ODFJELL DRILLING

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design: cox design

ODFJELL DRILLING

DEEPSEA METRO I & II

6th Generation Drillships
Ultra Deep Water

Owner: Deep Sea Metro Ltd
Manager: Odfjell Drilling
Design: Gusto P10000

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DEEPSEA METRO
GENERAL DESCRIPTION

Odfjell Drilling and the Metrostar Group in the shape of Metro Exploration have entered a joint venture for the ownership of two state of the art ultra deep water drillships of Gusto design.

Both units are to be delivered by Hyundai Heavy Industries (HHI) in South Korea in 2nd and 4th quarter 2011. Odfjell Drilling is responsible for the construction follow-up and management. The drillships are designed for operations in water depths of up to 10,000 feet and may be upgraded to 12,000 feet. The vessels incorporate state of the art technology for safe

and efficient operations in ultra deep water. They have large deck areas and storage capacities (topside/hull) that are especially favorable in combination with high transit speeds. The vessels comply with international rules and regulations for operations worldwide, except for harsh environment areas. The units carry the following class notation:

DNV + 1A1 Ship-shaped Drilling Unit, BIS, EO, DYNPOS-AUTRO, DRILL, CRANE, HELDK.

MAIN DIMENSIONS		
Length, overall	229.6 m	(753.3ft)
Length, between perpendiculars	210.1 m	(689.3 ft)
Breadth, moulded	36.0 m	(118.1 ft)
Depth at side, moulded	17.8 m	(58.4 ft)
Max Design Draught, moulded	11.0 m	(36.1 ft)
Displacement at 11.0 m draft	67,700 mt	
GENERAL DATA		
Operating water depth (Design)	3,000 m	(10,000 ft)
Operating water depth (Upgrade)	3,650 m	(12,000 ft)
Drilling depth 12.200 m		(40,000 ft)
Design temperatures	Seawater	0˚ to +32˚C
	Air	0˚ to +40˚C
Accommodation	210 persons	
CAPACITIES		
Diesel oil tanks incl. settling and service	7,500 m^3	47,100 bbls
Fresh water	1,400 m^3	3 8,806 bbls
Drilling water	2,700 m^3	16,980 bbls
Brine	1,200 m^3	7,550 bbls
Base oil	1,100 m^3	6,920 bbls
Reserve mud	1,500 m^3	9,440 bbls
Active mud	1,900 m^3	11,950 bbls
Water ballast tanks including peak tanks	25,000 m^3	157,250 bbls
Dry bulk mud tanks (6 eu)	450 m^3	2,800 bbls
Dry cement tanks (6 eu)	450 m^3	2,800 bbls
Bulk in sacks	8,500 sacks	
Drilling cuttings	100 mt	110 st
Casing	2,000 mt	2,200 st
Drill pipes	750 mt	825 st
Risers (10,000 ft)	4,000 mt	4,400 st

MARINE SYSTEMS
Total installed power 44 MW, 8 sets of 4 cycle turbocharged diesel generator sets (3 engine rooms)

Generators:
B&W/MAN 6 ea 4,300 kW & 2 ea 8,700 kW
Emergency diesel generator 1 ea 1,500 kW
PMS with full integration between marine and drilling systems

Power Distribution:
Drilling variable speed drives 690 V
Ship Distribution 480 V
Lighting and small power 220 V/427 V class III

Dynamic Positioning:
IMO DP 5 MW thrusters, retractable for service or drydocking.

Design Criteria
Max Drilling Conditions (max wind & waves):
Hs=6.0 m, Tp=10-13 s, Vw=25.0 m/s, Vc=0.8 m/s

DRILLING EQUIPMENT
The drilling equipment has been selected with special emphasis on creating a safe working environment and delivering high operating efficiency. The provision of redundancy on critical equipment prevents lost time due to equipment failures.

The equipment and layout have made it possible to obtain large storage capacity in the derrick setback in survival and transit conditions.

Remote-operated equipment will be installed to improve safety in all operations. Work baskets and man rider winches will be installed in the derrick and moonpool area where work platforms are not able to cover all requirements.

The rig cellar deck has been laid out for efficient handling, with storage capacity for up to 4 complete sets of X-mas trees of 120 mt each. The Xmas tree trolley has a 700 ton capacity and can also be used to support the riser and BOP during short transit or special operations.

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Facilities for integrated E-operations and contact with Onshore Support Centres (OCS) are provided for.

