense that it has been designed according to its functionality. At the same time, the seakeeping characteristics of the vessel have been used as an input for the design of the reel and the pipelay ramp.

The redundancy required by the customer was substantially higher than the usual DP2, resulting in IHC basing the design on DP3 philosophy.

A full width ROV hangar is located aft of the accommodation block. Recessed ROV deployment rails are fitted on both sides of the ship. A 400mt deepwater offshore crane and two additional large deck cranes are provided on the working deck. Furthermore the vessel’s pipelaying equipment (designed and built by Huisman) has a top tension capability of 400 tonnes and a storage capacity of 3,500 tonnes of rigid steel pipe on the main reel.

The vessel is a stable platform with a large payload due to the hull form. The stability of the vessel can be controlled and adapted according to different loading conditions by means of upper and lower ballast tanks in the sides. The ship’s motions can be further reduced by two independent anti-rolling tanks.

### SEVEN OCEANS

**Purchaser:** Subsea 7  
**Delivery year:** 2007

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<tr>
<td>Main crane capacity</td>
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<tr>
<td>Pipe capacity</td>
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<tr>
<td>Total installed power</td>
<td>21,700kW</td>
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IHC Engineering Business and IHC SAS are IHC’s specialist business units for the design and construction of tailored pipelaying equipment.

The core technology includes:
- **J-Lay**
- **S-Lay**
- **Reel-Lay**
- **Flex-Lay**
- carousels
- trenchers
- ploughs.

### J-Lay systems

IHC is a leading supplier of tailor-made, high-specification J-Lay systems. One of the world’s most versatile J-Lay systems, the Saipem J-Lay tower, is capable of deploying quad joints at line tensions of up to 1,500 tonnes and is able to hold the pipe string in the hang-off clamp at catenary tensions of up to 2,000 tonnes. Multiple travelling tower clamps, an adjustable stinger and a dedicated bulky item handler also contribute to the high functionality and low cycle time of the system.

### S-Lay systems

IHC 5-lay systems provide precise control of tension in the pipe string through the use of variable speed drives, and the synchronisation of line-up tools and tensioners during the laying process. Safe and efficient operations are achieved through the use of an integrated control and monitoring system, with automatic interlocks.

For the S-lay method, pipe tensioners are the essential means to hold the pipe and maintain pre-set tension in the pipe string while moving it from the deck to the sea.

### Flex-Lay systems

These systems are designed and built to satisfy all industry standards for quality, safety and environmental impact. The company delivered a 300 tonnes capacity vertical Flex-Lay system to McDermott and provided overall integration of the pipelaying system for the upgrading of an existing vessel. This is a modern, high-payload, dynamically positioned, fast-transit and flexible-laying product, which utilised the existing 7,000 tonnes capacity of the IHC carousel system.

The pipelaying spreads for the Sapura Navegação Marítima pipelaying vessels comprise a twin-tensioner tilting lay tower, flexible product storage in two below-deck baskets, and support equipment for the spooling and routing of products. The tower orientation allows for maximum deck space, while utilising a high-capacity 610 tonnes abandonment and recovery (A&R) system. A custom-designed control system integrates each aspect of the pipelaying spread to ensure excellent performance, safety and reliability.

### Pipeline ploughing systems

IHC has developed a wide range of pipeline and backfill ploughs to install pipelines in a variety of seabed conditions. The designs of the Saipem Plough (PL3) and Backfill Plough (BPL3), for example, follow a trend of ploughs being specified for increasingly large pipe diameters as projects develop ever more challenging requirements.
Integrated offshore solutions

Communication networks and offshore wind farms require constant innovations in installation and maintenance. Innovative solutions for transportation, installation of cables and protection by trenching are a necessity in harsh subsea conditions. IHC’s cablelaying vessels and equipment are designed to meet the increasing demands of cablelaying projects, such as those for power and fibre optic cables.

Innovative vessels

The IHC Supporter® class offers a modular platform for cablelaying activities. An optimised cablelaying solution is developed through the integration of the vessel, cablelaying system and other necessary equipment.

To deploy various types of subsea cable, a wide range of cablelaying modules are available, each specifically developed to suit the IHC Supporter® class. Each of these transform the IHC Supporter® class into a high-performance cablelaying vessel, while maintaining a competitive price and delivery time.

In addition, IHC offers complete custom-built integrated cablelaying vessels to meet specific demands. Typical examples include the C.S. ATLANTIC GUARDIAN, BOLD ENDEAVOUR (now named DEEP ENDEAVOUR) and C.S. SOVEREIGN.

Advanced equipment

The cablelaying equipment delivered by IHC Engineering Business offers maximum availability and functionality, while ensuring safe and reliable operations at all times. Combined experience in vessel integration and technically advanced equipment means that IHC is able to offer a cost-effective, fully integrated cablelaying solution.

