Worldwide Lifting, Drilling and Subsea Solutions

Heavy Lifting Equipment
General Introduction

Our in-house developed and manufactured cranes are used within the industry for over 25 years and have become a standard in the design and construction of heavy lift cranes. Huisman develops and builds a large range of both on- and offshore cranes, varying in size and type. All are characterised by their light weight and their small footprint. To meet our client’s specific requirements the cranes are either tailor-made or an existing crane concept is reused and amended where required.

As part of our crane design philosophy, we install major components inside the crane wherever possible. This offers good protection from the harsh marine environment. Huisman cranes are designed and built in accordance with international standards and are certified by recognised authorities such as LRS, DNV and ABS.

All crane components are thoroughly tested throughout the production process and before installation into the crane. The crane itself undergoes an extensive Factory Acceptance Test before delivery to our clients. Up to a certain capacity the crane can be load tested on the test facility in our workshops. This facility allows tilting of the cranes to simulate working conditions offshore.

Our facilities in the Netherlands and P.R. of China are accessible for seagoing vessels and have heavy lift capacity available which allows installation of the cranes at our quayside. Our Sales Department is able to offer the installation, commissioning and (load) testing on board of the vessel on a lump sum basis.

Furthermore Huisman can provide assistance during ICT and sea trials. Our globally operating service network is standing by to provide support on location as well as by remote access from one of the service centres.
Mast Cranes

In 1984 we introduced the Mast Crane in the heavy lifting industry. Since then this innovative crane has achieved a dominant position particularly for the use onboard Heavy Lift Vessels. We delivered Mast Cranes up to a lifting capacity of 3000t and we currently have a 5000mt Mast Crane under construction. We have extensive experience in designing and constructing two specific types of Mast Cranes - Heavy Lift Mast Cranes and Offshore Mast Cranes.

Our Mast Crane is based on the mast derrick principle. It consists of a fixed mast fitted with a rotating slew platform supporting the boom and a mast head. The boom hoist tackle runs from the mast head to the top of the boom and controls the boom angle. This allows the different hoists to be positioned at the preferred radius. The mast construction gives an inherent safety feature; the load moment is carried by the mast and not by the slew bearings.

The major components of the Mast Crane are installed inside the crane, well protected from the harsh marine environment. The rotating parts of the crane are provided with totally enclosed slew bearings and therefore maintenance is limited. Today's Mast Cranes are completely driven by frequency controlled electric motors.

Features Mast Crane:
- Superior load curve
- Small rectangular footprint
- Low own construction weight
- Minor tail swing, saving deck space
- Low position of the Centre of Gravity
- Major equipment inside crane
- Completely electric driven
- Limited maintenance

Our Mast Cranes up to 1600t lifting capacity can be fully assembled. This makes delivery and installation in one single piece possible. Larger Mast Cranes are delivered in only three of four pieces making a fast and easy installation possible. The rigorous shop testing prior to delivery ensures short commissioning times after mechanical installation.

Most of our cranes are custom-made. Due to our extensive experience we are currently able to include more redundancy in the designs with a focus on reliable operation.

Tandem configuration: 2 x 400mt Heavy Lift Mast Crane
2.1 Heavy Lift Mast Cranes

Our Heavy Lift Mast Crane (HLMC) is a compact powerful crane with high lifting capacities and state of the art technology. It is designed for heavy lift vessels used for oversea transport of large and heavy equipment. Most of the HLMC's are installed in a tandem configuration, one on each side or both at the same side of the vessel. Their capacity, range and structure are well-fitted for this specialised use.

The main, boom and auxiliary hoist winches are installed inside the wing section of the vessel. Therefore, the centre of gravity of HLMC's is located on a low elevation which is beneficial for the stability of the vessel. The steel structure built from high tensile steel and the crane not requiring ballast weight both contribute to a low own weight of the crane.

The omission of ballast weight and the compact design of the HLMC reduce the tail swing providing more free deck space and clearance between the crane and the load. Today's HLMC's are operated by wireless remote control units which can also be used from the vessel's bridge, canceling the need for an Operator's cabin. All HLMC's are delivered with electric frequency controlled inverter drives. Electrically driven cranes require fewer components and are more reliable than hydraulically driven cranes. Also the redundancy level of an electrically driven crane is higher than a hydraulically driven crane. Features like trolley hoists, load tuggers and sling hoists are common practice on our HLMC's.

