

Dual activity drilling turns in 20-40% time savings

IN A LITTLE OVER A YEAR of operation, the **Transocean Sedco Forex** drillship *Discoverer Enterprise* proved the efficiency of dual-activity drilling with up to 20% time savings on exploration wells and up to 40% on development wells.

It is indeed a success for Transocean Sedco Forex, creator of the concept, and for **BP**, the operator. But it's also a triumph in technology for the drilling industry.

The dual-activity drilling concept was born in the fall of 1995. Transocean Sedco Forex engineers and operations personnel envisioned a rig with 2 complete drilling systems, including separate drawworks, top drives and pipe-handling systems.

It would allow drilling to be conducted while running equipment at the same time rather than sequentially, creating a more efficient operation.

"We set out to develop a concept that would allow for simultaneous operations, reduce the critical path and save money for the operator, and that's what we're doing," said **Steve Woelfel**, Drilling Engineer for the *Discoverer Enterprise*.

"Dual activity has driven a step change in drilling operations."

From December 1999 to January of this year, Transocean Sedco Forex estimates that *Enterprise* performance has resulted in productive time savings of 32 days on four BP projects, including an impressive 40% time savings on batch work and the achievement of a Gulf of Mexico drilling depth record.

"Considering that operators make more money the faster fields are brought on line, the dual-activity process is receiving a lot of attention," Mr Woelfel points out.

"I am very pleased and excited with the (time-saving) performance," said **Curtis Jackson**, Wells Manager, Drilling and Completions for BP's Deepwater Production Business Unit in the Gulf of Mexico.

"What has surprised me is we have yet to realize the full potential of this vessel. BP and TSF are learning more



Transocean Sedco Forex drillship *Discoverer Enterprise* has 20-40% time savings using dual activity concept.

every day about how we can take advantage of this potential."

RECORD PERFORMANCE

The drillship has shown its versatility in several different types of projects. In its first assignment, the *Enterprise* plugged and abandoned BP's Neptune well in 8 days instead of an estimated 12 it would have taken using a single activity rig.

Moving on to the Crazy Horse field, the *Enterprise* reached a total depth record for the Gulf of Mexico at 29,100 ft on November 30, 2000.

Dual activity cut 16 days off the duration

of this exploration well compared to single activity performance. "The bulk of the time savings came in the first few hole sections when activity was riserless and we could use both rotaries to the full extent," Mr Woelfel said.

The Gulf of Mexico record stood only 4 days when another offshore driller reached 29,400 ft, but the *Enterprise* crew still relishes the accomplishment.

"Achieving the record really pumped us up," Mr Woelfel said. The Transocean Marianas brought the record back to Transocean Sedco Forex with a total depth of 29,750 ft.

Also during the Crazy Horse well project, the *Enterprise* was able to conduct tree running and testing operations aft while drilling forward.

The testing, which was conducted in more than 6,000 ft of water, saved several days of potential downtime by allowing problems to be identified and fixed off the critical path.

Earlier this year, the drillship also established new "Best-in-Class" performance benchmarks for batch setting and well development work in the King's Peak field.

"We batch set 4 wells in 10 productive days with the wells ranging in water depth from 3,400 to 6,400 ft. This type of performance is unheard of," Mr Woelfel said.

"Dual activity is perfect for this type of project because of the high percentage

Dual activity productive time analysis

Well	Dual activity days	Est single activity days	Days saved	Dual activity time savings
Neptune P&A (6,117 ft water depth)	8.0	12.0	4.0	33%
Crazy Horse No 2 exploration well (6,300 ft water depth)	121.0	137.2	16.2	12%
King/King's Peak batch work (3 wells, 36-in./38-in./20-in. MH)	8.2	13.8	5.6	40%
King's Peak No 2 development well (6,390 ft water depth)	15.0	22.0	7.0	32%
Work performed to 01/06/01	152.2	185.0	32.8	18%

of combined aft and forward rotary utility during batch setting, which is a riserless operation. In the future, we also envision batch setting while drilling through riser on the forward rotary.”

