

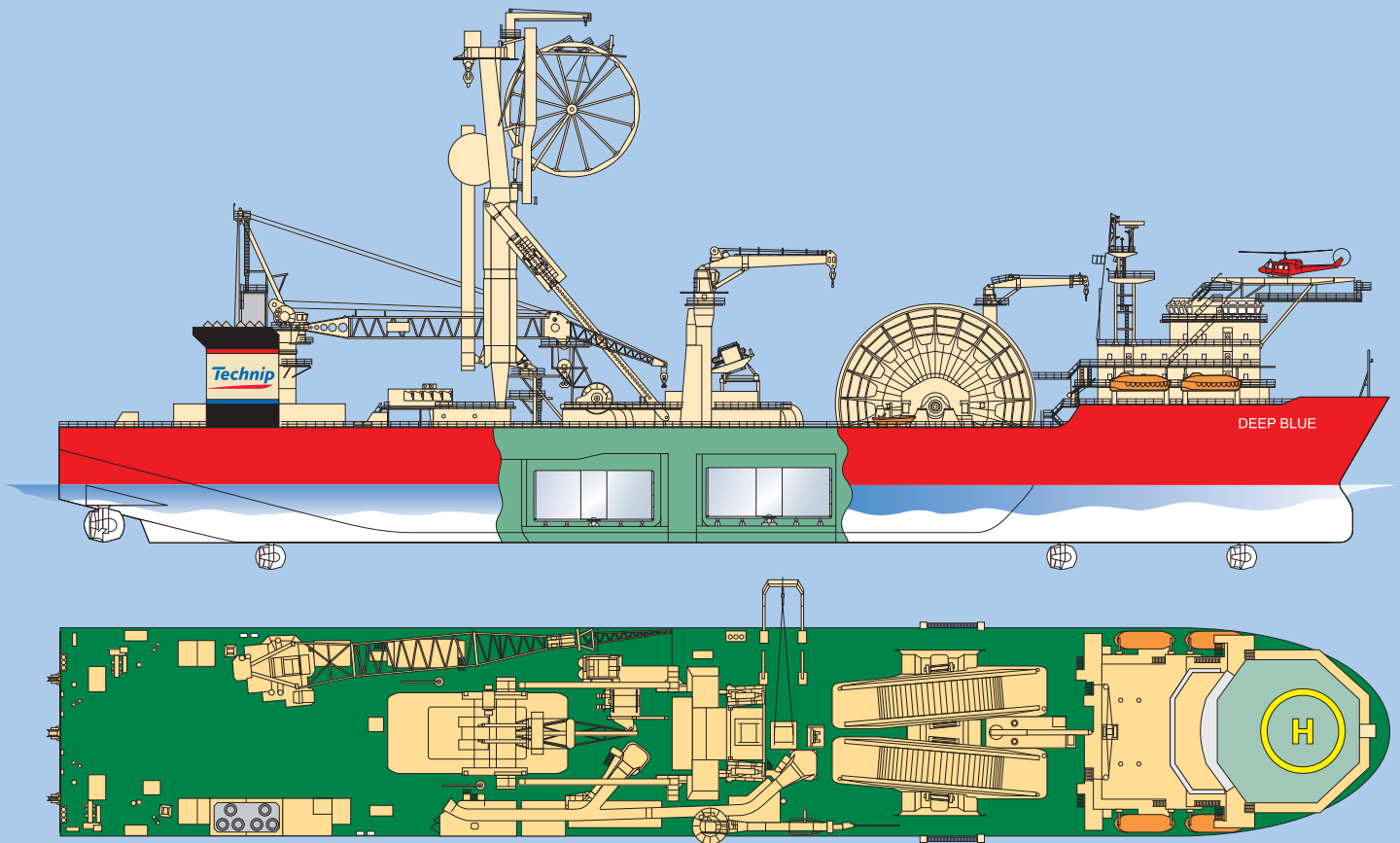


Deep Blue

One of the most advanced pipelay and construction vessels of the subsea industry and the flagship of the Technip Fleet



Deep Blue



The Deep Blue is one of the most advanced pipelay and construction vessels of the subsea industry and the flagship of the Technip Fleet. The vessel combines the highest technology for reel-lay, J-lay and flexi-lay operations. She supports Technip's operations in the most demanding environments and offers clients unique and cost effective solutions for the development of deep and ultra deepwater fields.

