
**Meeting operational
challenges for offshore
accommodation and
support vessels**

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Accommodation & Support vessel (ASV): Pushing the boundaries for offshore accommodation

Accommodation and Support roles

- Market approach
 - Healthy demand for accommodation
 - Accommodation & Support: Industry standards?
 - Pioneer ideas based on customer interviews
- Pushing the boundaries for new design
 - Design & investment choices for Dan Swift

Demand drivers for Accommodation and Support

- Deep water development
- Maintenance and repair
- FPSO delays
- Flexibility

Geographical focus – potential areas for deployment



Typical client criteria

- Station keeping
- Gangway uptime
- Passenger comfort
- Crane capability, versatile work areas
- Flexibility

Outline Specification of Dan Swift

Total Number of Berths	291 pax
Berths Available to Charterers	256 pax
Station Keeping	DP2
Gangways	2 x Telescopic Gangways
Main Crane	100T AHC Knuckle Boom Crane
Deck Area	About 600 sq.m
Workshops	About 350 sq.m

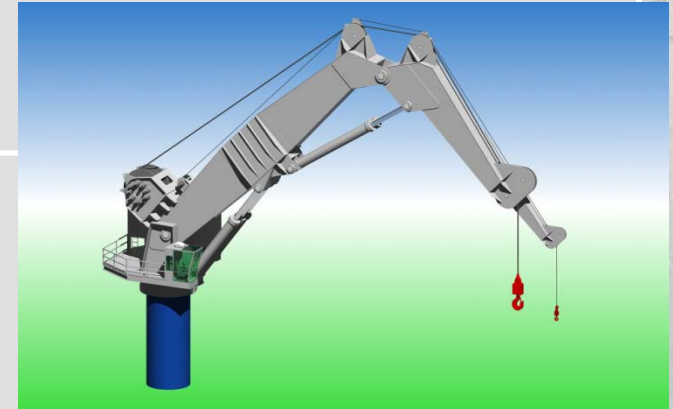
Dan Swift

DP2 Multi-Purpose Offshore Support Vessel



Operational Roles for Dan Swift

- Offshore accommodation and support for:
 - Platform Maintenance, Repair and Upgrade
 - Hook-up, Commissioning and Start-up
 - Decommissioning
- Can also perform:
 - Light construction works and subsea operations
 - Crane operations
 - Fast mobilisation and evacuation for emergency or hurricane contingencies



Dan Swift - Project start

- Conversion of a ex. Ro/Ro / cable layer, (ex Kraka)
- Basic design prepared prior to conversion contract
- Owners Furnished Equipment (OFE) secured ahead of shipyard contract

Dan Swift - Project start

- Shipyard contract with Blohm + Voss for completion in 2nd Quarter 2009
- Shipyard undertook detailed engineering during the conversion project



Project start - Owners Furnished Equipment (OFE):

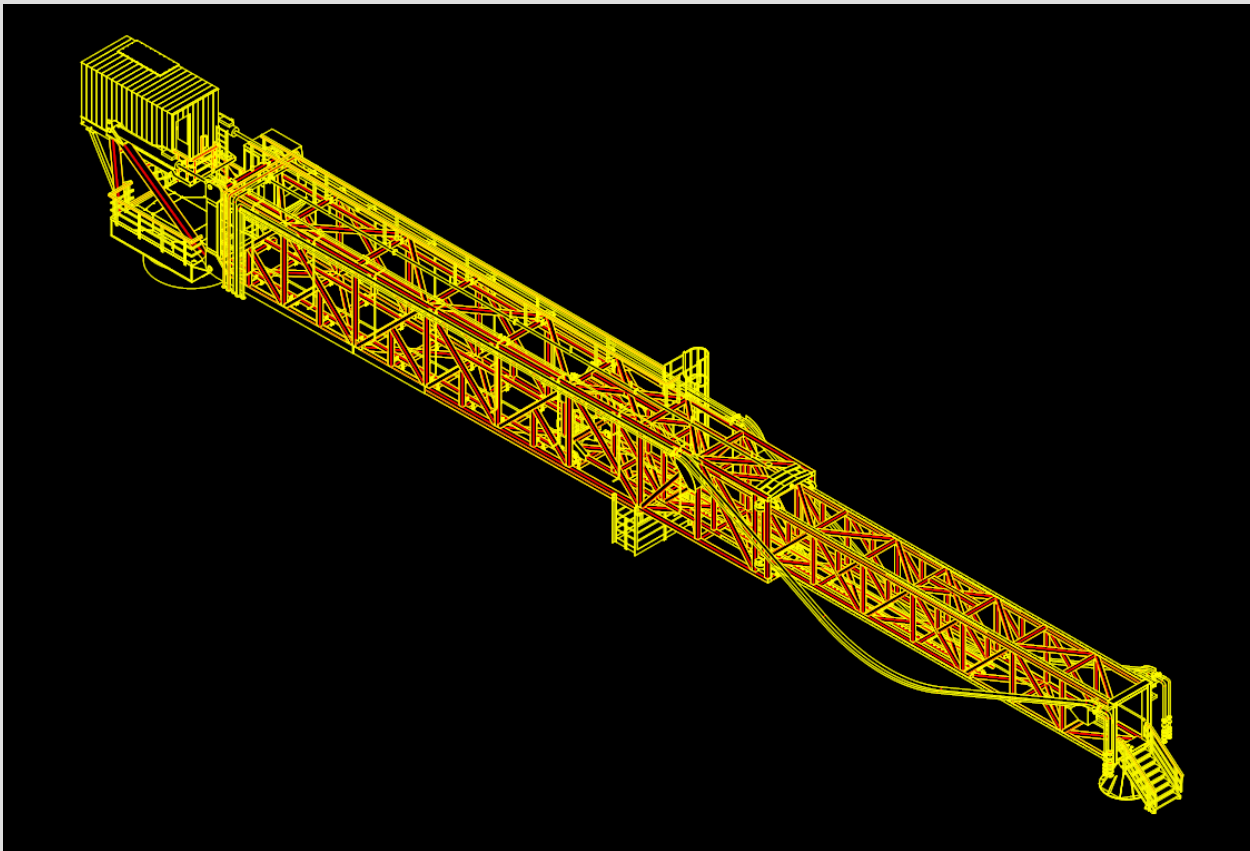
- Azimuth thrusters
- DP system
- Tank stabilizing system (anti-heeling)
- 100 ton active heave compensated knuckleboom crane
- Gangways