Features HLMC:
- Superior load curve
- Small foundation required
- Very small tail swing
- Low own construction weight
- Low elevation of Centre of Gravity
- Vertical sea lashing of boom is possible
- Lifting capacities up to 1200mt for each crane
- Wireless remote controlled
- Outfitted with a trolley hoist for handling cargo
- Applicable for harbour/sheltered water lifts
- Overall improved safety and operational flexibility
- Completely electrically driven

Tandem configuration: 2 x 700mt Heavy Lift Mast Crane
2.2 Offshore Mast Cranes

Our Offshore Mast Crane (OMC) is a compact design heavy lift crane using state-of-the-art technology and designed for use on offshore construction vessels or semi-submersibles. The rectangular footprint allows an installation of the crane directly on the stern of the vessel, achieving a large effective outreach.

Many of the Offshore Mast Cranes are suitable for ultra deep-water operations up to 5,000m water depth. They make use of a deepwater hoist system with a single line capacity up to 300mt. The deepwater hoist system consists of a traction winch and a storage winch and can also be equipped with an Active Heave Compensation System.

The main winches are normally installed inside the crane pedestal also providing housing for the electrical room and elevating the boom pivot to the requested level. The larger OMC’s are fully revolving and therefore equipped with a rotating winch column. When the crane is outfitted with a deepwater hoisting system the traction winch is either installed inside the crane or in the hull of the vessel. The heavy storage winch is normally installed on the tank top. For a completely controlled and inherently safe load transfer an Active Heave Compensation System can be installed.

Our OMC has a low own weight as the crane is built up from high tensile steel and doesn’t require ballast weight. The omission of ballast weight and the crane’s compact design reduce the tail swing providing more free deck space.

Today’s OMC’s are delivered with electric frequency controlled inverter drives. Electrically driven cranes require fewer components and are more reliable than hydraulically driven cranes. Technology in electronics is constantly improving leading to state-of-the-art cranes. In general, also the redundancy level of an electrically driven crane is higher than a hydraulically driven crane.

Features like load tuggers, block tuggers and sling hoists are common practice on the Huisman Offshore Mast Cranes. Additional features like a wireless remote control and trolley hoists can be provided.

Features OMC:
- Superior load curve
- Big effective outreach
- Small rectangular footprint
- Simple integration with vessel structure
- Low own construction weight
- Minor tail swing, saving deck space
- Low position Centre of Gravity
- Lifting capacities up to 5,000mt
- Can be outfitted with an ultra deepwater hoist system
- Can be equipped with an active heave compensation system
- Completely electric driven
Pedestal Cranes

3 Pedestal Cranes

Huisman delivers a large range of Pedestal Cranes which can be used for various tasks including unloading of supply vessels, pipe transfer and deck and subsea lifts. These cranes can be divided into two groups: Pedestal Mounted (Offshore) Cranes and Knuckle Boom Cranes.

The boom of a Pedestal Mounted Crane is suspended from a boom hoist tackle, which runs from the top of the crane house to the head of the boom, and pivot hinges on the front of the crane house. With the boom hoist tackle the working radius of the lower blocks is controlled. The boom of a Knuckle Boom Crane is suspended from Hydraulic cylinders and pivot hinges on the front of the crane house.

3.1 Pedestal Mounted Offshore Crane

The Huisman Pedestal Mounted Offshore Crane (PMOC) can be used for various tasks including the unloading of supply vessels, pipe transfer, offshore installation work, deck and subsea lifts. It comprises a steel crane house, bolted to the pedestal via the slew bearing, a lattice or box girder type boom and various hoist tackles to control the boom and the lower blocks.

All main equipment - winches, electronic cabinets and hydraulic power units - is located inside the crane house to protect it from the harsh marine environment. An operator cabin is mounted at a side of the crane house. The boom hoist runs from the top of the crane house to the boom tip and controls the radius of the lower blocks.

Features PMOC:

- Protection of equipment inside the fully enclosed crane house
- Small tail swing
- High redundancy level
- Special attention for fatigue on pipe transfer cranes
- Lifting capacities up to 1500mt
- Automatic Overload Protection System
- Manual Overload Protection System
- Constant tensioning
- Suitable for subsea lifts

The cranes are either electro-hydraulically driven or completely electrically driven. On our electric-hydraulic cranes redundancy is provided by installing an emergency diesel generator inside the crane. On our fully electric driven cranes redundancy is provided within the electric drive system. The crane will remain operational by installing two independent power supplies or an emergency supply.

The PMOC has a small tail swing saving deck space. It can be fitted on a square to round shaped pedestal to ensure an improved load transfer into the vessel. For heavy duty tasks, like pipe transfer, Huisman builds PMOC’s with special attention to fatigue issues, for example by installing large diameter sheaves.

