

# *Don Amado*

## Cost-Effective Workhorse



Photo courtesy of Flying Focus

### **DON AMADO**

BUILDER	Shipyards De Hoop
OWNER	Oceanografia S.A. de C.V.
YARD NUMBER	424



*Although Don Amado is the first vessel of a series of three, the brand new Diving Support Vessel (DSV) is by no means the first DSV to leave the De Hoop slipway in the Netherlands. With a track record dating back to the 1980s, she is also the third DSV for owner and operator Oceanografía S.A. de C.V. of Mexico.*

**D**ecember last's eagerly awaited birthday gift to Oceanografía, celebrating its 40th anniversary in 2008, is a special purpose vessel suitable for worldwide service in shallow as well as deepwater. Together with the 2001 and 2002 De Hoop-built Caballo de Mar and Caballo Trabajo, and Don Amado's 'sister vessels' Amado Daniel and Don Daniel, she will engage in construction, inspection, repair and maintenance of offshore installations, surface & sub sea crane operations, diving & ROV support and standby & rescue activities.

### Low Profile

Don Amado's high block hull – limiting pitch and heave motion – is optimized for station-keeping, showing a low draught and minimal drag. The U-shaped fore ship with bulbous bow minimizes fuel consumption in transit, while at the same time the pram type stern maximizes stability for heavy lift operations. The spoiler on the moon pool stern side also helps to reduce drag and avoid turbulence during transit. The low draught enables the vessel to enter very shallow offshore ports in Mexico. Above the waterline the hull and superstructure are low-profile in order to reduce wind-forces as much as possible. The steel plated heli deck is integrated in the

vessel construction to reduce weight and cost and also to keep the heli deck low, to reduce horizontal movements and accelerations as much as possible. The hull design features large wing tanks for carrying ballast water, also providing protection against collision damage. Although the vessel has a relative large beam and high metacentric height (GM) value – necessary to safely operate the crane – the roll motion is better than might be expected due to the high roll-damping values, which are a result of the high beam-to-draught (B/T) ratio and the high bilge keels.

### Power Generation

The vessels are fitted with a diesel-electric power plant consisting of four Caterpillar 3516B generator sets, each rated at 1,825 kW at 1,800 min<sup>-1</sup>, fitted in the central engine room. The entire electrical installation and integration is performed by De Hoop's long time partner and 'fellow town's man' Droste Elektro. By choosing a low voltage system of 480 V costs are kept at a minimum. The generators are connected to the main switchboard and can be switched locally as well as from the bridge. The main switchboard is split in a portside and starboard side for reasons of redundancy. The bus-tie breaker will be open





when all generators are on line. The main switchboard is fitted with a power management system (PMS) to prevent overloading the generators, in which case the propeller load is reduced. In case power generation is completely lost, the C18 CAT emergency/harbour genset will take over to power all essential services. The fresh air intakes are lead through the starboard funnel/boom rest. The generation is ventilated from starboard to portside – together with the exhausts – through the portside funnel.

## Propulsion Premiere

To propel Don Amado, Veth developed its first 1,500 kW offshore/inshore thrusters, the first two of which premiere in this vessel. At this moment De Hoop has ten of these units – which have proven remarkably silent – on order. The thrusters are designed for bollard-pull conditions in order to have maximum efficiency in DP operation. In transit, they enable Don Amado to reach 12 knots with 2 x 1,500 kW input power. The vessel's three 900kW fixed pitch bow thrusters – with a tunnel diameter of 1,600 mm – are fitted with five blades to reduce cavitation noise and vibrations. The aft bow thruster tunnel is integrated with the forward sea-chest for the box-coolers.

All thrusters are powered by asynchronous electrical motors produced by Wölfer of Germany. They were factory-tested together with the frequency drives to avoid long tuning times. The frequency drives are in fact supplied by Spanish Ingeteam, who have supplied over 11.000 similar frequency drives for windmills. The Active Front End (AFE) frequency drives on all thrusters help to keep the total harmonic distortion below 1%, eliminating the need for transformers. No break resistors are fitted, as the vessel's hotel load is sufficient to absorb any power feedback from the propellers.

## Dynamic Positioning

The vessel is fitted with a duplex dynamic positioning system in order to claim her DP2 status. The total transverse power is 2 x 1,500 kW aft plus 3 x 900 kW forward, equalling to only 0.8 kW/t displacement. With this thruster arrangement the vessel can achieve a transverse speed of 3.5 knots. The DP plot shows that the vessel can keep position (in DP2 mode) in wind speeds up to 20 m/s and significant wave heights of 5.0 m (beam on). The cost-effective DP system is supplied by Navis and features:

- simple and fast operation: two button pushes from transit to DP;
- touch screen operation, voice-assisted to enable the operator to keep his or her eyes on the job;
- on-screen, online capability plot showing limits of operation;
- integrated, class-approved autopilot;
- fast tuning time (just two hours) and high performance.