For optimal offshore and cablelaying performance, IHC Drives & Automation engineers highly integrated solutions tailored to the vessel’s design. Within the innovative platform automation, the Dynamic Positioning (DP) system ensures the accurate positioning of cabling. This intuitively controlled DP system, based on extensive experience gained in global dredging operations, will take cablelaying to the next level.

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Carousel

Cable plough

Integrated cablelaying equipment
Designed for laying fibre optic cables, the BOLD ENDEAVOUR has a large cable storage capacity, excellent seakeeping properties and redundant cable handling systems. It is able to carry out cable handling operations under harsh conditions.

IHC developed the hull form to provide excellent seakeeping performance, while also providing sufficient internal volume to allow integration of cable tanks with an extremely high capacity. The vessel can lay 8,800 kilometres of fibre optic cable in a single operation, which is equal to the distance between the USA’s West Coast and Japan.

Due to its dynamic positioning/tracking system, the BOLD ENDEAVOUR operates with great precision. The vessel is also equipped with a plough for trenching and installing cable in shallow waters.

The BOLD ENDEAVOUR is fitted with two cable tanks with a diameter of 16.5 metres and another two spare tanks of six metres in diameter. The total fibre optic cable capacity is well over 5,000 tonnes.

Special attention was paid to the design of the hull to reduce ship motions at the sheaves on the aft of the ship. The A-frame and the sheltered working deck provide safe and excellent working conditions in sea state five.

IHC has designed a compact version of the C.S. ATLANTIC GUARDIAN, utilised for rapid-response cable maintenance and repair works, ROV operations, buoy deployment and cable retrieval in water depths up to 2,000 metres. The C.S. ATLANTIC GUARDIAN has a transit speed of approximately 15 knots and a maximum range of 15,000 nautical miles.

Despite her compact design, the vessel carries the technical equipment to perform all maintenance and repair services: double rotary cable machines, A-frames and special winches for ROV and plough deployment, as well as a centralised control and monitoring system. The special hull form, dynamic positioning system and stabilising tank provide a stable and comfortable platform for cable repair operations.

The engineers at IHC Engineering Business have years of experience in designing cablelaying equipment. With this knowledge, IHC creates solutions for all types of cable installation in the hardest seabed conditions. It is capable of delivering full turn key solutions for cablelaying vessel spreads.

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Sea Stallion cable ploughs
Extensive experience in the design and build of subsea trenching equipment has enabled IHC to develop the world-leading Sea Stallion cable plough range, which has set new standards in submarine cable installation and protection. The Sea Stallion has a proven ability to allow effective cable burial of up to three metres in a wide range of seabed conditions, while minimising residual tension in the installed cable.

The Sea Stallion 4 is a simple, but strong and aggressive plough specifically adapted and designed to achieve efficient and effective burial of power cables to large trench depths. Its robust chassis can withstand tow forces in excess of 180 tonnes. IHC is able to tailor its Sea Stallion plough systems to specific project ground conditions.

Hi-Traq trencher
The Hi-Traq trencher is specifically developed for power cable and inter-array cable installation on offshore wind farms. This innovative trencher is designed with a focus on steering and traction for effective trenching operations. Developed primarily for shallow water environments and to resist high seabed lift and drag forces generated by currents and waves. The vehicle is also able to work in harsh weather conditions.

Carousels
IHC designs and builds offshore carousels for the spooling and storage of power cables, umbilicals, rigid and flexible products. The carousels are designed to ensure maximum productivity and minimum downtime. Innovative features ensure the carousels can operate in difficult weather conditions, when vessels experience significant accelerations.

Each carousel is designed to suit the customer’s individual requirements and can incorporate a number of features such as compliant roller mountings, changeable core diameters, hydraulically adjustable roof positions and modular design to ensure that mobilisation time is minimised. These handling solutions have an excellent track record of safe, reliable and rapid product installation.

Launch, recovery and handling systems
IHC’s systems are the result of rigorous engineering design and practical knowledge gained through operating in the harshest of conditions. The company’s in-house team provides easy-to-use systems that allow precise and efficient control on launch and recovery operations. It has also pioneered the use of accelerometers to assist with launch go/no-go decisions.
With a growing number of ageing oil wells and shrinking oil reserves, it becomes increasingly viable and important to maintain wells and extract the maximum amount of resources. Subsea well interventions pose many challenges and require much advanced planning. Our solutions provide a high level of reliability and flexibility.

Well intervention vessels maintain wells and carry out the required technical services in deep water. IHC designs and builds these ships to offer a favourable return on investment through high-performance levels and superior quality standards.