Huisman has extensive experience in building and designing PMOC’s up to 600mt and we are constantly exploring new and heavier means of application. Besides the regular harbour/sheltered waters working conditions, the crane can be used offshore and for subsea lifts.
300mt Pedestal Mounted Offshore Crane
The Knuckle Boom Crane (KBC) is specially designed for the use in an offshore environment. Its tasks vary from construction, pipe handling to subsea installation work. Huisman has designed and build KBC’s up to 250mt lifting capacity and 3000m water depth. The KBC, like a regular Pedestal Crane, consists of a crane house which is bolted via the slew bearing to the pedestal. The boom however consists of two parts. The main boom is hinged at the middle creating a knuckle boom. Both parts are controlled with hydraulic cylinders. This way, movements of the load can be limited as the boom tip can be kept at a limited height above deck. This feature makes the crane safe and efficient. The winches of a KBC are normally fitted outside the crane house since they require a large storage capacity for ultra deep lifts.

The Huisman KBC is equipped with at least two independent electro-hydraulic power units and the in-house developed secondary controlled hydraulic Heave Compensation System. This system has an extremely fast response at a low power consumption level as it stores energy in an accumulator. It enables real-time heave compensation minimizing the load movement.

Features KBC:
- Load can be kept at a limited height above the deck limiting movements of the load
- Secondary controlled hydraulic heave compensation
- Suitable for subsea lifts up to 2,500m
- Constant tensioning
- Independent electro-hydraulic power units with high redundancy level
- Automatic & Manual Overload Protection System
- Ceramic coated luffing cylinders
- Outfitted with fresh water / oil coolers

The Huisman Pedestal Cranes comprise the following parts:

**Crane House**
The crane house is installed via a slew bearing on top of the pedestal which is fixed to the vessel structure. It is a Huisman design philosophy to place all main equipment, like the main and boom hoist winches, electronic cabinets and hydraulic power units, inside the crane house protecting it from the corrosive marine environment. The operator’s cabin is mounted at a side of the crane house.

**Boom**
The boom is normally made as a lattice construction. In case of short boom lengths or high capacity, an A-frame construction, consisting of box girders, can be applied. On top of the boom a jib can be provided to accommodate the whip hoist.

**Winches**
Winches are normally fitted inside the crane house, however different arrangements can be provided such as locating the location of winches in the hull or inside the boom can be provided as well. The winches of Knuckle Boom Cranes are normally fitted outside the crane house as they require a large storage capacity for ultra deep water lifts. The final winch arrangement depends on the requirements and on the type of drive system selected.
Land Based Cranes

The Huisman Heavy Lift Ringer Crane is a mobile crane mounted on a ring construction. With lifting capacities up to 2,400mt, the completely assembled crane can be moved on location using its crawler. All Ringer Cranes are equipped with a modular main boom and jib which can be amended for the specific lifting job. In order to save transportation cost, we designed a Containerised Mobile Ringer Crane, easily transportable as 20ft and 40ft ISO containers.

Rigid Ring
The rigid ring is supported on hydraulic jacks. Depending on the permissible ground pressure and the weight of the lifted load, the number of hydraulic jacks can be increased from 24 to 48. The jacks are located on spreader boards, reducing the ground pressure to 40mt/m² or less. The total outside diameter of the ring varies between 24.0m and 27.0m depending on the used spreader board.

Modular Components
All components are of a modular design and are connected by quick connection pins to enable fast assembly of the crane. The dead-end of the wire is a swaged socket instead of an open wedge socket to facilitate reeving. The swaged socket can be reeved through all the sheaves without dismantling the socket.

Identical Modules
The front and rear bogies are identical. Depending on the type of crane, each fourth or second bogie is hydraulically driven. The mast sections are identical as much as the design allows. Identical mast sections are used in the back mast, main boom and jib for both the platform ring as the twin ring. For the Containerised Ringer Crane only three different types of mast sections are used.

Exchangeable Winches
The Ringer Crane is equipped with several winches of similar design. Each winch has a 52mm diameter wire and a max. line pull of 60mt. The use of similar winches ensures exchangeability, facilitates easy maintenance and saves costs.

Containerised
As the transportation of large machinery is rather expensive, Huisman designed the Containerised Mobile Ringer Crane. This crane can be easily transported in 20ft and 40ft ISO container parts and offers substantial transportation savings. Most parts of the crane have a double function: all components used for transportation are also used as structural parts of the crane.

Superlift
The possibility of a superlift configuration avoids transportation of additional ballast and increases the crane capacity. 800mt superlift ballast is equivalent to 1,500mt fixed ballast. The radius of the ballast can be varied between on top of the ring to max 22.5m. Superballast tackles are provided to move the ballast just above the ground surface for each radius.

