

Caballo de Trabajo

Already before delivery of the Caballo de Mar (newbuilding 385), De Hoop received a new order for the construction of an off-shore diving support vessel, newbuilding 391, Caballo de Trabajo for the same owner, Otto Candies Mexican Investments. The contract was awarded May 2001, launching took place 24th of January 2002 and the vessel was delivered 1st of June 2002. It is presently operated by Oceanografia and working for Pemex contracts in the Gulf of Mexico. Some 30 years ago De Hoop built the last vessels for Pemex (tankers and tugs), which are still operational. Now the two new modern offshore support vessels fly the Mexican flag (have Mexican crew) and have joined the fleet working for Pemex.

The Caballo de Trabajo has been designed for general maintenance work, above and below the surface, on various offshore installations in the oil fields in the Mexican Gulf for Pemex. It has accommodation for 100 offshore workers, carries a 100 ton crane and shows a free deck area of 610 sq. meter.

The main dimension and specifications are similar to a series of diving support vessels which were built by De Hoop in the early '80's: Shearwater Sapphire and Shearwater Topaz. Interesting differences/developments between these vessels are:

- change from CPP to frequency driven FPP thrusters aft;
- change from medium tension (6kV) back to low tension 480 Volt;
- price dropped from 68 million Dutch guilders to 58 million for the Caballo de Trabajo.

The main particulars of the vessel are:

Length over all	81.6 m.
Length between p.p.	74.4 m.
Beam	8.0 m.
Depth moulded	7.4 m.
Design draught	5.0 m.
Scantling draught	6.2 m.
Deadweight at 6.0 m draught	3,500 t.
Speed:	11.5 kn.

Capacities:

Fuel Oil	750 m ³ .
Fresh Water	740 m ³ .
Ballast Water	1,660 m ³ .

General Layout

The layout is as for a typical supply vessel, with machinery and accommodation forward and a large open aft deck.

Forward on the tanktop is an auxiliary engine room with the main switchboard. Aft of the switchboard room is the main diesel generator room.

A moonpool, measuring 3,6 x 3,6 m, for the diving bell has been arranged aft of the diesel generator room. The moonpool has a hori-



Caballo de Trabajo during trials

zontal connection to the saturation complex. In the forward part of the cargo hold the decompression chambers are fitted, together with the life support equipment and the compressors. The gas bottles for the heliox gas are stored below on the tanktop. Aft of the "hold" is the aft thruster room with the two azimuthing thrusters and the frequency converters for these.

On the main deck, PS aft, a 100 ton offshore crane is installed. Around the diving moonpool there is the handling equipment for the diving bell.

Forward in the forecabin and on top of the forecabin is an accommodation for a total of 134 persons, in one and two and four man cabins.

Power plant and electrical distribution

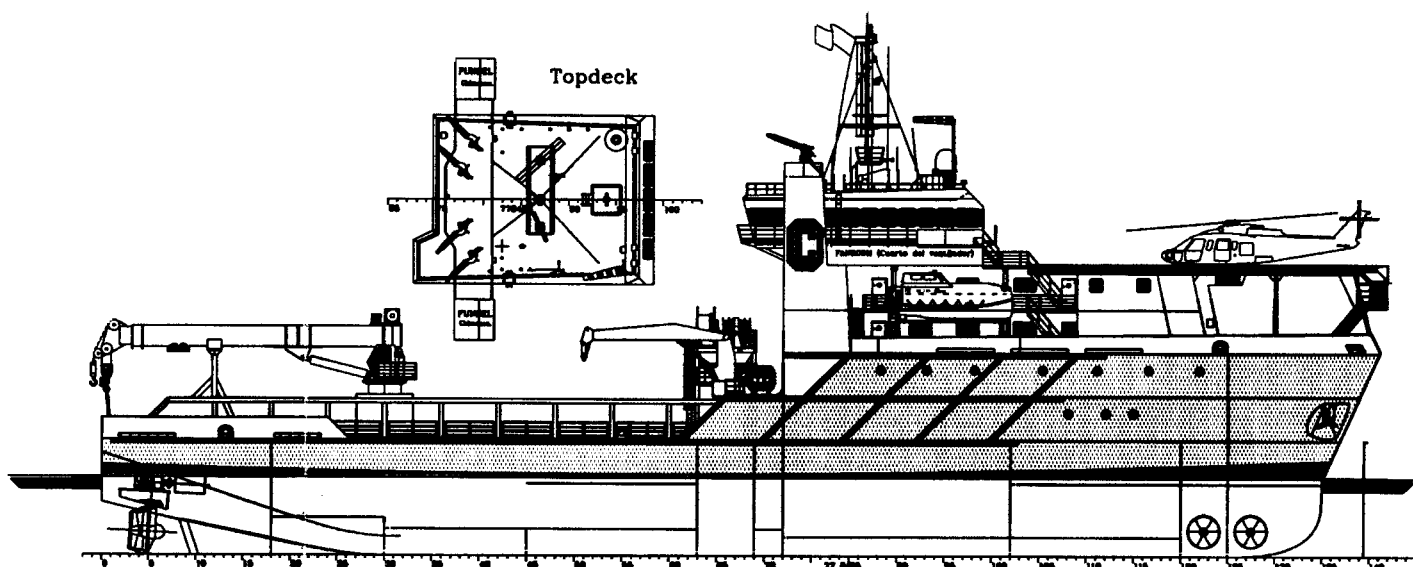
The diesel electric power plant consists of four diesel generators in one engine room and a 300 kW harbour/emergency generator in a separate space on the main deck level.