New well intervention vessel
This vessel has a unique multi-service capability that has been designed to offer the easy handling of equipment and effectiveness of well intervention operations. This provides cost-effective solutions in both well intervention and subsea services. Designed for class 2 dynamic positioning (DP2), the vessel can also be easily converted to DP3.

All disciplines are under one roof to provide the ultimate integrated solution. IHC can take full responsibility for the design, construction, delivery and integration of all equipment, including the tower and diving spread and third party specialist equipment. The latest technology in electrical drives and platform automation optimises the design, construction and operation of IHC’s complex working vessels.

### WELL ENHANCER

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<td>15,862kW</td>
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The WELL ENHANCER is a cost-effective vessel of high performance and quality. IHC designed the vessel to accommodate a multi-purpose tower (delivered by Huisman), an 18-person twin bell saturated diving system and a twin work class ROV system. She is also fitted with the option to deploy coiled tubing and has the potential for upgrading with a flare boom. The DP3 system, three engine rooms and propulsion systems provide triple redundancy and help the vessel to be extremely reliable. Safety and security are guaranteed during intervention work by a gas closure system, which uses overpressure to protect the vessel’s accommodation.

The handling of subsea modules or heavyweight structures (e.g. Christmas trees, process modules, jacket foundations and PLEM) on open deck demands a high level of safety for both equipment and personnel.

**Deck skidding systems**
IHC’s deck skidding arrangements are designed for safe storage and horizontal transportation onboard well intervention, pipelaying and wind turbine installation vessels during operations and transit.

Through its subsidiary IHC Offshore Systems, IHC provides integrated and on-deck solutions in any desired configuration. Particular attention is paid to robust design and flexible configurations to ensure low integration costs and extended lifetime of the equipment. The main objective is to ensure maximum safety during severe offshore weather conditions.

The main features of the deck skidding systems include:
- skidding of loads weighing maximum 1,100 tonnes
- integrated or on-deck skid rails
- flexible ‘drop-in’ rail design
- longitudinal and transverse rail combinations
- stackable skidding carriages for storage
- sea-fastened skidding carriages
- push-pull, rack and pinion or winch-driven carriages
- manual or full remote operation
- optimised layout and integration/interface with other systems for efficient deck logistics.

**Active heave compensation system**
The innovative AHCS assures the soft landing and recovery of valuable equipment, thanks to the Quick and Power lift boost functions. The AHCS requires minimum installed hoisting power and does not compromise on safety and reliability.

**Module handling towers**
Excellent system design and vessel integration is the key to the safe, reliable and efficient launch and recovery of subsea modules, coiled tubing, risers and subsea lubricating systems through a moon pool.

IHC’s module handling towers are custom made and adapted to comply with the customer’s needs:
- maximum operational speed
- well intervention equipment or modules parked in tower
- movable service platforms for easy tool and tower access
- maximum moon pool accessibility (four sides)
- hoist systems with multi-functional AHCS
- integrated umbilical, guide wire and auxiliary systems
- cladding options for operations in Arctic environments
- full remote control systems.
The HOS ACHIEVER is a versatile custom-built offshore support vessel that is suited to inspection, repair, maintenance, diving and construction activities. It is based on the IHC Type-22 design, which has been adapted for the vessel’s specific tasks with a range of advanced equipment, such as an A&R winch, ROV and cranes.

The ship is capable of accepting two 12-man modular saturated diving spreads — allowing the vessel to change functions rapidly — and a modular pipelaying unit, which can be placed on the aft deck. One dive bell of the modular twin-bell diving system is operated through the moon pool. A second can be operated through the large working moon pool.

Two engine rooms provide ample power for manoeuvring and positioning this DP3 vessel. A third dedicated engine room — providing power for deck appliances — guarantees additional power to enhance safety and flexibility. A 160 tonnes heave-compensated crane and a 400 tonnes heave-compensated A&R winch are suited to subsea work. The two additional cranes are ideal for deck work. A twin work-class ROV system is integrated into the vessel’s design.

IHC Supporter® class

IHC has introduced the equally versatile IHC Supporter® class to its expanding line-up of standard vessels. The modular design-and-build concept offers a cost-effective, medium-sized platform to offshore operators. This means that each ship is adaptable to a wide range of offshore activities, including cablelaying and pipelaying, offshore and diving support, and even offshore wind farm services. The flexibility offered by the IHC Supporter® class means that it can perform different mission requirements. Many features can be incorporated into the design, for example the platform can be equipped with a large moon pool; ROV hanger; helicopter deck; and offshore cranes.

The benefits of the IHC Supporter® class include low capital expenditure and short delivery time, as well as reduced operating costs and high residual value.

IHC Packhorse™ range

IHC has also developed a series of offshore support vessels, known as the IHC Packhorse™ range. The IHC Packhorse™ is a platform supply vessel (PSV) and the IHC Packhorse™-Maxi has been designed for subsea support.