Deep Blue is a versatile and highly capable vessel. For the first time ever, a vessel is able to combine the installation of all types of flexible and rigid risers (reeled and J-Lay), flowlines and umbilicals, and support developments in water depths up to 3,000m (9,842ft) at an optimised cost.

The Deep Blue has been designed to offer the best technical solutions to the needs of our clients wishing to develop deep and ultra deep fields at optimised costs.

The Deep Blue is particularly well adapted to Gulf of Mexico, West African or Brazilian requirements thanks to her unique tensioning capacity, the large range of pipe products and payload (10,000 Te of products) she can carry / install.

Deep Blue references

World records and Industry firsts

CLIENT	PROJECT	SCOPE OF WORK	WATER DEPTH	YEAR
Shell	Perdido (Gulf of Mexico)	World records: - deepest installed reeled pipe - deepest installed reeled in-line structure (PLET)	2,957m (9,701ft) 2,850m (9,350ft)	2009
Shell	Na Kika (GoM)	World records: - deepest Pipe-in-Pipe (PiP) reel-lay - deepest PiP J-lay - deepest PiP Steel Catenary Riser Industry firsts: - First reeled PiP in-line sleds - First reeled flowline shorter than water depth - First internal buckle arrestors used in PiP - First subsea Remotely Operated Vehicle SCR transfer operation - First reeled FSHR	2,115m (6,940ft) 1,912m (6,272ft) 1,938m (6,360ft)	2005

Most challenging and technically advanced projects

CLIENT	PROJECT	SCOPE OF WORK	WATER DEPTH	YEAR
Total	Pazflor (Angola)	EPCI contract for 50km of production PiP (12"/16") with flextails, 18km of 11" production line with flextails and 10 in-line structures, 28km of 10" water injection with flexible riser and 2x10" Integrated Production Bundles (IPBs)	600m - 1,200m (1,968ft - 3,936ft)	2011
BP	Block 31 PSVM (Angola)	EPCI contract for 45km of 12" water injection line with a 15mm thick HDPE liner and 20km of gas injection line	1,800m - 2,100m (5,905ft - 6,889ft)	2010
Tullow	Jubilee (Ghana)	EPCI contract for 31km of 12" production line, 5km of 10" gas injection line, 11km of 12" water injection line, 7 anchoring piles, 2 riser base manifolds (220 Te each) and 8 production and injection manifolds	900m - 1,700m (2,952ft - 5,577ft)	2010
Petrobras	Cascade Chinook (GoM)	EPCI contract for 10km of 9" production line, 84km of 6" gas export line, 9 anchoring piles, 2 manifolds, 2 pump stations, 5 reel laid FSHRs	2,400m - 2,700m (7,873ft - 8,858ft)	2009
Shell	Perdido (GoM)	EPCI contract for 13km of 6" circulation line with SCR connected to Perdido DVA spar	2,250m - 2,957m (7,381ft - 9,701ft)	2009
Petrobras	PDET (Brazil)	EPCI contract for 56km of 18" insulated gas export line installed by the J-lay method and one 18" J-Lay FSHR	100m - 1,800m (329ft - 5,900ft)	2007
Total	Dalia SURF (Angola)	EPCI contract for 86km of steel production, water and gas injection flowlines, 70km of steel tube umbilicals and 25km of flexible risers First use of the Integrated Production Bundle, an innovative and proprietary technology	1,200m - 1,500m (3,937ft - 4,922ft)	2006
Burullus Gas	Simian Sapphire (Egypt)	EPCI contract for 390km of rigid pipelines (diameter range 4" to 26") using both reel and J-lay methods. subsea control system including 250km of electro-hydraulic umbilicals	90m - 1,100m (295ft - 3,609ft)	2006
Shell	Nakika (GoM)	EPCI contract for 26km of production PiP (8" x 12") with SCR, reel-lay installation, 46km of 8" flowline with SCR, 12km of gas injection flowline and production PiP (10" x 16") installed by J-Lay	1,861m - 2,115m (6,105ft - 6,940ft)	2005
BP	Thunder Horse (GoM)	2 x 7.5", 10,000 psi-rated flexible risers	1,890m (6,200ft)	2005
Williams Field Services	Boomvang & Nansen Spars (GoM)	Pipeline system design and EPIC contract for 2 export lines. Engineering and installation of: - 195km of 12", 16" and 18" rigid pipelines and SCRs - 15 risers	1,054m - 1,121m (3,460ft - 3,678ft)	2001

