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Heave-compensated AHTS winch brought to market

Hallin Marine unveils Compact Semi-Submersible

Training takes centre stage at Annual OSJ Conference

Seabed logging ship is first of a new breed

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Cost-effective DSV is first of a new trio

Don Amado benefits from a 12-man SAT system, moonpool, large deck, excellent accommodation and an offshore crane

De Hoop Shipyard in The Netherlands has gained an excellent reputation for designing and building smaller offshore ships for a wide range of customers, among the latest being *Don Amado*, first of a series of dive support vessels (DSVs) for Oceanografia in Mexico

Now in operation in the Gulf of Mexico, *Don Amado* is the result of close collaboration between the vessel's owner, Oceanografia of Mexico, and the Dutch yard, De Hoop, which has a track record of building DSVs that dates back to the 1980s, with *Deepwater 1* and *Deepwater 2*. Oceanografia already operates two other De Hoop-built DSVs, *Caballo de Mar* and *Caballo Trabajo*, also the PSV *Caballo Criollo* (*OSJ* July/August 2008); another De Hoop-designed DSV is currently under construction at Niigata shipyard in Japan for the account of the Dutch owner, Noordhoek Offshore.

All the DSV designs are suitable for worldwide service in shallow and deepwater and will be engaged in construction and maintenance of offshore installations, surface and subsea crane operations, diving/ROV support and standby rescue activities.

The earning power of the vessel takes the form of a 300 tonne Liebherr offshore crane on the aft deck, which is capable of working at depths down to 60m, and a large open deck with removable railings providing an area of more than 1,000m^2. Below deck is a large store which can be reached through a flush hatch in the main deck. There is also accommodation for a total of 250, and the vessel has a 12-man diving system.

De Hoop describes the design as "simple, omitting all luxuries," and in line with this philosophy the vessel will be operated with a manned engineroom and a low level of automation.

The high block coefficient hull is optimised for station-keeping, with a reduced draught hull yielding minimal drag. A U-shaped forward section with bulbous bow minimises fuel consumption when steaming ahead while a transom stern is included to maximise stability for heavy-lift operations; at the same time the aft side of the moonpool is provided with a spoiler to reduce drag during transit. Model tests at DST in Duisburg proved the hull design to have a very low overall drag.

A reduced draught enables *Don Amado* to enter very shallow offshore ports in Mexico. Above the waterline, the hull and superstructure also have a low profile in order to reduce windage as much a possible. The steel-plated helideck is integrated in the vessel in order to reduce weight and cost, and to keep the helideck low, in order to reduce horizontal movements and accelerations as much as possible.

Don Amado's low air draught was also an advantage when transferring from Lobith to Rotterdam for commissioning, as only the wheelhouse needed to be lifted off the vessel. Large wing tanks are arranged for carriage of water ballast and protection against collision damage.

Although the vessel has a relative high beam and high GM value necessary to operate the crane, rolling motions are better than might be expected, due to the good roll-damping values which are a result of the high B/T ratio. Bilge keels also help to improve rolling motions, and the pitch and heave are good, too, thanks to a high block coefficient. In a seaway the vessel will, however, lose significant speed due to its blunt nose.

The DSV is fitted with environmentally friendly diesel-electric machinery, which takes the form of four Caterpillar 3516B-powered generators each rated at 1,825kW at 1,800 rpm and fitted in the central engineroom. The generators are connected to a main switchboard which is split port and starboard for redundancy.

A power management system prevents overload of the generators by reducing the propeller load. Start/stop of the generators is undertaken manually from the bridge or locally.

In case of loss of the complete generator plant, essential services will be supplied from an emergency/harbour generator.

The yard notes that, at the time that the thrusters for the DSV need to be ordered, the huge surge in orders for newbuild OSVs led to a series of problems at already over-worked thruster manufacturers, leading to extended delivery times and extremely high prices. This being the case, and considering De Hoop's excellent experience with the Dutch company Veth, which has supplied thrusters for other newbuilds at the yard, De Hoop asked the company to develop a 1,500kW main propulsion unit suitable for *Don Amado*.

The first two of these are fitted on board the new DSV, and have, said the yard, proved to be reliable and efficient, and to operate with very low levels of noise and vibration. Such has been their success that, at this point in time, De Hoop has 10 more examples of these units on order from Veth.

