

Frigstad Engineering

The Frigstad Engineering Group has provided rig designs and engineering services to the offshore drilling and production industry since 1981. With offices in Cyprus, Singapore, Norway and Brazil we have established strong ties with major offshore shipyards and suppliers of drilling equipment and we are able to serve our clients world-wide. Frigstad Engineering operates with a deeply embedded philosophy of designing and modifying rigs according to the operational needs of the professionals who work on them and with the expectations of oil companies and investors in mind. Particular emphasis is placed upon equipment selection and arrangement which offers superior safety and operational performance while maintaining the highest levels of environmental protection and cost-efficiency.

Frigstad D90 – Operational excellence

The Frigstad D90 is a proprietary semi-submersible drilling unit design which has been purposely developed for ultradeep water exploration & development. The general arrangement of the unit has been carefully designed utilizing the extensive practical experience of the personnel at Frigstad Engineering and Frigstad Offshore. All aspects of equipment functionality and placement have been carefully considered to ensure that each process is safe and efficient.



Large, open & clean deck



Vertical riser storage



Port & starboard well centers



Dual activity rig

Frigstad D90 DP3 DCR PSM – Key features

- 12,000 ft water depth capacity
- Prepared for 20K BOP system (2 x 7-ram 20K BOP's)
- 60,000 ft drilling depth (setback capacity).
- Vertical racking capacity for 10,170 ft drilling riser in 110 ft stands and 2,000 ft on deck. 60,000 ft drill pipe in quad. stands.
- Dual Quad. Cylinder Rig with 2 x 1,400 st hoisting capacity / 2 x 1,250 st load in elevator
- Payload capacity 17,000 t, VDL 10,000 t
- 2 x 150 t main cranes with full coverage of large deck space
- Dedicated handling and storage area for several SS X-mas trees
- Large moonpool opening of 44 x 9 m
- Powerful DP3 system with 8 thrusters that enables the rig to evacuate location and transit with a speed up to 10 knots
- Anchor winches for hook-up to pre-set mooring system
- Fully integrated cuttings storage and handling system (600 m³ / 21,190 ft³) designed to offer significant operational flexibility and cost efficiency
- MPD-Dual gradient drilling ready.