The four Caterpillar diesels are of the type 3512, each developing 1424 kW, and each

coupled through a gearbox and flexible coupling with a FiFi pump.

Main distribution voltage is 480 V, 60 Hz. Secondary voltage is 230 V with 110 V in all cabins. The distribution system is divided in two halves with the auxiliary systems follow suite. This means that no single failure, excluding fire, explosion or flooding, will cause the vessel to loose position. Alewijnse Nijmegen Schepen B.V. was the main electrical contractor responsible for the engineering, installation and commissioning of the electrical distribution, control and monitoring system.

Alstom has provided the thruster motors and the frequency drives for the aft azimuthing thrusters. The drives are of 12-pulse type with pseudo-24 pulse when two azimuthing thrusters are in operation simultaneously. The 12-pulse drives together with the transformers and generators have been tuned to limit the THD (total harmonic distortion). During the trials a maximum THD in worst case was measured of 1.5%.



Dynamic Positioning System and station keeping capability

The vessel is fitted with a duplex DP Class 2 system, delivered by Alstom in the UK. The DP system is using four reference systems: two DGPS via separate receivers and correction signals, one hydro acoustic system with one transducer and a cyscan system based on laser fanbeam technique using simple reflectors.

When all systems are working the vessel can keep its position, regardless of heading, up to a significant wave height of 3.5 meters and a windspeed of about 15 m/second. For the Mexican Gulf this means the vessel will be able to keep position for more than 99 % of the time. With 50 % power available, the limitations are: significant wave height about 2.0 m, wind speed around 10 m/seconds and a current of 1.5 knots. This situation is exceeded 15 % of the time.

During trials a maximum transverse speed of 3.0 knots was measured.

The maximum transverse speed (in DP mode) is favoured by us as a parameter to compare the DP capability of various vessels (monohulls). It is easy to measure and is a practical figure compared to the theoretical determined ERN, or PCR figures.

Similar to the system installed on Caballo de Mar, the DP system is controlling the vessel in all modes of operation. In case of insufficient power it will automatically reduce the power output to the thrusters. Emergency steering can be performed from the aft thruster room (steering and rpm control). Generators can be remotely started/stopped from the bridge.

Thrusters

All four thrusters have been supplied by Rolls-Royce.

The forward tunnel thrusters, 800 kW each, are from KaMeWa with constant speed and controllable pitch.

The aft thrusters, 1430 kW each, are from Aquamaster and are of fixed pitch type with controllable speed.

This combination has been selected as the best compromise between cost, space available onboard, fuel consumption and manoeuvrability.

Hoisting appliances

Techcrane has delivered the crane. The crane has been built in the USA and was installed on the vessel during its transit to Mexico. Crane capacity is 100 t at 9 m and 50 t at 15 m.

An auxiliary 20 t crane is installed on SB-side and was supplied by Neddec Marine.

Diving spread

The system consists of two twinlock and a diving bell to be handled through the moonpool. Theoretically the system can accommodate 12 persons, but in practice it will most likely be 9 persons: two diving teams of each 3 persons and one team in decompression. The main components as DDC's and Bell were purchased second hand and upgraded by Hytec.

Dive and saturation control rooms are located on either side of the moonpool below deck. In order to save deckspace it was decided to connect the bell in the moonpool to the spoolpiece leading to DDC1. The spoolpiece opening can be closed by a hydraulic operated WT door. The diving system was installed and commissioned by Divex, Aberdeen.

SMST of Franeker has delivered the bell handling equipment including the fixed gantry, overhead trolley, cursor, umbilical winch, guide wire winch and the bell handling winch. The mating position of the bell is in the moonpool. The bell is in the splashzone when

locked and large forces will be acting on the locking mechanism. A special cursor has been designed enabling horizontal transport of the bell when locked in vertical sense. An advantage of this system is that valuable deckspace has been saved.

On deck a hyperbaric rescue chamber can be installed.

Classification

American Bureau of Shipping has classed the vessel with the notation:

⊗ A1 (E) Offshore Support Vessel, ⊗ AMS, ⊗ ACCU, ⊗ DPS-2.

Note:

The earlier vessel, the Caballo de Mar, was described in the January 2002 issue of SWZ, page 18. The article has a paragraph on the Owner, Otto Candies L.L.C.

