



NEPTUNE

GEOSEA TAKES DELIVERY OF PURPOSE-BUILT WIND TURBINE INSTALLATION VESSEL

Builder

IHC Offshore & Marine B.V., Krimpen aan den IJssel, the Netherlands

Owner

GeoSea, Belgium

Principal particulars

Length o.a.	60.0 m
Beam mld.	38.0 m
Depth	6.0 m
Design draught hull	3.90 m
Main engines	4 x 1,600 kW

Jacking system

Number of legs	4
Type circular section	3.50 m diameter
Leg Length	92 m
Capacity per leg	2750 t

Capacity

Crane lifting capacity	600 ton @26m
Accommodation	60 persons

On January 31st 2012, in the Waalhaven in Rotterdam, the flags were changed on *Neptune*, a new self-propelled self-elevating platform, purpose-built for offshore wind farm construction. First the red-and-white flag of the builder, IHC Merwede, was lowered, quickly followed by the hoisting of the green-and-white flag of GeoSea, a company part of the DEME group and specialised in offshore construction works and site investigations at sea.

Delivery time

The contract for the construction of *Neptune* was signed on 16 September 2010, based on a basic design by Gusto MSC in close consultation with the owner GeoSea. The starting point for the design was Gusto MSC's SEA2750 jack-up platform, which was adapted and outfitted specifically for the construction of offshore windfarms, a sector in which GeoSea already has a strong foothold. With a delivery time of less than 1.5 years after the contract signing and just under one year after the keel laying date, IHC Merwede completed the *Neptune* in a record time.

Procedure

A typical working cycle for the *Neptune* can best be illustrated by its first project: the installation of an offshore wind farm for C-Power on

the Thornton bank, some 30 kilometres off the Belgian coast. In the port of Ostend, the *Neptune* will load a windmill, either fully assembled or in parts, on deck. The vessel will then sail under her own power to the required location. Using dynamic positioning the exact location is kept while the jack-up process starts. After all four legs are lowered to the seabed, and only lightly loaded, the legs will first be fully pre-loaded in diagonal pairs. Then, the load is distributed evenly over the four legs. The higher pre-loading ensures a firm footing for each of the legs before the platform is raised and lifting activities start.

Construction

The *Neptune* was built at the yard of IHC Offshore & Marine B.V. in Krimpen aan den IJssel. To simplify and speed up the installation

and commissioning of the jack-up systems, a dummy leg was used. This dummy featured the same geometry as the final jack-up legs, but at 25 tons and limited length, it was a lot easier to handle than the 420 ton jack-up legs. Each leg is 80 metres long and has a hollow circular section with a diameter of 3.5 metres. The jack-up system is Gusto MSC's hydraulic positive engagement system, featuring a fixed ring and a moveable ring, which are interconnected with six hydraulic cylinders and a measuring cylinder. From each of the rings, three locking pins can be inserted into the holes in the leg. The connection between the rings and the jack-up platform is through rubber mounts, allowing a certain amount of flexibility, which significantly reduces the stresses in the platform. For the same reason, the accommodation deckhouse and the housings for the jack-up system are



Deepwell pumps provide the cooling water through flexible hoses when jacked-up

separated by a small gap. A dedicated jack-up desk in the wheelhouse allows for the monitoring of the oil pressures in the cylinders of the four legs, allowing for intervention in the case one of the legs would lose firm ground. The entire jack-up system was supplied by Gusto MSC who subcontracted the hydraulic system to IHC Hytop.

Spudcans

The jack-up legs can be equipped with spudcans, enlarged bottom plates which are used when more supporting surface is needed

on the seabed, for example in clay or mud. The *Neptune* will not need these on her first projects, but recesses have been provided in the hull into which the spudcans will fit when the legs are in their uppermost position. The legs are 80 metres long, and can optionally be lengthened up to 92 metres for work in deeper waters.