DUAL CENTRE DERRICK
The vessels have a state of the art and highly efficient drilling system, which includes a dual derrick with a main work centre and an auxiliary work centre to facilitate a number of simultaneous operations. Both work centres are equipped for drilling.

The derrick is 64 meters high and designed for use with active compensating drawworks. This ensures reduced maintenance requirements and reduces weight in the top of the derrick by eliminating the need for top-mounted compensators.

A parallel pipe racking system with fingerboard and belly board for all stand positions and two (redundant) PRS-5 column racking machines serve both the main and auxiliary centres.

The derrick racking capacity is 1,587 mt of casing and drill string from 3.5" to 22" in diameter.

There is a personnel elevator from the drillfloor to the top of the derrick.

MAIN CENTRE
The main drilling centre is located at the forward side of the drillfloor. A hydraulically driven rotary table and 72" diverter housing are installed to allow the use of large riser buoyancy dimensions. The main centre is 1000 tons and may be upgraded to 1250 tons.

Riser and large casing joints are supplied by the horizontal catwalk from the forward deck or riser storage in the hull. Hoisting is provided by the active heave compensating drawworks system connected to the travelling block and Varco TDS 1,000 Ton AC Topdrive with retracting system.

The Drawworks has 6 each 1,150 HP AC water-cooled motors.

AUXILIARY CENTRE, 750 TON
The auxiliary drilling centre is located 12.5 meters aft of the main centre. A hydraulically driven 60.5" rotary table is installed.

Hoisting is provided by an active heave compensating drawworks system connected to a 750 ton TDS-8 AC topdrive and travelling block. A horizontal catwalk for supplying drill pipe, drill collars and casing from the aft pipedeck is provided. The standbuilding will be done in the aux centre using the topdrive, iron roughneck and column racking machine, which will rack the stands in the derrick. The auxiliary centre can drill surface holes and run casing.

DRILLER CONTROL CABIN
Driller control cabin for 2 + 2 operators with 4 National Cyberbase operator stations.

IRON ROUGHNECK
2 ea Hydra Tong ARN 200s are installed, one at each drilling centre, and prepared for casing and tubing modems.

HYDRAULIC CATHEADS
One CAT-P15 with 15 kN pull capacity is installed at each drilling centre.

MUD BUCKET
Dreco style for installation on the iron roughneck.

ROTARY TABLE
National rotary table with hydraulic drive in both centres, main type VarcoBJ RST 755 with 75.5" opening and auxiliary type VarcoBJ RST 605 with 60.5" opening.

ELEVATORS
2 ea VarcoBJ BX-4 and 1 ea VarcoBJ BX-5 frame elevators.

DRILLING FLUID SYSTEMS
The drilling fluid system is designed to handle two separate types of drilling fluid with one system at each side of the mud pump room, which is located in the hull at the aft side of the moonpool. The total capacity is 1,900 m^3.

The sack store and mud mixing room are accomodated in a room directly above the mud pump room. Reserve mud tanks with a capacity of 1500 m^3 are located in the hull at the forward side of the moonpool. All mud tanks have agitators. There are mud guns, sloped bottoms and a tank washing system for efficient cleaning.

The system includes:
- Mud pumps, 4 ea National 14-P-220, 2,200hp each, 7,500 psi, mission style "L" fluid end
- Shakers, 8 ea VSM 300 high-capacity shakers
- Gumbo conveyor, 2 ea Brandt
- Degasser
- Desilter, 24 ea 4" coneW above one shaker
- Desander, 3 ea 12" cone
- Remote control of mix transfer pumps and most used LP mud valves
- Mud additive system with venturi type mixers, sack cutting unit, dosing system, big bag unit, caustic mixer, liquid additive skid
- High rate mixers and HP shear units in both mud systems

Material handling systems on deck

RIG CRANES
Four knuckle boom cranes.
Port side forward: Hydralift OC4000KCE, 100 mt @ 20m, 17 mt @ 45 m.
Port side aft: Hydralift OC4475KCE, 160 mt @ 30 m, 15 mt Active heave compensated lift to 3000 m.
Two each starboard side: Hydralift OC3932KBE 85 mt @ 18 m, 17 mt @ 45 m.

RISER GANTRY CRANE
Gantry crane, 36 mt SWL installed for transport of 75 ft riser in hull storage to / from riser elevation system.

RISER ELEVATION SYSTEM
A riser elevation system is installed for transport of 75 ft riser joints from the hull storage room to the riser catwalk

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machine on the forward deck. This design enables use of the deck area above the hull riser store.