Gangways

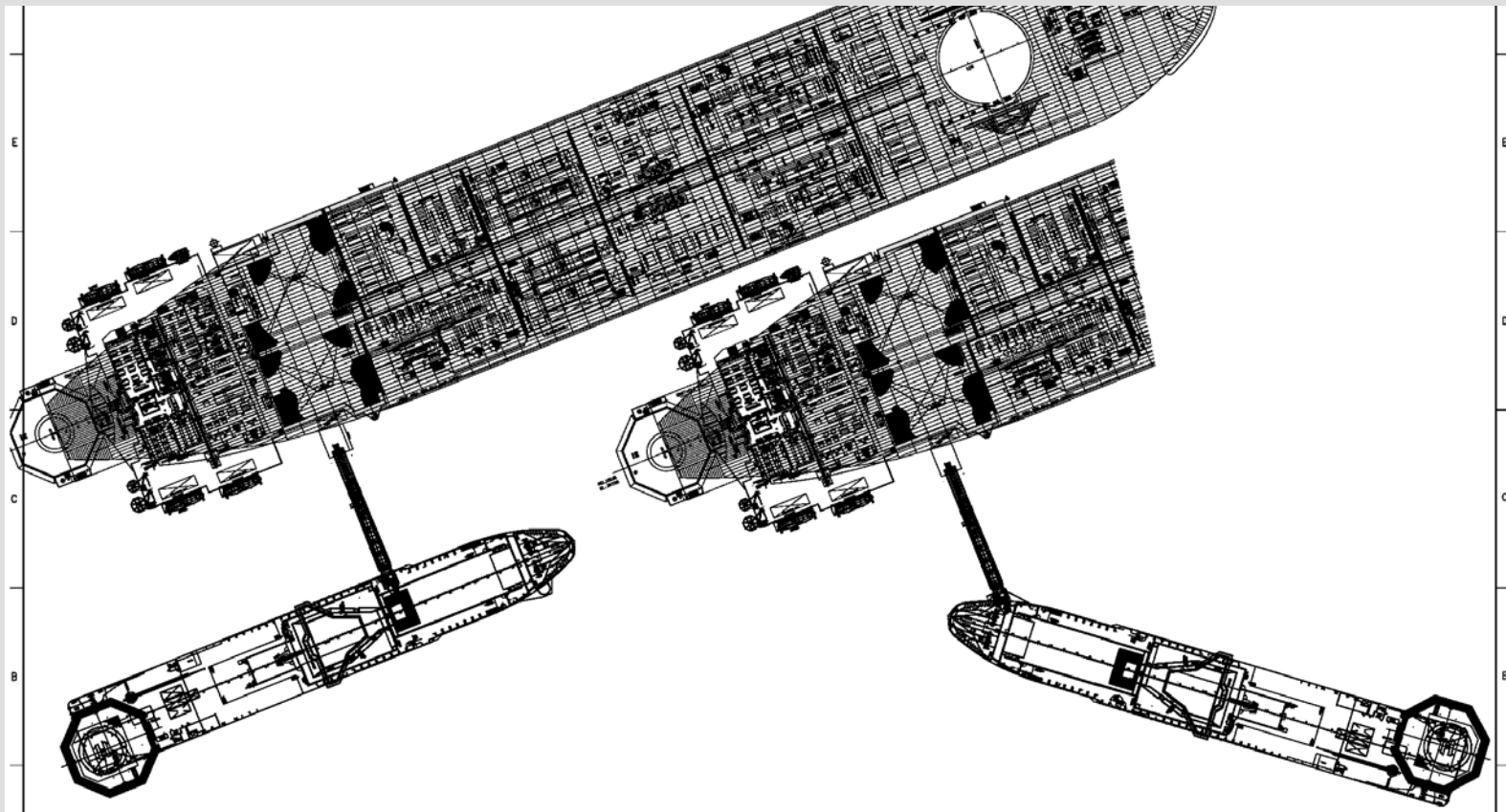
- Telescopic gangway
- Selected supplier: Marine Aluminium
- 2 gangways – flexible connections
- 38,5 meters + 8 meters stroke – the longest gangway ever produced by Marine Aluminium
- Quick connection and fast abortion