The main features include: a large working deck; fuel-efficient hull form; optimised power distribution; and a flexible tank configuration. To ensure efficient integration into the vessel’s operating systems, IHC business units supply among others the low-cost, yet highly efficient power distribution system, portable dive systems and cablelay solutions.

In addition, the IHC Packhorse™-Maxi has a 59-person accommodation unit and dual-stability books for operation as a non-SPS PSV at deeper draught. It has also been designed for the easy retrofitting of a heli-deck and to accommodate a 100 tonnes heave-compensated crane.

IHC supplies offshore support vessels and equipment for various applications, including inspection, repair, maintenance, decommissioning and deep-sea operations. They can be used to support pipelaying and offshore construction vessels, and adapted for specific charter tasks.

Equipment on board these versatile platforms is varied. The IHC Supporter® class, with a modular design and integrated equipment, is adaptable throughout its working life as an offshore support vessel.

IHC can deliver all equipment for the purpose of pipelaying, cablelaying, diving support and well intervention. It combines the expertise and experience of several experts within the company, which results in safe and efficient offshore support solutions.

High system availability

For system integration, IHC relies on the knowledge and electrical systems of its specialist business unit IHC Drives & Automation. It can deliver the integrated automation system, the full electrical installation and the complete machinery package. From generators via transformers and switchboards, to thruster drives with DP2 control, IHC engineers, builds and commissions the ship’s complete platform management system according to the latest technological developments.

This fully integrated approach warrants high system availability, sustainability and maintainability. It applies to the design, construction and operation of IHC’s versatile offshore support vessels.

Winch systems

The delivery of customised winch systems for use in the offshore oil and gas industry is one of the specialities of IHC Winches. It uses in-house resources for engineering, procurement, construction and on-site commissioning activities to deliver complete large-scale hydraulic or electric motor-driven winch systems.

An A&R winch is designed especially for the abandonment or recovery of a pipe or cable on the seabed. Greater water depths have led to an increase in top tension requirements and resulted in larger A&R winch systems. Working at greater water depths also calls for longer cable lengths. IHC’s A&R winches are available as single drum winches or as a traction with storage winch combination, depending on customer preferences. Furthermore, they are built in compliance with rules from ABS, DNV, Lloyd’s and so on.

Traction and storage winches have a relatively compact design, are extremely reliable and smooth for the wire rope to safeguard the continuity of operations. IHC’s expertise of swell compensation systems enables it to provide complete deep water lowering systems.
Integrated offshore solutions

Business concepts of diving operations have changed significantly. What once may have been considered a record-breaking dive has become a daily routine exercise. Therefore, new technologies are required to reach new depths, and to perform safer and more efficient operations.

The current developments in the exploration and production sector require a new generation of diving support vessels. The key factors to be considered in the development of these vessels are multi-functionality, optimal efficiency and worldwide usability.

Innovative vessels

IHC delivers custom-built diving support vessels, such as the SEVEN ATLANTIC, as well as the pre-designed modular IHC Supporter® class series with saturation diving equipment.

Diving support vessels operate as a floating dive base. Onboard, divers remain under high pressures in saturation dive chambers. The divers are transported to the work site by means of a diving bell, where they are involved in maintenance, repair and inspection activities.

IHC diving support vessels are designed to support: professional diving projects; global installation, maintenance and repair work; and other tasks such as subsea and offshore construction.

Innovative equipment

IHC Hytech is IHC’s in-house centre of competence for offshore diving technologies and integration of diving equipment. By combining experience in vessel integration and advanced equipment with knowledge of diving, IHC is able to offer integrated diving system solutions including DSV Class notation. This leads to short delivery times and a cost-effective diving solution. The vessel itself will also become more efficient and safer, due to this integration.

IHC offers a wide range of advanced equipment to ensure the deep-water diving operations of its customers can be carried out safely and effectively. This includes saturation diving equipment and decompression chambers that allow divers to stay under water for significant periods to complete their work. The company also supplies several diver handling systems and components required for deep-water diving activities, as well as the necessary electrical power and automation systems.
The modular approach for the IHC Supporter® class product range offers a variety of functionalities that suit the customer’s mission requirements. Maximum synergy is obtained by the integration of vessel particulars, a diving system and other equipment into a complete diving support solution. As a result, various diving configurations will be available for the IHC Supporter® class platform.

Different diving support purposes require varying vessel lengths and the integration of different diving systems. Vessel lengths ranging from 94 to 132 metres allow for the integration of diving systems with a capacity of six, 12 or 18 divers. The systems have a depth rating of 100, 200 and 300 metres of seawater respectively, and can be equipped with a single- or twin-bell launch and recovery system, each through a dedicated diving moon pool.