FORWARD RISER CATWALK MACHINE
Horizontal riser catwalk Hydralift model R40-75 with tilt function and tail-in arm installed to transport riser to the main drilling centre.

AFT PIPE HANDLING CATWALK MACHINE
A horizontal tubular feeding machine for feeding casing and drill string to the auxiliary centre with a tail-in arm which can handle up to 30" casing is installed. Capacity 10 mt.

The aft knuckleboom cranes with pipe gripper yoke are used for lifting pipe from the pipe rack to/from the catwalk. This makes the pipe handling from the deck to the drill-floor a remotely operated process, greatly improving safety for the deck crew.

BOP TROLLEY WITH INTEGRATED GUIDING SYSTEM
The BOP is handled by a 540 mt capacity trolley running on the 10.6 m rail span moonpool. BOP storage and handling is accomodated at the forward side of the moonpool.

BOP GANTRY CRANE
A gantry crane of 2 x 200 mt can lift and park the LMRP at the upper deck when the BOP trolley is in the starboard parking position. A bulkhead guiding system is provided for safe handling. There is an arrangement for testing the BOP with a retractable test stump and an arrangement for changing the BOP connector at the storage position.

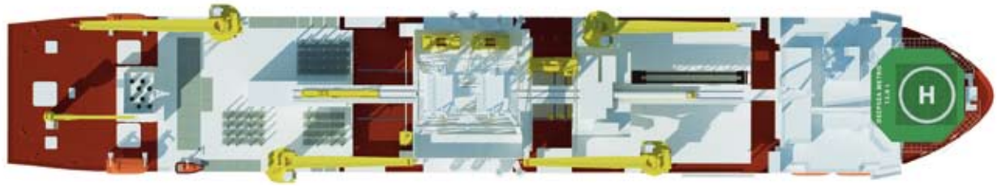
X-MAS TREE TROLLEY
The X-mas tree trolley is rated for 700 mt and runs along the moonpool rails. At the parking position on the aft side a complete X-mas tree can be skidded into the trolley from the port or starboard stacking positions (2 each side).

X-MAS TREE BRIDGE CRANE
The X-mas tree bridge crane has 2 ea 15 ton winches and covers the X-mas tree stacking area at the aft side of the moonpool.

LOADING STATIONS
Loading stations at the port and starboard sides with hosereels for bulk mud, cement, fuel, pot water, drill water, base oil, liquid mud and brine.

Well control and subsea equipment

BOP
Hydril 18 3/4" x 1,035 bar with 6 rams.
2 ea annular BOPs.
Vetco H-4 Well head connector and LMR connector. MUX control and 345 bar hydraulic supply system.



DIVERTER
A 72" diverter housing, 21" ID with CSO, 35 bar WP.
The Diverter has 16" lines to port and starboard, 16" flow line, 8" water fill, 4" trip tank fill.

MARINE RISER
The riser is a Vetco Class G HMF type 21" OD, 3 mill lbs rated with 2 ea 4.5" ID x 6.5" OD kill/choke, 4" ID x 5" OD booster and 2 ea 2.3" ID x 3.5" OD hydraulic supply. Length of each joint 75 ft. Telescopic joint with latch for locking inner barrel to outer barrel, tensioner support with fluid assist bearing, stroke.

RISER TENSIONER
Hydralift wireline riser tensioners with 3.5 million lbs tension capacity. Individual piping and control panel for 14 tensioner cylinders. Wire travel 50 ft.

CHOKE MANIFOLD INCLUDING MUD GAS SEPARATOR
HP/HT 3 1/16" x 1,035/690 bar choke manifold with 2 remote and 2 manually operated chokes installed at the drillfloor. The low-pressure side of the manifold is connected to the mud gas separator, well test area, stripping tank and 5" vent line to port and starboard.

Mud gas separator has 1200 mm ID, 12" vent line to derrick top and 12" inlet from riser degas line.

GREEN RIG
The drillship is designed for zero discharge. Drain water will be cleaned by a centrifuge system to meet requirements for discharge to sea. Fluids which can not be cleaned will be stored onboard and sent ashore. Green rig features:

- All drain lines routed to central cleaning unit by means of several tanks and pumps
- Discharge from mud pits by pumping, no gravity discharge
- Waste management system will be implemented
- Low NOX emissions, clean design engines
- Electrical drawworks with power regeneration