The maximum overshoots measured when sailing the square-test at sea at 5 Beaufort were only 0.2° on



heading and 0.7 m in surge. The system uses four position reference systems:

- 2 x C-Nav / Trimble DGPS;
- 1 x Sonardyne hydro-acoustic system;
- 1 x Cy-scan optical position reference system.

Preparations have been made for future fitting of a taut-wire system. For signal correction, two vertical reference units (VRUs) and three gyro's are fitted. In case all systems lose track, a conventional magnetic compass is fitted on the top of the wheelhouse.

## Diving System

The installation of the 12-man saturation diving system has been done in Mexico. The diving moon pool is fitted in the centre of the vessel. To enable bell deployment and recovery in rough seas, an aeration system is fitted at the bottom of the moon pool. Passive heave compensation allows diving operations to take place in significant wave heights of up to 5.0 m. The saturated diving system is rated for water depths up to 300 m. The decompression complex consists of two transfer-under-pressure chambers (TUPs) and two deck decompression chambers (DDCs) for accommodation. A davit-launched Hyperbaric Rescue Chamber is located on D-deck. The dive bell handling system is designed by Caley and shows a conventional overhead gantry, which moves the dive bell from the mating position(s) to the moon pool. Winches are placed on a platform in the hangar, protected from the weather. Operations can be

monitored from the Dive-control room on main deck, with assistance of two cameras. Life support equipment including He-Ox bottles are located at tank top level. All diving spaces are protected by a single water mist system, which also protects the engine room.

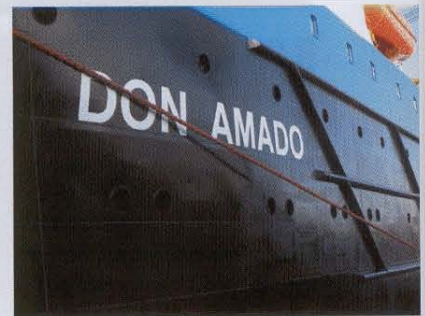
## Fire Fighting

Three fire fighting pumps, each supplying 2,400 m<sup>3</sup>/h to the fi-fi monitors, are directly coupled to three of the four 3516B CAT gensets. Fire-fighting operations can be done in manual thruster control mode or in DP mode. The fi-fi pumps can only be started if sufficient spinning reserve is available. The fi-fi monitors are located on the aftship in order to be able to reach as far as possible. At the same time, in this way the accommodation can be kept as far as possible from the source of the hazard. For sub sea jetting work and hose-cleaning operation a fourth branch is available, equipped with a constant pressure valve.

## Lifting Capacity

For offshore platform maintenance, a Liebherr BOS 7500-300 crane is fitted aft at starboard on the large open deck totaling 1000 m<sup>2</sup> in which a 20 ft flush hatch gives access to a large store below. The crane is able to lift 300 t at 20 m, or 100 t at 43 m. A counterweight of 150 t counteracts the heeling-moment of the boom and reduces the tilting moment on the slewing bearing. The boom can be extended with 12 m to achieve a reach of 55 m with the main hoist. Crane operations are





supported by means of a 1,500 m<sup>3</sup>/h anti-heeling system, keeping vessel tilt within a preset range. Under extreme conditions the ship's ballast system can be used to create extra heeling moment. An auxiliary hoist is fitted to support diving operation on the sea floor with a fast hook speed of 100 m/min. The auxiliary hoist is also suitable for man-riding. Aft on the hangar a Sormec auxiliary crane with a telescopic boom provides extra lifting capability of 10 t at 15 m.

## Accommodation

The accommodation for housing 250 is arranged forward, in single, double and 4-person cabins. On D-deck all officers, client representatives and diving superintendents are berthed in spacious single and double cabins, fitted with carpet and wood-panelling. On B and C-deck – where also three large offices, a hospital and a cinema are located – the majority of the crew cabins is arranged around a central staircase. Personnel transfer can be arranged by helicopter (up to D = 22.8 m) and by crew boat (surfer landing). Crew instructions can be given in the large cinema on B-deck. On tween deck all service spaces are arranged like cold stores, linen & laundry facilities etc. On main deck the change room, mess and dayroom can be found along with the large galley. Storing can be done using the elevator with access from the open deck and the galley. The mess room is fitted with a serving counter and can seat half of the onboard personnel at any given time. The large wheelhouse on top of the accommodation measures 144 m<sup>2</sup>. The navigation desk is of course the central focal point. Portside there is a

combined chart/radio table. At the central aft position the DP desk is arranged. On both sides there is sufficient space for survey equipment, an online office etc.