Frigstad D90™ Outline specification D90-DP3-SDR-PSM with NOV Dual Cylinder Rig			
REGULATIONS			
SOLAS 2008, MARPOL 1973/78, IMO MODU CODE 2009, all with latest amendments			
CLASSIFICATION			
DNV +1A1 COLUMN STABILIZED DRILLING UNIT, DYNPOS AUTRO and ER (DP3), POSMOR-ATA, CRANE, HELIDECK-SH, ECO, F-AM, DRILL & BWM-T			
ENVIROMENTAL OPERATING LIMITS			
Maximum wind velocity	70 knots / 100 knots	Air gap (Operating/Survival)	10.5 /16.5 m (34.4/54.1 ft)
PRINCIPAL PARTICULARS			
Length of pontoons	117 m (383.8 ft)	Displacement (operational)	69,802 t (76,943 st)
Width & length, pipe rack deck	89 x 81 m (292 x 265.7 ft)	Displacement (survival)	61,525 t (67,819 st)
Height to pipe rack deck (ABL)	43.3 m (142 ft)	Displacement (transit)	51,448 t (56,711 st)
Draft (operational)	24 m (78.7 ft)	Water depth (max)	12,000 ft (3,657 m)
Draft (survival)	18 m (59 ft)	Drilling depth (max)	60,000 ft (18,288 m)
STORAGE CAPACITIES			
Bulk mud	440 m³ (15,538 ft³)	Drill water, pontoon	4,811 m³ (30,260 bbls)
Bulk cement	440 m³ (15,538 ft³)	Potable water, pontoon	1,256 m³ (7,900 bbls)
Sack material, upper hull	9,000 sacks	Open pipe rack deck area	4,000 m² (43,055 ft²)
Base oil for mud, pontoon	653 m³ (4,106 bbls)	Variable deck load (max oper.)	10,000 t (11,023 st)
Liquid mud / brine, upper hull	1,603 m³ (10,100 bbls)	Variable deck load (max transit)	6,700 t (7,385 st)
Liquid mud / brine, pontoon	2,144 m³ (13,485 bbls)	Payload (max operational)	16,700 t (18,408 st)
Diesel fuel oil (MDD), pontoon	4,694 m³ (29,524 bbls)	Cutting storage, column	600 m³ (21,189 ft³)
ACCOMODATION / OFFICE			
Total capacity of 200 persons with all single person bedrooms with windows. Ample office space and service facilities.			
MATERIAL HANDLING			
Deck cranes	Two (2) 150 t revolving deck cranes with 57 m boom. Capable of handling under water thruster change out. Two (2) 14 t knuckle boom cranes for tubular handling.		
Cargo handling and logistics	Two (2) 6 t cargo elevators & several forklifts to service storage and machinery areas on pipe rack deck and inside the deck box and pipe rack deck including: engine rooms, mud pump room, cement unit room, workshops, sack storage, warehouse, galley stores etc.		
MARINE SYSTEMS			
Main power / emergency power	Eight (8) diesel engines, each with 5,760 kW capacity. Total installed power is approx. 46, 000 kW (62,500 BHP).		
Power distribution	11 kW AC main switchboards and DP with MP + AW drives and WM system.		
Thruster	DP Class 3. Eight (8) 4,5 MW azimuth thrusters (DNV DYNPOS AUTRO ER).		
Dynamic positioning	DYNPOS AUTRO (DP3)		
Mooring system	Four (4) double drum winches with 600 meters of 83 mm wire and eight (8) fairleads for connection to pre-set mooring system (DNV POSMOR ATA).		
DRILLING SYSTEMS			
Drilling rig	Dual quadruple cylinder rig with full dual handling capabilities. Each rig have 1,400 st hoisting capacity with 1,250 st load in elevator. Setback for 60,000 ft quadruple drill string / casing in triple stands. Two (2) diverters / flow lines.		
Rotary table	Two (2) 75.5" rotary with independent drive.		
Top drives	Two (2) top drives, with 1,250 st capacity.		
Riser tensioners	Six (6) hydraulic cylinder riser tensioners mounted on skid system (skiddable at full load). 4,800,000 lbs tensioning capacity.		
BOP and riser	Two 18 ¼" 15k, 7 cavity BOP 21" riser, 55 ft joints with K&C, booster and hydraulic lines. Vertical marine riser rack for 10,110 ft, 110 ft stands (2 x 55 ft lengths). Storage onboard for 12,000 ft of riser. Designed for up to 8-ram BOP, and 20K ready.		
Drill string	Drill strings with subs, drill collars, heavy weight drill pipes, casing.		
DRILLING FLUID SYSTEMS			
Mud pumps and treatment system	Four (4) main mud mumps, triplex 2,200 HP, 7,500 psi wp. Four (4) triple deck multi-sizer shakers. Two (2) desilters, two (2) centrifuges, one (1) gumbo conveyer, two (2) degasser units and two (2) 60 bbls trip tanks. Storage of 600 m³ cuttings in columns with direct off-loading through hose loading stations. Space for additional mud pumps and shale shakers.		
OTHER			
Helicopter deck capacity	Designed for Sikorsky S61/S92, MI8 and EH 101 helicopters. Max 15,6 tons.		
Life-saving equipment	Four (4) lifeboats with total capacity of 400 persons (98 kg, 21" seats). Sixteen (16) inflatable life rafts with capacity of 25 persons each. Two (2) fast rescue boats.		
Note: The details included in this specification are subject to change without prior notification		doc no 1000-FEL-SA10-0003 - rev 2 (11-15)	

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Frigstad D90™
With NOV Dual Cylinder rig



DUAL DERRICK HOISTING TOWER
with full lifting capacity, and active/passive heave compensation in both well centers (2 x 1,400 st)