A unique multipurpose installation and construction vessel



Deep Blue mobilising at the Technip Spoolbase in Mobile, Alabama



Deep Blue on the Boomvang and Nansen project in the Gulf of Mexico

Pipelay equipment

Reel-lay: 550 Te, a unique tensioning capacity to reel-lay the largest range of deep lines

The Deep Blue's laying system is designed around a powerful tiltable tower, equipped with two quad track tensioners capable of sustaining 550 Te. What makes the Deep Blue really unique is her ability to lay both flexible (up to 24" outer diameter) and rigid reeled lines (from 4" to 18" overall diameter, including PiP) down to 3,000 meters water depth (9,842 ft).

The moonpool-fitted tower is fed either by two reels for laying rigid pipe or by two carousels for flexible lines (vertically).

The tensioners are designed to handle both products. This allows her to lay flexible and rigid lines within the same trip with a maximum load of 10,000 Te of product.

A key feature is also her capability to lay Reeled Steel Catenary Risers (RSCRs) and Hybrid Catenary Risers (HCRs).

J-Lay: 770 Te tensioning capacity

The Deep Blue also incorporates a J-Lay system. This allows the laying of lines up to 28" O.D., which may be required as part of a large field development, or

laying the non reelable portion of specific rigid lines of a more complex design, such as internally clad SCR's. The J-Lay configuration provides headclamps capable of taking pipe with or without collars or friction pads. The range of laying angles for the tower varies between 90° and 58°.

Storage capabilities

The Deep Blue is fitted with twin reels of 2,800 Te capacity each which are used for the storage of reeled rigid pipeline.

Two built-in under deck carousels are used as the main storage capability for flexible pipeline.

Finally, the Deep Blue has been designed with a large multi-purpose working deck which can either be used for transport of subsea structures to be installed in any offshore development or additional flexible product stored on portable reels. During J-lay operations, the deck is fitted with two bins, each capable of storing 2,000 Te of quads.

Craneage & deck winches

The vessel's main crane has been designed for offshore lifts ranging from 60 Te at 55m (180ft) radius up to 400 Te at 18m (59ft) radius enabling efficient subsea

equipment installation through its active heave compensation system. In addition to the main deck crane, a number of smaller utility cranes ranging from 10 to 30 Te capacity are provided in way of the pipelaying equipment.

Two large winches are provided in support of pipelay operations. These are:

- 327 Te SWL (360 Te dynamic) Traction and Storage Winch are provided for abandonment and recovery of pipelines with tensions 150 Te < T < 350 Te.
- 150 Te Initiation/A&R Winch is provided for initiation of pipelines using primarily Suction Piles, diverless latch and pipe transfer, etc. Also for abandonment and recovery of pipelines with tensions up to 150 Te.
- 15 Te Fast Winch with 3500m wire for quick and reliable light load deployment to seabed.
- 550 Te Pipe Follower for abandonment and recovery of pipelines with tensions 360 Te < T < 550 Te. This is a flexible used as A&R equipment through the two tower tensioners.



Deep Blue mobilising at the Technip spoolbase in Dande, Angola

Deep Blue bridge

Remotely Operated Vehicles (ROVs)

Pipelay and construction activities are supported by two identical Triton® MRV advanced workclass ROVs. Both systems are 3,000 m (10,000 ft) rated. One vehicle is deployed through the moonpool on the vessel centre line and the other over the vessel side via a customised heavy duty A-frame. Both systems are cursor deployed and are fitted with active heave compensation devices.