Features Build-up Time
To minimise assembly time, several aspects are simplified:

- Winches remain reeved during transportation
- Connections of the ring are located outside and are therefore easily accessible
- Similar ring parts and outside connections allow one part to be removed, facilitating access with, for example, a fork-lift truck
- Use of swaged sockets instead of open wedge sockets

1,600mt Ringer Crane

Ringer Crane
Wind Turbine Installation Cranes

Huisman has expanded its heavy lifting product range with a customised range of Wind Turbine Installation Cranes. Building on the successful operation of the existing Huisman heavy lifting equipment for the installation of wind turbines and the increasing demand for customised equipment by the fast growing market for renewable energy, we have now designed a range of customised cranes that will be able to efficiently install all current turbines, as well as future turbines.

The new designs for Wind Turbine Installation Cranes are a result of many years of design and operational experience and based on our drive to design and deliver new solutions that add value to the market’s existing technologies. In addition to the low construction weight, small footprint and minor tail swing of the existing Huisman cranes, additional value-added features are the extensive lifting height, the small operational minimum radius and the possibility to install the crane around the leg of the jack-up. All these features make the cranes very suitable for installation on jack-up vessels.

The currently operational cranes used for wind turbine installation include the 2 x 800mt and 1 x 1,700mt A-frames onboard Scaldis’ Multipurpose Heavy Lift Vessel Rambiz, the 1,600mt crane onboard Smit’s Taklift 4, the 300mt cranes onboard Seajacks’ Kraken and Leviathan, and the 900mt cranes onboard Jumbo Offshore’s Javelin and Fairplayer.

Features WTIC:

- Low construction weight
- Minor tail swing
- Extensive lifting height
- Small operational minimum radius
- The option to install the crane around the leg of the jack-up
- Additional options to ensure a safe installation procedure at high elevations
Floating Cranes

Huisman projects are typically complex and innovative, requiring solution-aimed thinking, technical excellence, creativity and passion. The design and construction of Floating Sheerlegs has been part of the Huisman scope of supply since 1981.

**Taklift 4**
In 1981, we received the award for the engineering and construction of the Taklift 4, a 1600t Floating Sheerleg with a total height of 52.4m. In 1984, we added a 600t fly jib with a length of 17m. In 1994, the Taklift 4 was adjusted for heavier operations and equipped with a 1400t fly jib with a length of 30m.

**Taklift 8**
In 1993, we received an award for the engineering and construction of a super lifting Floating Sheerleg. The Taklift 8 was used for the construction of the foundations for the European Storebaelt Bridge. The Taklift 8 is equipped with a super strong A-frame with lifting capacities of 3200t.

**Taklift 9**
In 1994, a bridge lifting system to construct the Great Belt East Bridge in Denmark was needed, resulting in an award to design and construct the Taklift 9. This bridge lifting Sheerleg has a lifting capacity of 1400t. The length of the A-frame is 30m and has an adjustable radius from 4m to 22m. The Taklift 9 was used to lift bridge elements in close cooperation with the Taklift 4.

**Rambiz**
A special type of Floating Sheerleg is the Rambiz. This is a seagoing twin hull lifting vessel, equipped with 2 x 1350t cranes. This lifting vessel is originally built in 1996 for construction of the Vasco da Gama bridge in Portugal and was modified after that project.

**Features Rambiz:**

- Specifications (after the modification):
  - Length: 85m
  - Beam: 44m
  - Depth: 5.6m loaded
  - Lifting cap.: 3400t at 23m radius
  - Lifting cap.: 3300t at 26.3m radius

Top: 3,300mt Heavy Lift Vessel, middle: 1,600mt floating Crane and 1,350mt Bridge Lift System, bottom: Wind Turbine Installation Crane.
7 Heave Compensation

Our equipment can be fitted with Constant Tension and a Passive and/or Active Heave Compensation System to compensate the relative motion between the vessel, its equipment and fixed objects such as platforms or the seabed.

7.1 Constant Tension
Constant Tension (CT) is used to achieve a constant line-pull set by the Operator. The line-pull is measured by a load cell and monitored by the control system. If the actual value differs from the preset value the winch will pay in or pay out wire rope to maintain the preset value. Instant adjustment of the cable tension is possible by changing the tension set-point value. CT can for example be used to pretension a wire rope prior to lifting a load from a supply boat or after landing a load onto the seabed. CT prevents the loads to bounce on the deck or being picked up again. CT can also be used on tugger winches.