TOP DRIVES
Two (2) top drives.
1,250 st SWL each

PIPE HANDLING SYSTEM
Efficient pipe handling system with set-back capacity for up to 60,000 ft drill pipe, or in combination with most casing strings

LIFE SAVING EQUIPMENT
Four (4) lifeboats, total capacity 400 persons. Sixteen (16) inflatable life rafts, 25 persons each. Two (2) fast rescue boats

MAIN POWER
Eight (8) diesel engines with total installed power of approximately 62,500 BHP

BOP & X-MAS TREE HANDLING/STORAGE
Stbd: 2 x 7-Ram BOPs with 2 x 300 t BOP handling crane & 650 t BOP Transporter. Storage for multiple X-mas Trees with 2 x 60 t tree handling crane & 120 t X-mas transporter 20k ready

RISER HANDLING SYSTEM
Efficient riser handling system with set-back capacity for 10,170 ft 21" marine riser system in 110 ft stands

HELICOPTER DECK
Designed for Sikorsky S61/S92, M18 and EH101 helicopters

ACCOMODATION/OFFICES
Total capacity 200 persons, all with single cabins with windows and attached bathroom. Ample office space and service facilities

DECK CRANES
Two (2) 150 t main deck revolving cranes with 57 m boom. Capable of handling any under water thruster change out

EXTENDED DECK BOX
Additional space in deck box on port & stb sides of the vessel, houses mooring winches, reel mounted «bulk» hoses, ventilation equipment and provides more deck space on pipe rack deck

MOORING SYSTEM
Four (4) double drum winches with 8 fairleads for connection to pre-set mooring system with 8 x 600 m x 83 mm wire.

DRILL CUTTINGS HANDLING
with integrated tanks and direct offloading

RISER TENSIONER
Six (6) in line skid mounted hydraulic cylinder riser tensioners

THRUSTERS
Eight (8) 4.5 MW azimuth thrusters. Designed for change out in the field

Thruster shaft and nozzle tilted 8° for optimal efficiency and minimal interference loss

Pull-out 26" BHA

20" casing hang off in N-line tensioner frame

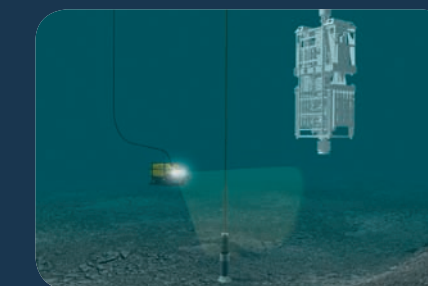
RISER SYSTEM
21" marine riser

SIMULTANEOUS OPERATIONS
Running BOP & riser

DUAL ACTIVITY



Drilling in Port-Rig & running casing in Starboard-Rig



Drilling in Port-Rig & preparing landing of BOP in Starboard-Rig

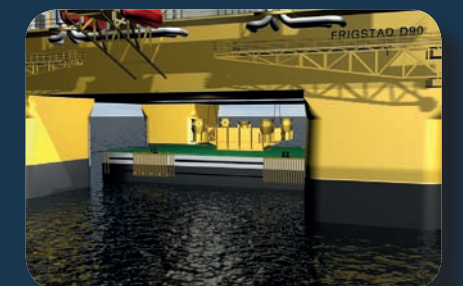


Patented "Handsfree" Gooseneck handling.

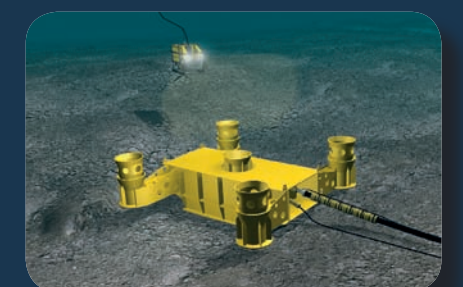
SUBSEA INSTALLATION



Barge with heavy loads such as SS template, flow manifolds or BOP's positioned under rig



Heavy loads lifted off barge and lowered into water



Landing template on seabed