The ROVs are deployed in powered cages complete with tether management systems and have 750 m (2,500 ft) extended tethers fitted. State-of-the-art manipulators, sensors and tooling are permanently fitted. Client-supplied tooling is easily interfaced via dedicated valve packs and hydraulic systems. Both the ROVs and powered cages are fitted with survey quality, North-seeking fibre optic gyros and bathymetric systems. Each system is configured with a 200 hp power train and can accommodate any industry standard work package. The ROVs are operated from a dedicated control room built into the vessel and customised workshop and storage facilities are also provided.

Station keeping

The vessel is dynamically positioned during pipelay operations. Two main azimuthing propeller units are provided aft for propulsion and DP. Additionally, four further retractable azimuthing thruster units and two tunnel thrusters are provided for DP. A total of 25.6 MW (34,000 hp) thruster power is provided.

Integrated Vessel Management System (IVMS)

A fully integrated Kongsberg control system is installed. This monitors and, where applicable, controls all machinery for power generation and propulsion. Integral with the IVMS is a Kongsberg Simrad SDP-22 Dual redundant dynamic positioning system.

Machinery / propulsion

The vessel's main machinery consists of six diesel driven alternators (split between two separate machinery spaces) providing a total of 33.6 MW (45,000 hp) to the vessels electrically driven propulsion systems and various other consumers.

Transit speed

The transit speed of the vessel allows short transit time between spoolbase and field locations and shorter international transit between projects.

Hydrotest system

A dedicated hydrotest system provides high and low pressure technical fresh water at outlets adjacent to the main reels, carousels and moonpool for testing pipelines. The test pumping system provides for:

- a single low pressure supply of 800 ltrs/min @ 10 bar (211 gpm @ 145 psi)
- a dual high pressure with supplies of 120 ltrs/min @ 220 bar or 25 ltrs/min @ 600 bar (32 gpm @ 3,190 psi or 6.6 gpm @ 8,700 psi).

Key features

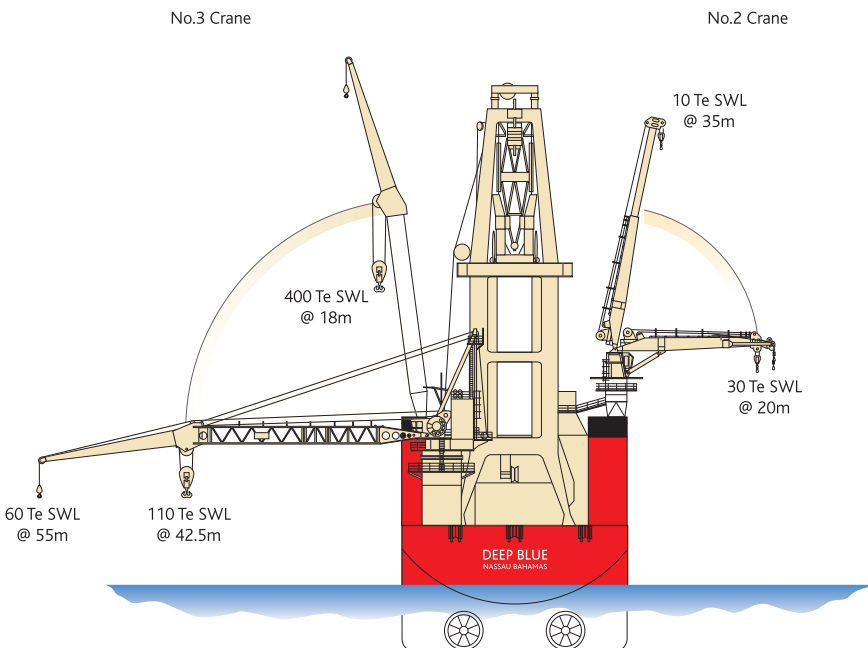


- Maximum water depth: 3,000 m (9,842 ft)
- Maximum pipe diameter range:
 - Rigid reeled: 4" to 18" O.D.
 - Flexible: up to 24" O.D.
 - Rigid J-Lay: 4" to 28" O.D.
 - Umbilicals: 70mm to 250mm (2³/₄" to 9¹³/₁₆")
- Maximum pipe payload: 10,000 Te (11,023 short tons), can consist of the combination of:
 - Rigid lines (2 reels): 5,600 Te (6,170 short tons)