## Crew Comfort

Very low noise levels have been achieved by paying great attention to this subject. A major contributing factor is the amidships located engine room, aft of the accommodation. Also, it conveniently allowed for late installation of the main generators during the build of Don Amado. The variable frequency bow thrusters with their five bladed propellers contribute to the silent running of the vessel as well, not to mention the floating floors on the main deck and flexible mounted pumps. The perforated ceilings in large public areas guarantee a high level of sound absorption, as well as the noise damping bulkheads in the ships side and in between cabins. Furthermore each cabin is equipped with a fan-coil unit enabling individual temperature control to increase onboard well-being. Public spaces have been finished to a high standard with large flat-screen TV sets and artwork. As a cost-effective workhorse Don Amado will most certainly contribute to an increase in the production of the Mexican oilfields and at the same time serve as a comfortable 'floatel' for many offshore workers.

## Main Suppliers &amp; Subcontractors

**Ajax-Chubb Brandbeveiliging** Ajax Fog water mist, foam equipment for Heli deck, CO<sub>2</sub> for galley | **Alfa Laval** Fuel oil separators | **Alphatron Marine** Navigation & communication systems, Navis dynamic position system | **De Boer Staal** Steel plates and profiles | **Deno Compressors** Air compressors | **Droste** Complete electrical installation, E-motors for propulsion and bowthrusters | **Drumarkon** Marine Range HPL for all furniture | **Econosto** Valves & fittings | **Facet Industrial** Bilge water separator | **Hatenboer-Water** Demitec sea standard RO seawater desalination systems, fresh water hydrophore unit, fresh water treatment equipment | **Ingeteam** Frequency converters | **Adviesbureau Intersona** Vibration measurements | **Kraaijeveld** Anchor- and mooring winches | **Kroon** Alvedoor fire doors | **Lemans** Fairleads | **Liebherr** Main deck crane | **Lloyd's Register** EMEA Classification | **MacGREGOR** Lashings | **Noreq** Lifeboat | **Pon Power** Caterpillar generator sets | **Praxis Automation Technology** Alarm & monitoring system | **Reikon** Azcuc pumps | **Rodenstaal** Sections/side boxes | **Sigma Coatings** Coating systems | **Snijder Filtertechniek** Separ air filters | **Sormec** Deck crane | **Veth Motoren** Veth Tunnel Thrusters, Veth-Z-Drive rudder propellers | **Winel** WTS doors type Albatros, WT and WET musketeerdoers, tank vent check valves | **Winteb** Air pipe heads | **Wölfer Elektromaschinenfabrik** Electric propulsion motors | **Wortelboer** Anchors & anchor chain cables

i. [www.dehoop.net](http://www.dehoop.net)

i. [www.oceanografia.com.mx](http://www.oceanografia.com.mx)

## Facts & Figures

# Don Amado

### Principal Particulars

Length o.a.	105.13 m
Breadth mld.	24.00 m
Depth to main deck	7.00 m
Draught	4.00 m
Deadweight	5,500 t

### Manoeuvring & Propulsion Systems

Main Engines/Generators	4 x CAT 3516B, 1,825 kW, 1,800 min <sup>-1</sup> , 480 V, 60 Hz
Propulsion	2 x 1,500 kW fpp azimuth stern thruster 3 x 900 kW fpp bow tunnel thruster
Emergency/harbour generator set	1 x CAT C18, 425 kW, 1,800 min <sup>-1</sup> , 480 V, 60 Hz

### Speed

Speed [transit]	12 knots
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### Dynamic Positioning System

DP System	Navis DP system
Reference Systems	1 x Radius 1000 2 x DGPS Receivers 3 x Gyro Compass 2 x Motion reference units 2 x Wind sensors 1 x Hydro acoustic system 1 x Laser scan system

### Saturation Diving System

Capacity	12 divers
Maximum Operating Depth	300 m
Hyperbaric Rescue Craft	1

### Lifting Gear

Liebherr BOS 7500 main crane	300t at 20 m underwater capacity 50 t at 200 m
Sormec auxiliary deck crane	10 t at 15 m

### Workdeck

Area	1,000 m <sup>2</sup>
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### Tank Capacities

Fuel oil	600 m <sup>3</sup>
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### Accommodations

Accommodation is provided for 250 in single, double and four-man cabins.

### Classification

Classification	LRS100 A1, LMC, DPS-AA, FiFi II
Note	Support Vessel SOLAS Special Purpose