The Dalian Developer – A new approach to oil spill response

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- Introduction to the Dalian Developer (DD) drillship
- The challenges of oil spill response
- The DD solution
- Conclusions
DD Introduction

- Will be the World’s largest drillship when completed early next year
- Motion characteristics equivalent to or better than 6th generation semi in head seas.
- Double hull structure built to DNV ICE class C.
- Identical bow and stern sections for +/- 90° heading change.
- 2 moon-pools (one for drilling, second for subsea work and production).
- Equipment / systems modularized and elevated above tank top – less integration.
- Accommodation upgradable to 240 men.
- Large available deck space (5000sqm) for Extended Well Testing (EWT), Early Production System (EPS) and spill containment equipment.
- Large storage capacity – 1million bbls - for oil, methanol & chemical dispersants, etc.

General Particulars:
- Basic Design: INOCEAN
- Detailed Design: COSCO
- Class: DNV – DP3
- LOA: 291.25 m
- Breadth: 50.00 m
- Depth: 27.00 m
- Drilling Draft: 13.00 m
- Displacement: 240,750 mt
- Water Depth: 3,050 m
- Drilling Depth: 10,670 m
- Transit Speed: 12 knots
- Accommodation: 180 men
- Crude Oil Storage: 1,000,000 bbls
- Variable Deck Load: 32,000 mt
Challenges of oil spill response – many vessels

- Availability
- Response time

Macondo scheme

Challenges due to many vessels:
- Coordination
- Splitting of flow
Opportunity to replace multiple vessels with one main vessel

Macondo oil capture scheme

DD scheme
(Compatible with current Subsea capture & Containment Systems)
Each deepwater basin in the World will require a contingency plan for oil spill response. The Dalian Developer offers an economically viable solution which could lead to the deployment of multiple units across the World’s main offshore deepwater basins.
DD EWT and Oil Capture Philosophy

- Provide an Oil Capture facility that is also an EWT system

Oil Capture facility sized for:
- 100,000bpd total fluids
  - 100k Oil or 70k Oil + 30k water
- 200mmcfd gas flaring
- *All safety spec compliant

EWT sized for:
- 30,000bpd Oil, 30% WC
- Heavy Oil Capable to 17API
- All export spec compliant

* Export crude may exceed salt specs
DD EWT and Oil Capture Process Scheme
DD EWT and Oil Capture Process Scheme

- Two stages of separation plus electrostatic coalescer
- Heat recovery to minimise heat input
- Crude washing in EWT mode to meet salt specs (if required)
- Produced water treatment by hydrocyclones and compact degasser / floatation unit
- Product oil spec in EWT mode:
  - BS&W < 0.5%vol
  - Salt ≤ 10ptb
  - RVP < 12psia
- Produced water overboard spec: 20-30 mg/l (in both EWT and Oil Capture modes)
Process module layout

Production Module Upper Level

Production Module Lower Level

Production Module Elevation
(also showing flare tower and offloading hose-reel)
DD EWT and Oil Capture - Utilities

The following utility systems are provided topside to support the process facilities:

- Gas and Fire Detection and Fighting system
- Methanol pumping / injection
- Flare System (Flare stack height: 50m plus water screen):
  - 1 MP Flare system
  - 1 LP Flare system
  - Flare ignition package

The following utility systems are provided by the vessel to support the process facilities:

- Electrical Power for heating and pumps (main power system rated at 58MW)
- Compressed air for instrumentation and controls / hand tools
- Seawater for process cooling (direct SW only) and deck washdown
- Firewater for deluge / monitor coverage of process facilities
- Fresh water for desalting and chemical dilution
- Potable water for safety showers and eyewashes
DD EWT and Oil Capture – Vessel Systems

- Oil Cargo Tanks and associated cargo pumps
- Rundown header for tank filling
- Pump discharge piping with COW (crude oil wash)
- Tank heating (2x 100% thermal boilers plus tank coils)
- Tank vent system - incl Inert Gas Generator & P/V valves
- Offloading System – incl metering (ultrasonic) and offloading hose
- Slop oil system (two dedicated tanks with associated piping / OIW monitoring)
- Firewater / Foam system for deck coverage (above oil storage tanks)
- Methanol and Dispersant bulk storage
Dalian Developer Layout

- Flare tower
- Process package
- Offloading hose
Summary of DD attributes - general

- Ultra-deepwater, 6th generation, DP3 drillship
- Oil Spill Emergency Response & Containment
  - Capture, process and store well flow
  - Drilling relief wells
  - Emergency subsea intervention
  - Mother-ship / command-center
- Warehouse Logistics Offshore Hub
  - Lower dependence on supply chain
  - Serve multiple vessels in remote offshore areas
- Extended Well Testing with more reliable reservoir data / history
- Early production achieving early cash flow
- Simultaneously drilling & production:
  - Drilling appraisal wells while testing
  - Drilling development wells while producing
- Intervention & Subsea installation works
- Dual gradient drilling & underbalanced drilling

### E&P Activities

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<th>Dalian Developer</th>
<th>Drill Ship</th>
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Summary of DD attributes for oil capture

- A unique concept: the DD is the only mobile drilling unit in the world large enough to capture, process & store oil spills in excess of Macondo’s flowrate
- Safe, simple & reliable: this single asset solution means reduced interface complexity (operations / logistics / communications / procedures / flow splitting issues) compared with the multi-asset system used for Macondo
- Only tried & tested systems and technologies are used on the DD
- Rapid response time: limited time needed to disengage from active drilling and transit distance to spill site. The unit has a 12 knot transit speed
- Suitable as emergency operations hub or command centre: thanks to her size and excess capacities (storage / accommodation / power)
- High weather resistance: the DD’s hull size, motion characteristics and full DP3 system enable her to operate safely even under harsh weather conditions in virtually all major drilling basins worldwide
Summary of DD attributes for oil capture

- The production system is permanently installed and requires no mobilization / commissioning – hence response time is significantly reduced
- Since the system is regularly used for well testing there will be more confidence in it performing its oil capture duty when required
- On board storage of bulk methanol and dispersant chemical simplifies logistics and avoids the need for subsea storage and injection packages
- Superior economics: as a fully functioning drillship with Early Well Testing / Early Production System capabilities, her earnings capabilities in normal mode should ensure an attractive return on total investment
- The unit is under construction: it can therefore be ready for deployment much sooner than a newbuild unit
Current status of DD
Conclusion

- The DD is ideal to act as an EWT and Oil Capture capable vessel
- The EWT system has been optimally designed to minimise the cost of the Oil Capture capability
- Technip has the capability to design and deliver the complete EWT and Oil Capture system
- Technip is involved in both MWCS and Total WA initiatives
Thank you

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