- Flexible lines/umbilicals (2 carousels): 2,000 Te and 1,500 Te (2,240 short tons and 1,680 short tons)
- Portable reels (8 reels): 8 x 300 Te (330 short tons)
- Rigid pipe quads: 4,000 Te (4,409 short tons)
- Subsea structure: 3,000 Te (3,307 short tons)
- Heavy lift capability: 400 Te
- Moonpool: clear opening for 7.5 m wide x 15 m long (24 ft x 49 ft)
- Worktable over moonpool: clear opening for 5 x 5 m

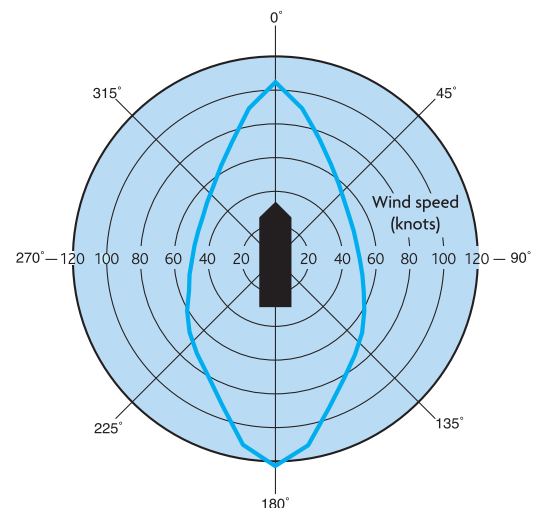
- (16'4" sq) footprint equipment with 770 Te swl holding capacity
- Tower equipped with:
 - 2 stacked quad-track tensioners and centraliser modules, the total traction capacity is 550 Te (2 x 275 Te) dynamic loading. Tensioners to allow clear passage of 1.8m (5'10") diameter pipe attachments.
 - Rigid pipe straightener
 - Top module with crane, winch and crown block

- transfer assembly
- Rigid pipe aligner
- Flexible pipe aligner
- J-Lay system on aft face of the pipe tower
- Hinged at deck level and capable of jacking from 32° (measured from horizontal) to 90°. Rigid pipelay takes place between 60° and 85°, J-Lay 58° to 90° and flexible pipelines generally laid at 90°.
- PLET handling system



DP Footprint

Considered Available Power: 100% Thrusters capacity
 Considered Current: Nil
 Considered Pipelay force: 55 tons horizontal pulling from the stern



Specifications

Principal dimensions

Length Overall	206.5 m (677'6")
Length B.P.	191.8 m (629'3")
Breadth, Moulded	32.0 m (105')
Depth, Moulded	17.8 m (58'5")

Operating draft

Typically	9 m (29'6")
Maximum	10 m (32'9")

Displacement

50,122 Te, at 10 m draft (55,234 short tons)

Gross tonnage

33,791 Te

Pipelaying systems

Operational water depth - 75 to 3,000 m (250 to 8,200 ft)
Rigid Pipe (Reeling) - 4" to 18" O.D. - up to 5,600 Te* (6,170 short tons)
Rigid Pipe (J-Lay) - 4" to 28" O.D. - up to 4,000 Te* (4,400 short tons)
Flexible Pipe - up to 24" O.D. - up to 5,900 Te (6,490 short tons)

* Deadweight and stability restrictions apply for combined loading

Cranage

Crane # 1

Type - Telescopic box boom, ram luffing
Location - Between main reels on centreline forward
Reach and Capacity 12 Te @ 15 m, 8 Te @ 23 m (13.2 short tons @ 49', 8.8 short tons @ 75')