Alternatively, diving equipment can be integrated into vessels with other primary mission profiles, such as well intervention. The versatile IHC Supporter® class platform, in conjunction with advanced modular diving equipment, offers a cost-effective offshore diving solution that suits a wide range of mission profiles.

Cutting-edge technology is readily available for condensing into IHC vessels. The automation of the modular design is integrated in the system architecture by IHC’s specialist business unit, IHC Drives & Automation. Triplicated engine rooms allow the IHC Supporter® class to maintain DP3 operation with one engine room out of service.

IHC Hytech is IHC’s specialist in high-quality diving systems and equipment. With a broad customer base that includes various navies, governmental organisations, salvage companies and inshore/offshore diving contractors (both domestic and international), it has extensive experience in designing and manufacturing safe and reliable diving equipment.

Saturation diving
As well as integrated third-party saturation diving systems for its innovative vessels, IHC also provides other equipment for safe deep-water diving.

A variety of innovative and modular air and mixed gas diving systems are available. These range from basic transportable decompression chambers via air dive basket LARS units to fully integrated mini SAT-diving systems with all the necessary life-support equipment. All of these systems are built around deck compression chambers, which provide safe and controlled diver decompression. A dedicated launch and recovery system allows the divers to be transported to and from the subsea work site with the closed dive bell. This is equipped for two or three divers, depending on system configuration.

IHC Hytech is the market-leading supplier of hyperbaric evacuation pressure chambers, complete with the chamber outfitting, and the internal/external life-support and environmental control equipment. The evacuation chamber rooms are available for nine, 12, 18 or 24 divers and for depth ranges up to 400 metres of seawater.
Noise mitigation system

The purpose of the noise mitigation system (NMS) is to reduce the impact on sea life due to offshore construction activities for oil, gas and renewable energy. The NMS is based on a double-walled steel casing, with stiffeners to resist wave, current and compression impact.

The monopile NMS is equipped with a variable guiding system. This assures the swift guidance of the monopile through the NMS and the positioning of the NMS concentrically with the monopile. Furthermore, the variable guidance isolates the mechanical contact between monopile and screen. A multi-level bubble injector system operating inside the NMS creates an extra noise barrier. The mudmat flange on the bottom of the screen enables a stable positioning on the seabed.

Hammers and handling equipment

The majority of European offshore wind farms using monopile foundations were installed with hammers supplied by IHC Hydrohammer®. IHC offers a wide range of unique and renowned equipment to install offshore wind turbine foundations thoroughly and efficiently. This includes the transportation and handling of various types of foundation structures with upending tools, monopile plugs, internal lifting tools, upending hooks combined with saddles, skidding arrangements, winches, hydraulic devices, buoyancy systems for jackets and piling templates.

Blade handling tool

IHC has developed a patented concept for handling blades with a tool mounted to the boom of the Wind Turbine Generator installation crane. This increases the allowable wind speeds for blade installation and makes it possible to mount a blade at any angle.
Pile-driving equipment is used for the reliable and controlled installation of conductors, anchor piles, jacket skirt and/or leg piles, monopiles and start-up piles at sea. The installation of subsea structures has moved from shallow waters to deeper, and even ultra-deep waters beyond 3,000 metres. This means that the capabilities, capacities and even design of IHC equipment are continuously improving to meet these new markets. IHC’s pile-driving equipment has been designed and manufactured as a response to the installation challenges faced by its customers.

One-stop shop
With hydrohammers from IHC Hydrohammer, piling frames from IHC Sea Steel and handling equipment from IHC Handling Systems, IHC is a one-stop shop for the rental or sales of all necessary installation equipment related to offshore pile installation projects.

IHC’s pile-driving equipment offers its customers a more efficient solution for their installation projects. As an example the Fast Frame was developed to significantly reduce offshore installation times while maintaining the orientation and verticality of the pile.

Innovative approach
IHC Hydrohammer designs, builds and supplies hydraulic piling hammers, for on- and offshore use and is known throughout the world for its innovative approach. This is not simply confined to the hammers, but also extends to entirely new piling techniques, foundation equipment and hammer accessories, with a view to making pile-driving more efficient, easier to control, quieter and more widely usable.

IHC technology has been successfully introduced and applied within the offshore industry. The closed hammer housing, excellent control options and reliability make the hydraulic hammer eminently suitable for driving conductors, anchor piles, jackets, monopiles and start-up piles for pipelayers at sea.

Hydraulic hydrohammers
There are no compromises in the design of the hydraulic IHC Hydrohammer, where reliability, efficiency, possibilities and safety are the focus. The design is forged from billions of hammer strikes, both on- and offshore. The hydrohammer combines a solid one-piece ram with a fully enclosed hammer housing. The result is an elegant yet robust and reliable hammer.

