"I'm proud to work with GlobalSantaFe and the men and women on Team DDI. We've overcome a number of significant challenges and worked together to build a culture of 'Performance Through Safety.' These efforts are paying off — we just finished drilling a GOM ultra-deepwater record well in 1.50 days/1,000 ft, less than 10 months after rig start-up."

— Steve Nowe, BHP Billiton Neptune Wells team leader, 12 April 2007

Building on success — the evolution of the Development Driller class semisubmersibles

By Barry Braniff, GlobalSantaFe

COMPLEX DEEPWATER developments require efficient deepwater drilling, completion and subsea construction capable vessels. **GlobalSantaFe**'s 2 existing 5th-generation deepwater Development Driller class semisubmersibles, the GSF Development Driller I and GSF Development Driller II ("DDI" and "DDII," respectively) have proven they possess the online and offline capabilities to realize this requirement.

During the construction phase of both vessels, GSF worked closely with the respective clients to realize additional modifications and enhancements, which transformed an already capable design into a vessel capable of meeting our client's exact needs for deepwater development and associated subsea construction. Lessons learned, enhancements and modifications as a result of these first 2 vessels have fueled the design evolution of the 3rd Development Driller class unit currently under construction in Singapore.

The way in which these rigs have been used to date has been somewhat different. The DDII commenced operation in November 2005 and has been drilling and completing wells that were previously batch set. During associated well testing operations, several wells were flowed back to a barge moored to the DDII, a first for this particular client in the Gulf of Mexico. In comparison, the DDI, which commenced operations in June 2006, started off with an extensive top-hole batch setting campaign before commencing to drill these wells to TD.

Both rigs have also been heavily involved with subsea construction activities. This has especially been the case with the DDII, due in part to the relatively close proximity of the wells on the subsea development. Using both the auxiliary load path and an anchor winch modified to act as a high-capacity deep-reach subsea winch, the DDII has been employed running the majority of the subsea equipment required for the development. Subsea construction activities have included the deployment of trees, manifolds, flowline jumpers, electrical and hydraulic flying leads, and rig transponders, not to mention a multitude of ROV tooling runs. It is worth highlighting that this subsea winch has also been used for remotely initiating flowlines. This innovation results in significant time savings by removing the requirement to disconnect and move off location whilst a heavy lift barge installs the Pipeline End

GlobalSantaFe's Development Driller class units were designed for complex deepwater developments. The Development Driller II, seen above, commenced operation in November 2005 and has been drilling and completing wells that were previously batch set.

Termination (PLET) and initiates the flowline lay away.

In addition to subsea construction, online operations on both rigs have been interlaced with a multitude of other offline activities. Trees and manifolds have been staged, prepared and tested offline on the dedicated subsea equipment skidding system. Almost all of the required tubulars have been assembled and tested offline on the auxiliary rotary. In addition, offline operations are further supported on the DDII by the inclusion of a bucking machine between the 2 catwalks. On the DDI, the auxiliary rotary has been used to operate in full dual-activity mode with casing strings being run offline to the seabed while drilling ahead on the main rotary. Both rigs have also assembled trebles of casing offline in support of online casing running operations on the main well center. This operation requires meticulous cooperation between both well centers and the personnel on deck.

Client feedback on rig performance, both from a safety and operations standpoint, is always at the forefront. This was especially evident on the DDII, which recently achieved 1 million man-hours of operations for **BP** without a DAFWC (Days Away From Work Case), and on the DDI, which recently finished a Gulf of Mexico ultra-deepwater record well for **BHP Billiton**, drilled at a rate of 1.5 days/1,000 ft.

GLOBALSANTAFE DEVELOPMENT DRILLER III

Building on the successes of the DDI and DDII, construction began on the GSF Development Driller III in July 2006 with delivery expected from the shipyard in late March 2009. With regards to operational performance, the DDIII has had the bar set high by the DDI and DDII but has also benefited from being able to implement lessons learned during their construction and initial operation.

The DDIII is a 6th-generation semisubmersible whose hull is a larger KFELS DSS51 design in comparison with the F&G ExD hull used with DDI and DDII. It also is equipped to operate in moderate environments in water depths of 7,500 ft and has a total rated drilling depth of 30,000 ft below mud line. As is the case for DDI and DDII, the DDIII can be upgraded for 10,000 ft water depth). Total rig power has been increased from 28.8MW to 38.4MW and thruster output from 25.6MW to 32.2MW.

The Development Driller III builds on the successes of the DDI and DDII and incorporates previous lessons learned. It is scheduled to be delivered in late March 2009.