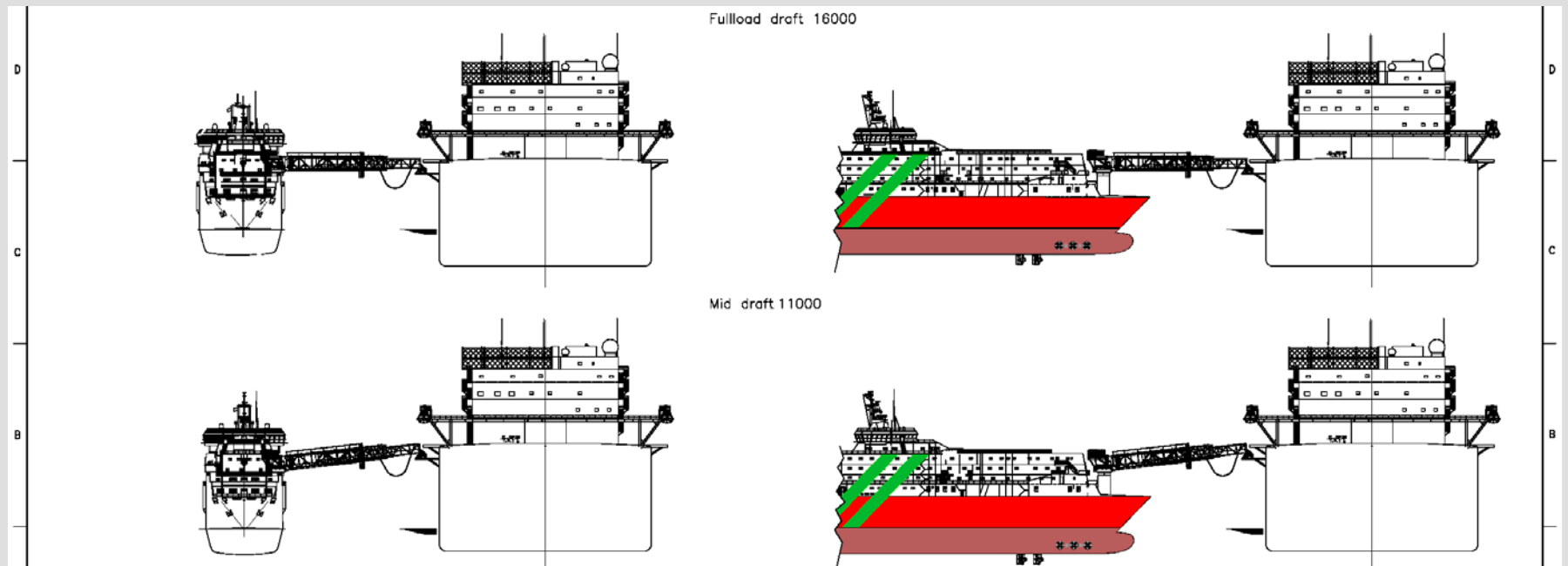
Gangways



Key Features – Two Gangways



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- Two gangways for the transfer of personnel in all environmental situations.
 - One gangway positioned on the bow
 - One gangway situated in the mid ship area on port side
- This provides complete flexibility and redundancy compared to other single gangway accommodation vessels:
 1. Optional vessel positioning to suit all weather conditions
 2. Ability to facilitate rapid evacuation in emergency situation
 3. Gangways can be connected to platform and crew boat simultaneously.
 4. Redundancy – spare gangway should one be damaged or under maintenance