Features CT:
- Line-pull is constant
- Safe landing and lifting of loads

7.2 Passive Heave Compensation
Using Passive Heave Compensation (PHC) the line pull can be kept constant as well. It does not require an input signal and is therefore also called Passive Constant Tension. The PHC system acts as a gas loaded spring system. It consists of a hydraulic cylinder which is connected via a medium separator to an nitrogen accumulator which is charged with gas. PHC is mostly used in situations where the load is standing or working on the seabed, for example as a drill string compensator. It can however also be used for motion compensation. The motions of a vessel cause drag forces on the load which will decrease or increase the line-pull. As a result, the hydraulic cylinder will move in or out and reduce the motions of the load.

Features PHC:
- Line-pull is constant
- No additional energy is required
- The system does not rely on an input signal
- Movement of the load is reduced
7.3 Active Heave Compensation

To control the relative position of a load to a fixed object, Active Heave Compensation (AHC) is used. The position is determined by the control system using the real-time signal of a Motion Reference Unit (MRU) as an input signal. In response to this signal the AHC system will pay in or pay out to keep the load at a constant elevation. Huisman can deliver Active Heave Compensation on hydraulic or electric winches and on hydraulic cylinders.

For hydraulic winches Huisman uses the unique in-house developed AHC system with secondary controlled hydraulics. We have over 20 years of successful experience with this system. In secondary controlled hydraulic systems the pump unit controls a constant system pressure and works independently of the connected motors. The motor torque is controlled by varying the swash plate angle of the hydraulic motor. By changing the swash plate angle, an acceleration or deceleration of the winch is achieved. This results in an extremely fast response enabling real-time compensation of the heave movement. With secondary controlled hydraulics it is possible to store energy in an accumulator during AHC. For smaller capacities it is also possible to deliver AHC on electric winches.

Especially for higher capacities hydraulic cylinders are used for Active Heave Compensation. In this case the load is balanced using a Passive Heave Compensation System. By adding active cylinders which are connected to a hydraulic power unit and a MRU, it is possible to control the position of the load. Since the main part of the load is compensated by the PHC system, the active cylinders only have to overcome accelerations, friction forces and a possible unbalance in the passive system and the actual load. Therefore limited power is required for AHC.

Features AHC:

- Elevation load is constant
- Real-time signal of a MRU is used
- With secondary controlled hydraulics energy is stored in accumulator
- With combination of Passive and Active Heave Compensation limited energy is necessary.
Two 900mt Heavy Lift Mast Cranes loading a J-lay Tower
About Huisman

Huisman is a worldwide operating company with extensive experience in the design and manufacturing of heavy construction equipment for world’s leading on- and offshore companies. Our equipment, varying from stand-alone components to highly engineered and integrated systems is fully designed and manufactured in-house.

Our products can be subdivided into three main categories: heavy lifting, drilling and pipelaying equipment. We divide our operations between the offices in The Netherlands, Brazil and USA and our production facilities in The Netherlands, Czech Republic and China. We acquired Bodewes Winches in 2008 to expand our product range with stand-alone winches and mooring systems.

Quality
The equipment delivered by Huisman is often the critical main equipment onboard. Therefore, delivering high quality has been set as core company value since the establishment of our company. As a result, our equipment is internationally known for its high reliability during operations. It meets the most stringent performance criteria and is certified by recognised authorities such as Lloyd's, DNV, ABS, NMD and TÜV.

Innovative Solutions
The majority of our clients require tailor made solutions and we consider it a challenge to deliver a product that fits their unique needs. Our people share the necessary passion for technique, creativity and challenges to provide our clients with the best possible equipment in the market. We continuously research and develop new concepts, engineering solutions and techniques which we believe add economical, technical, environmental and safety value to the market’s existing technologies.

Our experience in various sectors of the on- and offshore industry enables us to use the best solutions from a wide variety of our projects.

Turnkey Delivery
The unique combination of our in-house design and engineering expertise and our production, testing commissioning and installation facilities enables us to deliver custom-designed equipment on a turnkey basis in close partnerships with our clients.

Reliable Partner
Due to our strong belief in partnerships with clients, commitment to find new technical solutions and the dedication to deliver them as turnkey projects, we have built a reputation as reliable partner in the market. Based on our extensive project history we are proud to state that Huisman reliably delivers state-of-the-art equipment, fully tested, on time, within budget and ready for commercial operations.

Worldwide Service
Our equipment is known for its high performance. However, a worldwide operating service network is on stand-by to provide service support after delivery and installation, as well on location as by remote access from one of the service centres in The Netherlands, Singapore or USA.

Safety, Health and Environment
We set a high value on being a responsible company and therefore take the safety, environmental and health impact of our operations on all our stakeholders seriously.
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