Human factors engineering has been at the forefront of the DDIII design, with significant effort having been applied to maximize the quality of life aboard the vessel and streamline the work flow process. This is evident when considering the accommodations. POB has been increased to 200, with considerable time and effort having been spent on the layout of the 6-level accommodations. A

"The GOM Atlantis Wells Team would like to announce the achievement of a significant safety milestone. Today the GlobalSantaFe Development Driller II deepwater semisubmersible successfully completed its first one-million man-hours of operations with BP without a DAFWC (Days Away From Work Case) injury. There were excellent levels of communication and teamwork between BP and GSF throughout with a desire to continually improve. The successful development of a 'One Team' concept provided the linkages/interdependency necessary for the multiple successes without a DAFWC. Significant SIMOPS between multiple large dynamically positioned vessels were all carried out safely and successfully due to extensive pre-planning and commitment from offshore personnel."

Jon Sprague, BP Atlantis wells delivery manager, 8 April 2007

120-man cinema is included, in addition to numerous meeting rooms, an Internet room and one entire floor of administrative offices. The bridge has been relocated above the accommodations with the heli-deck located in the port forward corner. The internal layout of the deckbox has been greatly simplified, with a horseshoe-shaped walkway arrangement allowing ready access to all areas below main deck

The mud processing system, which has been moved aft to maximize separation from the accommodations, is a fully dual mud system with separate flowlines from the diverter housing to the shaker house and separate flowlines from the shaker house to the mud pits routed to completely separate completion brine and mud pits. The active mud system consists of 8 dedicated mud pits (5,300 bbls) and 8 dedicated brine pits (an additional 5,300 bbls). There are also a further 5 pill/mix pits at 240 bbls each. Bulk mud and bulk cement capacity has been increased to 24,000 cu ft of each. The fuel oil capacity has also been increased to 27,000 bbls from 20,000 bbls.

Continuing with the work flow process theme, the usable deck space has been increased from 19,000 sq ft to 26,600 sq ft. This is due to:

- The larger hull.
- More efficient placement or removal of fan and vent houses on the main deck.
- The bulk tanks have been moved into the columns.
- The area between the main and auxiliary catwalk has been decked in to provide an additional raised pipe deck.
- The bulk loading pipework is routed directly into the deck box below the main deck level.

The DDIII is also DP2 enhanced, but the mooring system differs considerably in that the rig will be delivered with an 8-point pre-set mooring system, which can be upgraded to a 16-point system in order to satisfy MMS requirements for a 100- year hurricane. This was based on recent client preferences for operating in DP mode; especially over extensive subsea developments where the ability to move quickly and efficiently between wells is advantageous, in addition to potentially being able to move off location to allow pipeline installation and

Crew members run the BHA on the main well center of a Development Driller unit. On the DDI, the auxiliary rotary has been used to operate in full dual-activity mode with casing strings being run offline to the seabed while drilling ahead on the main rotary. Both DDI and DDII have assembled trebles of casing offline in support of online casing running operations on the main well center.

subsea construction. In addition to maximizing available deck space, removing the requirement for take-up reels has enabled the bulk storage capacity to be increased and to be located in the columns.

The drilling equipment is largely unchanged, with 2 fully redundant load paths complete with active heave draw works, automated pipe-handling systems, 3 million-lb derrick and a 2 million-lb setback capacity. Enhancements and lessons learned from the DDI and DDII have, however, been incorporated. Notable enhancements on the drillfloor include:

• The local equipment room has been relocated below main deck. This additional space has allowed the main drillers cabin to be moved further to starboard increased the clearance at the V-door in addition to providing a dedicated drilling tool service area on the rigfloor.

• The drillfloor has been extended 2 m on the port side, allowing more efficient access with the iron roughneck to the auxiliary well center.

• The drive motors on the pipe-handling system have been changed from hydraulic to electric drives.

• The drilling control system has been replaced with a Cyber base drilling control system.

The moonpool area has been redesigned to provide easier access to the riser tensioners. The riser tensioners are now located behind the moonpool bulkhead and thus more protected from the environment. In addition, the moonpool work baskets have been located on the tween deck towards the base of the moonpool, thus maximizing their functionality and minimizing the requirement for man-riding for routine operations.

SUMMARY

The DDIII is being purpose-built for a major operator, and early engagement between GlobalSantaFe and our client was seen as essential. This ground floor engagement has helped ensure that third-party equipment will be more efficiently integrated into the design and has enabled a one-team approach aimed at maximizing the capabilities of the rig.

While it is too early to review in detail, it is worth noting that with regards to additional offline operations, it is envisaged that the GSF Development Driller III will have capabilities that build on the offline successes of the DDI and DDII.

By building on the performance of the DDI and DDII, the GSF Development Driller III will take this class of vessel to the next level. The goal of the DDIII is to provide a safe and ultra-efficient deepwater development semisubmersible capable of meeting our client's demands for deepwater drilling, completion and subsea construction activities.

The riser gantry crane is used to transfer tubulars between the rig floor and the riser setback area, which can accommodate 100 joints of 75 ft riser stored vertically.

The Development Driller units' main catwalk has dedicated riser carts for transporting riser joints to and from the rig floor.

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