

LOCATION: GULF OF MEXICO

**BAKER  
HUGHES**  
a GE company



## X-Treme Clean tools and xSight services reduced NPT in deepwater casing exit operation



An operator with a deepwater well in the Gulf of Mexico needed to perform a casing exit with a window depth of 25,803 ft (7,864.8 m) in 9<sup>5</sup>/<sub>8</sub>-in. casing. Before beginning the job, Baker Hughes, a GE company (BHGE), recommended a designated wellbore cleanup run to remove any debris that could interfere with the operation. The customer declined.

At the customer's direction, we ran our **WindowMaster™ G2 whipstock system** and **PathMAKER™ polycrystalline diamond cutter (PDC) window mill** assembly in hole, but the system began taking weight at approximately 1,300 ft (396.2 m) above the target depth. Several attempts resulted in the bottomhole assembly (BHA) reaching a final depth of only 24,661 ft (7,516.7 m), which was 1,142 ft (348.1 m) short of the target depth. The BHA was pulled out of hole when it was clear that no further progress could be made. On inspection, it was discovered that the whipstock, bottom-trip anchor, and whipstock extension had been left in the hole.

The BHGE team reacted quickly and deployed a fixed-lug retrieval tool to fish the whipstock, a downhole sensor to collect BHA data, and **X-Treme Clean™ extreme performance (XP) magnets** to collect debris during the retrieval. To accelerate the fishing operation, the operator agreed to add **xSight™ smart intervention services**, which collect real-time data to help optimize operations and reduce NPT.

The fixed-lug retrieval tool fits into a dovetail slot on the whipstock, which is 2½ in. (6.35 cm) wide and has approximately 1/16-in. (.159-cm) clearance. This would normally make the fishing operation extremely challenging and time consuming, but using xSight services helped accurately measure downhole weight-on-bit, torque, and orientation from the surface. This type of real-time data provides a tremendous advantage in deep fishing operations.

### Results

- Reduced NPT
- Saved several days of rig time
- Increased overall efficiency through comprehensive casing-exit solution
- Milled the window in 5 hr and 39 min and drilled 40 ft of rathole
- Collected a total of 416.5 lb of debris using XP magnets

### Challenges

- Perform a casing exit in 9<sup>5</sup>/<sub>8</sub>-in. casing with window depth at 25,803 ft
- Fish whipstock, anchor, and extension out of the hole before beginning
- Connect to a 2½-in. dovetail slot with a 1/16-in. clearance on the whipstock at 24,661 ft
- Reduce NPT and speed up the operation as much as possible through the use of real-time downhole data and feedback

### BHGE solution

- X-Treme Clean XP magnets and scrapers to collect debris and clean the well
- xSight smart intervention services to gather real-time data during operations
- WindowMaster G2 whipstock system and PathMAKER PDC window mill assembly
- BHASYS-PRO software for prejob planning

The fishing BHA was run in hole to just above the target depth of 24,672 ft (753.5 m) and oriented to match the last suspected whipstock high side. After depth was established, the systematic process of catching the whipstock dovetail slot with the lug began. The fishing tool was carefully rotated 5° before picking up, and we watched for overpull to indicate the whipstock was safely latched. This would normally be an impractical process, as the torque and resulting windup in the toolstring typically make it impossible to judge orientation from surface measurements. xSight services enabled this process to be repeated quickly and reliably by monitoring the real-time data feed until finally confirming the lug had found the slot by observing 6,000 lb (2,721.6 kg) of overpull.

This fishing job, which would typically require at least one day (and commonly more) to perform without the assistance of real-time data, was reduced to only a few hours, saving the operator considerable NPT. In addition to successfully capturing the whipstock, the XP magnets captured and returned 90.5 lb (41.1 kg) of debris to the surface, mitigating the risk of debris being strung throughout the wellbore or deposited in the blowout preventer (BOP) stack.

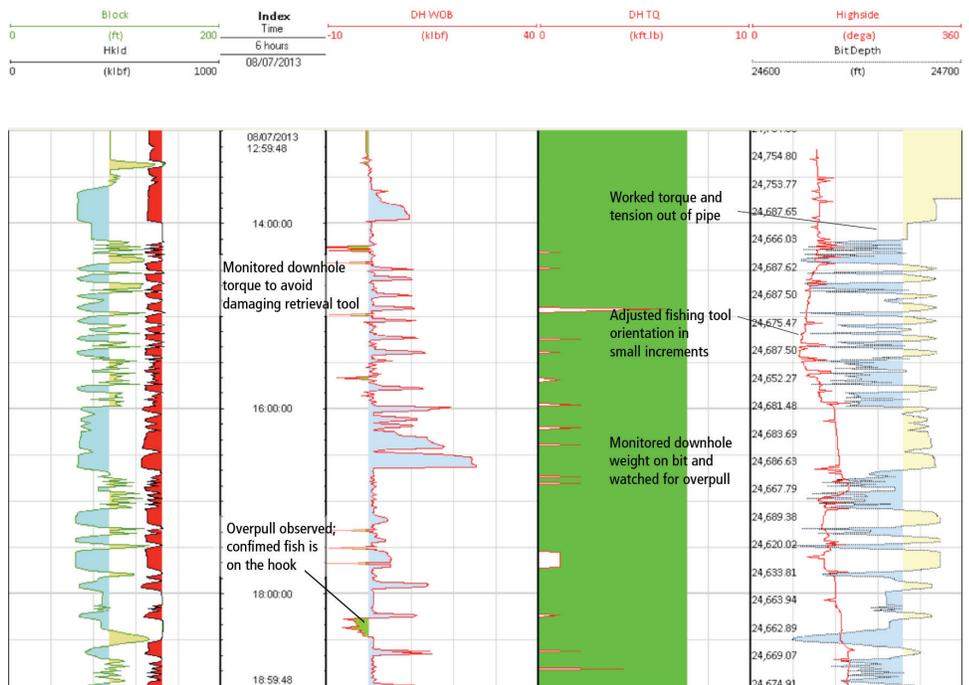
Prior to the second window-milling attempt, the operator agreed to perform a designated cleanout run. The cleanup BHA included XP magnets, a scraper, a boot basket, and a string mill. The XP magnets were spaced out over more than 400 ft (121.9 m) of the wellbore to enhance the collection of metallic debris from the fluid. During the cleanout run, the XP magnets recovered 26 lb (11.8 kg) of debris, including metal shavings, pipe dope, and mud. xSight smart intervention services were also used to collect torque and drag data, which enabled pre-job simulation and optimization of the whipstock BHA using our **BHASYS-PRO™ analysis software**.

Following the designated cleanout run, we redeployed our WindowMaster G2 whipstock system to perform the casing exit. xSight services were used once again to improve performance of the milling system, and XP magnets were used in the milling BHA to collect debris generated during the operation.

After arriving at depth, the BHA was successfully positioned, and the window was milled in under 6 hr. After completing the window we continued to drill an additional 40 ft (12.2 m) of rathole using our PathMAKER mill, which is optimized for extended rathole in hard and abrasive formations. The tools were then pulled out of hole, and inspection of the mill confirmed that the operation was

successfully completed. Inspection of the XP magnets showed that more than 300 lb (136.1 kg) of debris was collected during the milling operation.

The combination of our wellbore cleanup services, xSight smart intervention services, WindowMaster G2 whipstock system, and PathMAKER mill contributed to the efficiency and success of the operation. Although the first attempt resulted in a lost fish due to debris in the well, we were able to respond with a solution that minimized downtime during the fishing operation and then proceed to complete the casing exit with zero additional NPT.



Annotated data collected from whipstock fishing operation using xSight smart intervention services