Its unique design makes it suitable for all types of piling and foundation work, ranging from piling impact-sensitive concrete piles, to piling large and long offshore caisson piles. The hammer can even be used to break rock (also underwater).

Pile support frames
IHC Sea Steel supplies a wide range of pile support frames and other piling solutions, suitable for piles ranging in diameter from 20 to 104 inches. The piling frames have been developed to substantially reduce the time for installation, and safeguard the position of the pile.

The equipment can be utilised for many different applications, including the installation of FPSO mooring piles, pipeline initiation piles, wellhead protection piles, pre-piled jacket foundations and pre-driven conductors. All products can be modified to meet the requirements of a project and bespoke engineering solutions can be developed to suit all subsea conditions.

‘Hands-on’ solutions
IHC Handling Systems equipment is suitable for various offshore activities. It ranges from internal lifting tools (ILT), used during the handling of foundation piles for a jacket structure installation, to specially designed handling and cutting tools, used for decommissioning a complete steel structure.

Renowned equipment used during pile-driving operations includes: external and internal lifting tools; pile anti-running clamps; levelling equipment; and jacket pile grippers.

Using its wide experience and innovative skills, IHC Handling Systems maintains a market focus, which places emphasis on quality products, either standard or custom-made, and services designed to meet specific customer needs. All equipment is designed using a ‘hands-on’ operational approach, based on IHC’s long experience in the oil and gas installation market.

For example it has designed and constructed an innovative pile guiding tool for the installation of wind turbine foundations at sea. After delivery is was installed on board Seajacks’ jack-up vessel, ZARATAN. It has replaced the commonly used ‘spending bucket’ and ‘guiding and positioning tool’ by combining two operations – lifting and positioning – into one piece of equipment. This saves valuable time during the installation process, less deck space is required and it is much lighter than the current equipment.
Mooring system on board

28 Royal IHC

Depending on the project, mooring provides dual-pawl chain stoppers, for supporting and extending corrosion protection systems. The optimum pocket design minimises chain wear, fatigue, and maintenance requirements. Minimum motion impact on top chain, low integration costs, and extended lifetime of the equipment. The main objective is to ensure maximum safety during severe offshore weather conditions. A winch can be placed on top of the deck-skidding system.

Mooring systems (on board)

IHC delivers advanced equipment for various floating production systems – such as floating production, storage and offloading vessels (FPSOs), semi-submersibles, tension leg platforms (TLPs), and spar platforms – including on-board mooring systems, riser pull-in, and offloading systems.

The IHC team works closely with the customer to ensure the most efficient solution is achieved. IHC is a one-stop shop for the best result in system integration, either for new builds or conversions. It can deliver a completely integrated system or supply equipment as separate components.

Advanced equipment

IHC delivers multi-functional, custom-made, movable chain handling systems. Used to handle heavyweight cut-off chain parts safely, they can also lift the deadweight of a chain jack or carry the weight of a chain pull-in winch, and skid it above a number of mooring slots.

Riser pull-in systems

IHC supplies tailor-made complete riser pull-in equipment packages comprising custom-made pull-in winches, turn-down sheave trolleys, winch skidding systems, traction winch systems, hydraulic power units and dedicated control systems.

IHC’s turn-down sheave trolleys are custom-built installations that combine several technologies into one autonomous system dedicated for riser handling. The trolley position can be adjusted in a longitudinal direction alongside the vessel to ensure vertical riser pulling on multiple riser slots, which are predominantly found on spread-moored FPSO vessels.

With years of experience in designing and manufacturing winches, IHC can supply any winch to meet the requirements of its customers, designed for the harsh conditions of the offshore industry.

Offloading systems

IHC engineers and delivers complete offloading systems, comprising of a hose reeling system, hawser reeling system and quick-release mooring mechanism. IHC’s comprehensive and fully integrated offloading systems are reliable, easy to operate and tailored to meet specific customer requirements. Special attention has been paid to the easy and safe maintenance of offloading hoses, and their replacement, while the FPSO is moored in her offshore field.

For safe and efficient operations between the FPSO and a shuttle tanker, IHC delivers complete and tailor-made tandem mooring systems. These contain the means for storage, deployment and recovery of the mooring hawser assembly and integrated mooring point, with a full load quick-release facility. In addition, hydraulic power, control utility and load monitoring and data-logging equipment can be incorporated.

The design of the offloading hose reel minimises the space needed on board to store the hose. The reel can be made according to any size and type of hose and storage. A spooling device assists in the smooth spooling-on of the hose, on to the drum.

A central or dedicated hydraulic power unit can be used to smoothly operate the hose and hawser reel. A power unit, which is driven by electric power from the FPSO distribution board, generates the hydraulic supply. The drive with an integrated hydraulically operated fail-safe parking brake is controlled by a local console. It is possible to vary the speed of the reels and spooling device using proportional hydraulic valves.

