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## Advancing the Learning Curve in Drilling With Casing Technology

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### Abstract

Drilling with Casing is a fast growing technology generated by a driver to optimize cost and time in tophole wellbore construction. In this South China Sea application neither was optimized although the potential for both is patently evident. The operation took place on a 16-slot platform where 20-inch conductor casing had been set and 50 meters of 17-1/2" hole had been drilled in preparation for the DwC operations. Just over 803 meters was drilled with the DwC before the hard formation slowed the ROP to less than 2 meters/hour. Although this was not the longest section drilled with this patent pending technology, a total of almost 409 meters was achieved which is significant in the hard formation environment in which this technology was applied. This run represents a record in that this is the deepest 13-3/8" DwC to date. There were many lessons learned in this application and when applied in subsequent 2006 operations, both time and cost are expected to be significantly optimized and it is anticipated that this method of tophole wellbore construction will become the norm rather than the exception.

### Background

The drivers for drilling with casing (World Oil, Oct. 1999 Tarr and Sukup<sup>1</sup>) haven't really changed as reported in a 1998 study, that is:

- ◆ Reducing drilling flat time
- ◆ Getting casing to planned depth
- ◆ Getting casing set through troublesome zones (water flows, shear zones, fluid-loss zones)
- ◆ Extending hole sections beyond traditional limits
- ◆ Reducing the starting hole size required by using lean-profile casing schemes

### Additional drivers include

- ◆ Safer operations
- ◆ Reduces or eliminates drill pipe or wireline trip times
- ◆ Monobore geometry with reduced annulus size provides for optimal hole cleaning
- ◆ Reduced pipe handling incidents
- ◆ Reduced tool failures
- ◆ Minimizing on-site inventory such as drill pipe and collars during batch drilling operations
- ◆ Reduced fuel consumption/emissions
- ◆ Reduced pipe stand-back area
- ◆ Provides a near gauge hole for cement volume and bond optimization
- ◆ DwC maintains constant circulation of borehole until cementing
- ◆ Reduces potential requirement of contingency casing
- ◆ Drills straighter holes reducing torque, drag and cleaning problems due to spiraling
- ◆ Reduces formation exposure time and associated drilling problems
- ◆ Concentric borehole quality mitigates stuck pipe
- ◆ Reduces or eliminates well control incidents of drill pipe tripping (swab/surge)
- ◆ Reduces down hole trouble time (fighting lost circulation potential)
- ◆ Mitigate for potential seepage losses
- ◆ Helps prevent and cure lost circulation due to mechanical smearing from cuttings

There is another driver however that cannot be understated, especially in surface hole applications. The rigidity of 13-3/8" casing (and larger) presents an opportunity in harsh anti-collision environments and well architectures requiring deep kick-off points, that lend itself to a verticality driver, that is, less than 1 degree deviation. Tophole drilling with 13-3/8" (and larger) casing provides that necessary rigidity to avoid unexpected dogleg building due to formation changes as well as costs of gyro-controlled tophole vertical drilling systems.

This was the first Drilling with Casing project for this operator. The project was to comprise two back-to-back DwC jobs in a new 6-slot, 6-well drilling program in which the 26"hole/20" conductor and 13-3/8" surface pipe were to be batch-drilled. The vertical 20" conductor had already been installed just prior to the first DwC job.