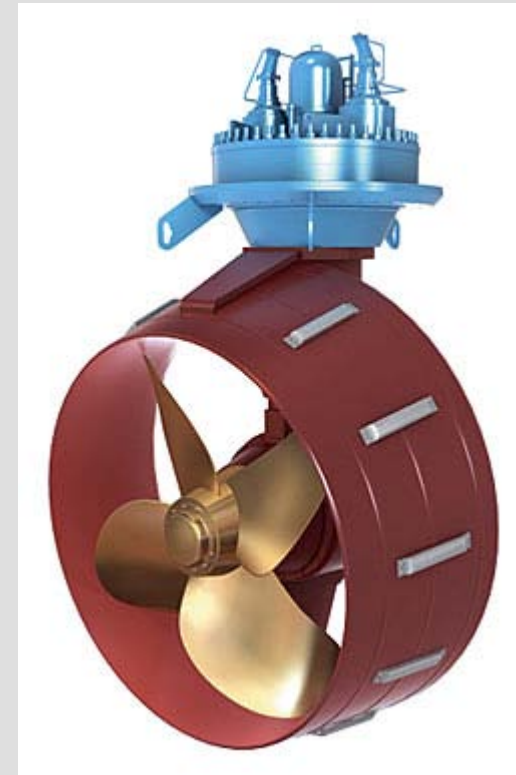
Power and Thrusters

- **Power**

- Total installed power: 15000 kW on 5 generators

- **Thrusters**

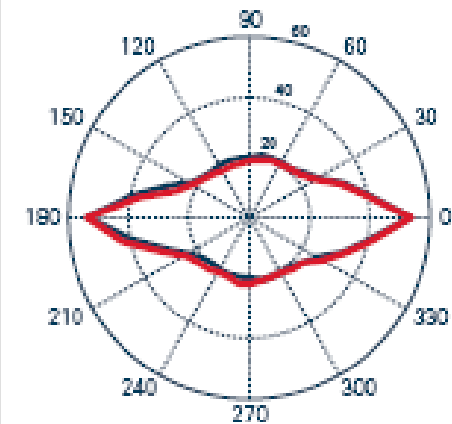
- 5 Azimuth thrusters (between 1200 and 2000 kW)
- 3 Tunnel thrusters (1200 kW)



Key Features - DP System

- DP2 Class
- All DP equipment is new - Kongsberg
- 2 (two) totally independent engine rooms
- ERN: (99,99,87)

DP capability with 5 azimuth thrusters and 3 bow thrusters



— Current head on
— Current 30 deg from bow
(Current 1,1 m/s)

Project start - Model Tests

- Extensive model tests were carried out at the Marin Institute, Holland in January 2007.
- Model scale 1:33, adjacent to turret moored FPSO at 200 meters water depth.
- Tests carried out in medium environments (Scatter diagram Campos Basin, Brazil)
 - Wind m/sec. 15
 - Wave height, significant H_s 3.5 m.
 - Wave period, peak swell T_p 12.8 sec.
 - Wave period, peak wind T_p 9.0 sec.
 - Current m/sec. 1.1



Model Test Results - General

- The vessel is overpowered. Very similar DP behaviour can be obtained by using azimuth thrusters with approximately 50% less thrust.
- The thruster failures were modelled with either 3 azimuth thrusters failing or 2 azimuth thrusters and the bow thrusters failing. In both cases the DP behaviour of the vessel was still acceptable.
- The vessel responds very well to wind squalls and could easily follow the squall induced yaw motions of the FPSO and withstand the high wind forces.

Model Test Results - Gangway Uptime

The Marin tank tests show that the gangway uptime is high – based on Campos Basin scatter diagram:

- Gangway uptime (when connected) close to **95 percent** of the time
- Ability to connect in more than **82 percent** of the time

Model Test Results – Risk Studies

- With strong station keeping, collision risks are reduced
- The gangway solutions and the fast abortion time can enable the vessel to move quickly under emergencies, such as gas leakages or fire
- Operational safeguards & new equipment

Model Test Results - Passenger Comfort

- Comprehensive study on passenger comfort performed by Marin Institute, Holland
- 'Motion Illness Rating' (MIR)
- **Probability is 99,6% that the crew will feel no worse than MIR 25**
- Rolls Royce 'Intering Tank Stabilization System':
 - Can reduce roll motions by up to 40%.
 - Will further improve gangway uptime.

ASV Dan Swift – Passenger Comfort

High standard recreational areas



Conclusions – ASV Dan Swift

- The concept is fully model tested at Marin Institute to confirm
 - Strong station keeping
 - Gangway uptime
 - Passenger comfort
- Flexibility: DP solution designed for both fixed structures and floating units such as FPSO's
- Two gangways to maximise flexibility (fast connection / abortion)
- Versatile work areas (external and internal) & 100T crane capacity with active heave compensation
- High standard of accommodation