FPSO installation and offloading

IHC delivers surface chain jacks, removable subsea chain jacks, chain winches (windlasses), traction winch systems or combination winches as standalone items, or in combination with other mooring equipment for both shallow and deepwater field applications.

IHC’s deck-skidding arrangements are designed for safe storage and horizontal transportation on board. Particular attention is paid to robust design and flexible configurations to ensure low integration costs and extended lifetime of the equipment. The main objective is to ensure maximum safety during severe offshore weather conditions. A winch can be placed on top of the deck-skidding system.

IHC’s turn-down sheave trolleys are custom-built installations that combine several technologies into one autonomous system dedicated for riser handling. The trolley position can be adjusted in a longitudinal direction alongside the vessel to ensure vertical riser pulling on multiple riser slots, which are predominantly found on spread-moored FPSO vessels.

With years of experience in designing and manufacturing winches, IHC can supply any winch to meet the requirements of its customers, designed for the harsh conditions of the offshore industry.
IHC supplies a wide range of offshore handling, lifting and deep-water lowering equipment.

All of these products are of very high quality, guaranteeing an extensive field of application. Working in deep and ultra-deep waters brings several challenges. IHC designs equipment to withstand these extreme conditions and heavy loads.

Its heavy lifting and deep-water lowering equipment provides first-class transportation and construction services to the offshore industry. For example, it encompasses the safe movement of large piles, jackets and blades.

Efficient handling equipment
Handling equipment is required for upending, handling and taking the full load of long piles or any other object in a safe and controlled way. The pile upending frame, for example, has been designed for upending foundation piles that exceed the height of the crane boom. The frame operates as a fixed ‘clamping’ hinge on the edge of the deck, allowing the pile to extend overboard during the upending operation.

This equipment can significantly improve the usability and efficiency of the installation contractor’s crane vessel. What was originally a project-related design is now a well known standard piece of equipment in the market.

Tailor-made solutions
As well as handling solutions for surface and/or shallow water use, IHC is also familiar with water depths beyond 3,000 metres. It has successfully completed projects that involved positioning mooring piles in depths of 2,500 metres or installing subsea manifolds in depths of 3,000 metres. In addition to IHC’s supply of standard equipment, its ability to offer tailor-made solutions has resulted in an outstanding reputation as a manufacturer of custom-made equipment.

The equipment on offer includes:
- external and internal lifting tools
- surface and subsea levelling systems
- jacket pile grippers
- upending frames
- pile plugs
- skidding equipment
- hydraulic release shackles and pin-release systems for subsea use
- hydraulic power packs for surface and subsea use
- hose reels
- lifting frames
- traction winches and storage winches for deep-water lowering
- jacking systems
- pipe cutters
- pile anti-running clamps
- bear cages.

Traction winches
The water depth limits for offshore field development are extending continuously. This means that the limits for IHC winches are constantly evolving as well. The company’s answer is a new generation of traction and storage winches.

Both have a relatively compact design, are extremely reliable and are smooth for the wire rope to safeguard continuity of operations. IHC’s expertise of swell compensation systems, together with its new generation traction winches, enables it to also provide customers with complete deep-water lowering systems.

As water depths and loads are limited by available wire rope diameters and their maximum production weight, IHC Winches is running tests using special synthetic wire rope onto traction winches, extending water depth limits for its customers’ future projects.

Fail-safe internal lifting tools
Internal lifting tools are hydraulically activated, fail-safe lifting tools that clamp on the inside of the top of a pile. Required to lift piles, conductors, small jackets and even modules, they can also be used for decommissioning projects and in the removal market.

The diameter of IHC’s standard internal lifting tools ranges from 16 up to 106 inches and the lifting capacity varies from 200 to 2,000 tonnes. Internal lifting tools are globally used by the majority of offshore contractors in standard water depths of 500 metres and up to 2,250 metres with a special deep-water package.
The specialists at IHC Hytop have the capability to deliver complete, large-scale hydraulic installations, as well as serial production of compact hydraulic systems and equipment. It has the know-how to execute its customers’ projects with basic or detailed engineering, and with planning and production facilities. In addition, it tests the hydraulic systems and equipment before it is delivered to customers.

Hydraulic systems
IHC specialises in the provision of complete hydraulic systems for use in the offshore industry. It is focused on upstream oil and gas industrial applications, such as hydraulic systems for catenary anchor leg mooring systems (CALM buoys), floating production storage and offloading facilities (FPSO), jack-up platforms, jack-up vessels, and pipelaying vessels.