Propulsion

Although the *Neptune* is a full-fledged oceangoing ship with unlimited notation, she can hardly be called a hydrodynamic beauty with her 38 metre wide bow and boxy shape.

"With the long jack-up legs and a long crane boom combined, even the largest windmills available today can be assembled at sea"



Four completely independent engines/pod units provide the propulsion and steering



The pump room is a work of art for engineers



In the bow, the pods' lower gearboxes are housed in gondolas

Nevertheless, her propulsion installation shines in other fields, such as redundancy, manoeuvrability and simplicity.

Direct-diesel

IHC Merwede's project manager Florian van den Broek explains: "Neptune will mostly either be sailing ahead at full speed or be jacked-up. There is a dynamic positioning system of class DP-2 on board, but that is mainly used during manoeuvring or for position-keeping just before the jacking-up starts." The Neptune has a MODU (Mobile Offshore Drilling Unit) certificate. In line with her ABCU class notation (short for Automated Bridge Centralized Control Unmanned).

Auxiliary power for the cranes and the accommodation is generated in two gensets, which power an onboard network of 440 V at 60 Hz. The electrical installation was done by Verhoef Electrotechniek B.V. and incorporates a dynamic positioning system from Kongsberg. The integration of the DP-system was done by Bakker Sliedrecht. Besides the possibility to jack-up or use the DP-system, there is a third way for the Neptune to remain stationary: she has four anchors for position-keeping, of which two also serve as the nautical anchors.

Wind Turbine Installation Crane

The large crane was supplied by Huisman Equipment and is the second in its series of 600 ton cranes specifically designed for wind turbine installation from jack-up platforms. Gerben Roks, product manager cranes from Huisman explains: "By using a long boom of 85 metres which can be raised very steeply, the design fulfils the requirements for a very high maximum lifting height, and a small minimum working radius - 12.5 metres - on deck." As the crane is stored over the bow, with about a third of the boom cantilevered forward, some modifications were needed. So-called block garages were constructed to retain the lifting blocks in a fixed position during transit. Furthermore, the boom structure was modified to keep the stresses below the fatigue strength, as the pitching of the vessel represents a very frequent load cycle on the crane boom. With a crane supported at the tip of the boom, the fatigue stresses are normally not determinative in the design of the boom.

"Because of the long overhang when stored, fatigue strength considerations determined the design of the crane boom"

The crane is entirely electrically powered, which leads to significant power savings. During standby time, when a load is hanging in the crane but not moved, the hydraulic power unit of a hydraulically-powered crane still consumes about 20% of its nominal power. With an electrically powered crane, the power consumption during standby is negligible. The crane has a very small footprint and can be rotated 360 degrees, even when the jack-up legs are all the way up. Using a crane built around one of the jack-up legs would not have been beneficial in this case, as its different load distribution on the platform would have led to bigger jack-up legs. For smaller lifting jobs and during sailing, the crew will resort to a ten ton SWL Liebherr crane mounted on the aft deck. This crane has a wireless remote control and is certified for manriding applications.

Working spaces

The vision of ship owner GeoSea and mother company DEME is that technical spaces are for working and relaxation rooms are meant to relax. You will therefore not find a sofa on the bridge or even an engine control room on their ships. There are however plenty of relaxation options for off-time: in addition to the shared mess room, three lounges (one smoking, one quiet lounge and one normal lounge) and a gym are provided for the crew. Each cabin has access to the IPTV system. The Neptune will sail with a nautical crew of twelve to 14 persons, augmented with operational crew up to a total of 60 persons, depending on the job at hand.

The wheelhouse features three desks: the navigation and DP console facing forward, a navigation and communication desk on the side and a console facing the working deck aft, with radar and chart displays, DP-controls, the jacking control station and mooring winch controls. In the deckhouse structure, the foundations are built-in for the possible retrofitting of a helideck.

At the time of writing, the Neptune is steaming to the Belgian coast to start up preparatory geotechnical works for the C-Power wind farm on the Thornton bank.

Bruno Bouckaert