Crane # 2

Type - Telescopic box boom, ram luffing
Location - Starboard side aft of main reels
Reach and Capacity:
30 Te @ 32.75 m (33 short tons @ 107') (harbour use)
30 Te @ 20 m (33 short tons @ 65') (offshore use)
10 Te @ 35 m (11 short tons @ 114') (offshore use)

Crane # 3

Type - Lattice boom, rope luffing with 15 m flying jib and active heave compensation system.
Location - Port side aft of main moonpool
Reach and Capacity:
400 Te @ 18 m (441 short tons @ 59') (harbour condition)
110 Te @ 42.5 m (121 short tons @ 139') (harbour condition)
60 Te @ 55m (66 short tons @ 180') (harbour condition)

Capacities

Fuel	
(including day tanks)	4,172 m ³ (26,228 bbl)
Hydraulic Oil	60 m ³ (377 bbl)
Fresh water	895 m ³ (5,629 bbl)
Technical water	1,444 m ³ (9,082 bbl)
Ballast	19,348 m ³ (121,695 bbl)
Flume tank	1,655 m ³ (10,409 bbl)

Deck services

Deck loading

- Upper deck aft of moonpool
10 Te/m² (14 lb/in²)
- Moonpool covers 3 Te/m² (4 lb/in²)
- Rest of upper deck 5 Te/m² (7 lb/in²)
- Free deck area (aft of moonpool)
Approx. 690 m² (7,400 sq.ft)

DP system

(Dynpos AUTR - Class II)

A Kongsberg Simrad SDP22 dual redundant dynamic positioning system is fitted. Reference systems provided include the following:
3 x Robertson RGC11 gyro compasses
1 x MRU 5 vertical reference unit
2 x MRU 2 vertical reference units
3 x DEIF879 wind sensors
3 x Sercel DGPS and 2 x C.NAV DGPS
2 x Hydro-acoustic systems (HIPAP)
1 x KS mark 8 light weight taut wire (300 m max)
ERN 99,99,99
1 x fan beam

Power plant

Total installed normal power
33.6 MW at 6.6 kV (45,000 hp)
Emergency power 1 MW at 440V
Transit thrust power
11 MW (2 thrusters in use)
14 MW (3 thrusters in use)
DP thrust power
25.6 MW (8 thrusters in use)

Propulsion

Vessel is equipped with eight (8) thrusters as follows:

- 2 x 5.5 MW (7,000 hp) KaMeWa type UUC 7001 non-retracting azimuthing thrusters aft for propulsion and DP (each unit has thrust of 87 Te in bollard condition).
- 1 x 3 MW (4,000 hp) KaMeWa type UL 4001 retractable azimuthing thruster aft for propulsion and DP.
- 3 x 3 MW (4,000 hp) KaMeWa type UL 4001 retractable azimuthing thrusters forward below keel for DP (each unit has thrust of 49 Te in bollard condition).
- 2 x 1.3 MW (1,740 hp) KaMeWa type TT2200-BMS-CP tunnel thrusters in the bow used for DP and maneuvering.

All azimuthing thrusters have a fixed pitch propeller (FPP) and variable speed. The tunnel thrusters have a controllable pitch propeller (CPP) and fixed speed.

Endurance (& Fuel Consumption)

Transit	56 days (70 m ³ /day)
DP operations	115 days (34 m ³ /day)
Standby conditions	90 days (>5 Te/d)

Transit speed

10 knots

Helideck

Sikorsky S61N type helicopters

Accommodation

Hotel accommodation is provided for a total complement of 160 persons, comprising:

4 x Executive, single occupancy cabins
18 x Single person cabins
59 x 2-person cabins
6 x 4-person cabins

Lifesaving appliances

4 x 80 man TEMPSC located two port and two starboard of accommodation. Inflatable life rafts are installed on upper deck with 100% POB capacity port and starboard.

Flag

Bahamas

Call sign

C6RM8

Classification

+ 1A1 DYNPOS-AUTR, EO, ICS, ISM, SBM, HELDK

Year built / builder

2001 / Hyundai Mipo Dockyard, Korea

Owners

Technip



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