An interesting look back at the advancements in drilling from 1992 when the King’s Peak field was discovered, shows that then, it took 100 days to reach 10,000 ft below mudline.

In 2001, it took the Enterprise only 25 days to reach that same level on the field’s No. 2 well and only 15 days on the No. 3 well.

In February, the Enterprise perforated and frac packed BP’s Nile development well. The produced fluids were stored in the rig’s crude oil storage facilities.

“We are learning on every project how we can take advantage of the Enterprise to improve performance to ‘Beyond the Best’,” Mr Jackson adds.

Mr Woelfel said pre-planning wells is critically important to achieving efficient results with dual activity.

Mr Jackson agrees. “Planning for dual activity is essential to achieve zero injuries and maximum performance. Planning must be conducted jointly by BP and TSF to achieve maximum benefit. We must work as a team, in the office and on the rig, and be totally aligned in achieving the objectives of the project.”

SUCCESS THE ONLY OPTION

The seas of success were choppy at first for the Enterprise with a wave of equipment failures, but the determination of Transocean Sedco Forex employees pulled the drillship through.

“We’re excellent at making equipment work,” said **Andy Cates**, Corporate Subsea Manager, Transocean Sedco Forex.

“There was never any doubt that we would make the dual activity concept a reality.”

“One of the new technologies for us on the Enterprise was the use of computer touchscreens and joysticks to control all drilling equipment as opposed to the more standard discrete controls,” Mr Woelfel said.

“Going into it, many of us were concerned about the potential for computer-related problems, but as it turns out,

during 2000, we only had 3.5 hours of downtime directly related to computer touchscreens.”

The challenges primarily centered on the BOP hydraulic system, which was somewhat of a surprise to the Enterprise team.

“Higher operating pressures, larger hydraulic operators and faster closing

times resulted in an operating environment that was more severe than we anticipated,” Mr Woelfel said.

The challenges with hydraulics were among more than 150 documented lessons learned as the Enterprise went through sea trials. The lessons have helped make adjustments on Transocean sister ships Discoverer Spirit and Discoverer Deep Seas.

ACTING ON LESSONS LEARNED

The lessons learned will also benefit the industry. Based on a BOP Assurance Study conducted by Transocean Sedco Forex last summer, recommendations have been made not only to improve the subsea business at the company, but throughout the industry as well.

"The industry needs to fully understand the dynamic conditions and forces that are exerted on deepwater components," Mr Cates said.

For example, the study can help lead to improvements in a hydraulic hose or hydraulic system modification and more thorough lab testing to more accurately simulate deepwater conditions.

The study recommends that BOP component design and testing be included as part of an overall joint industry effort to improve the reliability of all deepwater BOP systems.

As Mr Cates notes in the study, "We could start with a framing session that

includes representatives from deepwater operators, drilling contractors and manufacturers.

"The objective of this session would be to develop a plan forward for improving the reliability of deepwater BOP systems through more realistic testing.

"Transocean Sedco Forex has made a commitment to make improvements at our company. We are developing a quality-based system for managing our subsea business. Our goal is to have all our rigs focused on doing things the same way with the same objectives, exchanging information and acting upon lessons learned."

But becoming a learning organization goes beyond sharing information, Mr Cates said.

"You have to discover what you really learned by developing action items. You need to be willing to make changes in training, maintenance procedures and design of equipment.

"And it needs to go across the fleet, not

just to one rig. Dual activity-class rigs offer a lot of potential to improve the operators' field development.

"The potential has just begun to scratch the surface. My team's focus is to make sure the potential is realized safely and reliably," Mr Cates adds.

"I have been very pleased with the technical expertise of the staff, the relationships established at the team leader level and the commitment of the crew in achieving the goals of the projects, with no injuries and no damage to the environment," Mr Jackson said.

Rig Manager **Larry McMahan** says if the Enterprise were a movie, the credit list would be long.

*Based on an article appearing in the Transocean Sedco Forex company magazine "Offshore Frontiers," and on a presentation by **Earl Shanks, Transocean Offshore Deepwater Drilling Inc.** at IADC Drilling Northern Deepwater, Stavanger, 31 May-1 June, 2001.* ■