The aft mounted main propulsion thrusters are designed for bollard pull condition and to have maximum efficiency in DP operation. In transit the vessel reaches 12 knots with 2 x 1,500kW input power. A trio of bow thrusters, each of 900kW, has fixed pitch propellers, and each is fitted with five blades in order to reduce cavitation noise. They are mounted in tunnels with a diameter of approximately 1,600mm, with the tunnel situated furthest aft being integrated with the forward sea chest for the box coolers.

All the thrusters are powered by asynchronous electric motors produced by Woelfer in Germany, the motors being tested together with the frequency drives in the factory in order to avoid long tuning times or other surprises during trials. The frequency drives were supplied by Inge-team, a Spanish company which has provided more than 11,000 similar frequency drives for a range of applications.

For the main propulsion and bow thrusters, Active-Front End (AFE) frequency converters were utilised, and with this configuration very low THD (total harmonic distortion) values are achieved. No resistors are fitted, as the hotel load is sufficient to absorb any power feedback from the propellers.

Don Amado is fitted with a duplex dynamic positioning system according DP Class 2 requirements. The total transverse power is 2 x 1,500kW aft plus 3 x 900kW forward, equal to only 0.8kW/tonne displacement, and with this arrangement the vessel can achieve a transverse speed of 3.5 knots. The DP capability plot shows that the vessel can maintain position in DP2 mode in a wind speed of up to 20 m/sec and a significant wave height of 5.0m (beam on).

The DP system was supplied by Navis, and has, says the yard, a number of advantages compared to the other well known systems, including: simple and straightforward operation, moving from transit mode to DP mode with the touch of a button; touch-screen operation; an on screen/online capability plot showing operating limits; an integrated, class approved autopilot; an overall high level of performance; and low cost compared to alternatives. The equipment uses four position reference systems: 2 x C-Nav/Trimble DGPSs; a Sonardyne hydro-acoustic system; and Cy-Scan position referencing (a taut-wire system can also be fitted should this be required).

The high block coefficient hull is optimised for stationkeeping

On arrival in Mexico, a 12-man diving system was fitted, the diving moonpool being fitted in the centre of the hull. To enable bell deployment/recovery in rough seas, an aeration system has been installed in the moonpool, and a passive heave compensation system is arranged which will allow diving operations in significant wave heights of up to 5.0m.

Don Amado has a 12-man SAT system for water depths of up to 300m, complemented by a davit-launched hyperbaric rescue chamber on D deck. The dive bell handling system was designed by Caley in the UK, and uses a conventional overhead gantry which moves the dive bell from the mating position(s) to the moonpool. The winches are placed on a platform in the hangar, protected from the effects of weather, and operations can be monitored from the dive control room on the main deck with assistance of two cameras.

All the diving spaces are protected by a single water mist fire extinguishing system, which also protects the engineroom. The ship's three fire-fighting pumps each supply 2,400 m^3/h to the monitors and are directly driven by the ship's diesel generators.

The Liebherr Boss 7500-300 crane is fitted at the aft end and is able to lift 300 tonnes at 20m, or 100 tonnes at 43m, and has a counterweight of 150 tonnes to counteract the heeling moment of the boom and reduce the moment on the slew bearing. The boom can be extended by 12m to achieve a reach of 55m with the main hoist. To support the operation of the crane, an anti-heeling system is fitted with a pumping capacity of 1,500 m^3/h. This maintains heel within preset ranges, and only in extreme conditions does the ballast system need to be used to counteract excessive heeling moments.

An auxiliary hoist is fitted to support diving operations on the seabed with a hook speed of 100 m/min. The auxiliary hoist is also suitable for man-riding. The crane was built in the Liebherr Rostock facility and transported to Rotterdam for installation. An auxiliary crane supplied by Sormec is installed aft of the hangar and is capable of lifting 10 tonnes at 15m with a telescopic boom.

Accommodation takes the form of single, twin and four-person cabins arranged forward. Personnel transfer can be undertaken by helicopter and by crewboat.

De Hoop says crew comfort was an important consideration during the design and construction of *Don Amado*, very low noise levels having been achieved by paying close attention to the subject and by careful consideration of issues such as the location of the engineroom in the midship area, aft of the accommodation. Other features to achieve low noise levels include the use of variable frequency bow thrusters, with five-bladed propellers; floating floors on the main deck; flexibly mounted pumps, walls, and ceilings; and the use of noise damping bulkheads. **OSJ**

Don Amado has a reduced draught, which enables the ship to work into and out of smaller Mexican ports and harbours