Wide range
IHC uses its in-house resources for engineering, procurement, construction, installation and on-site commissioning activities to deliver: complete, large-scale hydraulic installations and hydraulic equipment for turret mooring and connect systems; buoy pull-in and locking systems; hose and hawser reeling systems for tandem mooring; spread mooring systems; jacking systems; cantilever skidding systems; stinger handling systems; stinger uplift compensation systems; stinger shock absorption systems; and special handling systems.

As a total system supplier, it offers customers the advantage of commitment coupled with knowledge and experience. This results in creative and innovative hydraulic systems, regardless of size. IHC is an expert in one-off and serial production, partial solutions and turnkey delivery.

Cylinders
With 40 years of experience in designing and maintaining cylinders for use in demanding environments, IHC Vremac Cylinders has all the know-how required to transform customer requirements into cylinder specifications that will perform in real-life field applications.

In addition to vessels and equipment, IHC delivers solutions for optimal offshore operations. Tailored to meet the performance requirements of customers, the latest technology in electrical drives and platform automation optimises the design, construction and operation of its complex working vessels.

Integration of systems
IHC Drives & Automation excels in the integration of a variety of systems, such as navigation functions, communication, energy management, heavy crane operation, offshore handling and propulsion control. The approach ensures high system availability, sustainability and maintainability.

The specialists at IHC design and deliver generators, electric/submersible motors, main switchboards, variable frequency drives for low and medium voltage, transformers and inverters, DP2 and DP3 systems, and artificial intelligence-based platform automation systems. Complete electrical installations and additional equipment integrate all features. Training and life-cycle support help to reduce the cost of ownership for customers.

High level of performance
Electrical power systems and conversion are becoming increasingly important on board. The growing number of electrical systems enables a more flexible vessel layout and, in most cases, greater efficiency in the application of energy. The modular design of IHC vessels in general and their innovative frequency drives provide a high level of system performance and the lowest cost of ownership.

The integration of in-house developed platform automation systems is mainly provided in three product lines, accompanied by complete electrical installations:
- Alarm and Monitoring Systems (AMS) with principal design appraisal of classification societies
- Vessel Management Systems (VMS) for the integration of all platform functions, including PMS and offshore operation systems
- Condition Monitoring Systems (CMS) for the support of maintenance and logistical decisions.

IHC offers the optimal integration of electro-technical and automation knowledge with naval and mechanical engineering to its customers, which results in enhanced control of the vessel and a higher level of performance.
IHC customers rely on the unrivalled level of commitment that is offered to them through dedicated and comprehensive life-cycle support services. These help to maximise the equipment’s availability and the return on investment, and therefore reduces the total cost of ownership.

The cycle can be entered at any of its five integrated stages. The technology innovator’s highly qualified experts design and build innovative vessels and advanced equipment based on their vast worldwide experience of the dredging, mining and offshore industries.

The company offers a complete spectrum of high-quality and up-to-date services to ensure that crews operate in a highly skilled and efficient manner to achieve optimum levels of productivity. IHC life-cycle support also allows operators to maintain the durability and reliability of their systems through a range of specialist services.

Furthermore, an upgrade by means of renovation, modification or update of the existing systems, components and/or software can extend the working life of the vessel and equipment. With the expertise to research, engineer and install to the highest possible standard, the IHC team will also utilise complex processes, knowledge and experience to maintain the correct and safe operation of all its products on board.

**Design**
The design phase encompasses the entire trajectory, from the first point of contact about a potential offshore challenge, to the last drawing or calculation, directed to offer a practical solution.

**Build**
Irrespective of the actual location, the building stage integrates the procurement, manufacturing, commissioning and testing of the vessels’ and equipment’s hardware and software. Their future utilisation and operational efficiency are enhanced and ensured by the life-cycle support services. Examples of the services are project management, works and site supervision, commissioning and technical support.

These services improve the quality, sustainability, durability, ease of maintenance, compliance to regulations, and awareness of systems and operations. Depending on the type of equipment and/or contract, they are – partly or wholly – integrated in the scope of delivery, but they can also be offered separately to customers worldwide.

**Operate**
The operational stage of a system either embraces the period from the day of delivery of vessels and/or equipment until its functional withdrawal, or a full lease/rental period. During this trajectory, the aim is to preserve the system’s vital functionality and efficiency under prevailing or changing operational conditions.

**Maintain**
At this stage, the aim is to optimise the system’s availability in a cost-effective manner. This is achieved by intelligently maintaining its technical functionality with regard to prevailing operational circumstances – and by a quick response in the event of an unexpected technical defect.

**Upgrade**
This stage facilitates several options for the necessary overhaul and/or replacement of major or structural systems and subsystems. These are based on economic considerations, continuing compliance to regulations or changing operational requirements.
Reliable partner for efficient offshore solutions

Offshore

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