

# Integrated BHA Drills Salamander Energy Sidetrack in One Run Per Section

Combining rotary steerable system and PDC bit maximizes performance and reduces risks in shallow well offshore Thailand

## CHALLENGE

Drill horizontal sidetrack through soft formations to increase oil production from shallow reservoir.

## SOLUTION

Design a BHA incorporating

- EcoScope\* multifunction LWD service†, an application-specific MDi519LBPX PDC bit with 19-mm cutters, and the PowerDrive Archer\* high build rate rotary steerable system (RSS) in the 8½-in section
- PeriScope\* bed boundary mapper and PowerDrive X6\* RSS in the 6½-in section.

## RESULT

- Drilled each section in one run.
- Increased ROP 66% in the 8½-in section.
- Placed the 6½-in horizontal section within 2 m of TVD of top of reservoir, as planned.

Salamander Energy plans to use the same integrated approach on future Bualuang field wells.

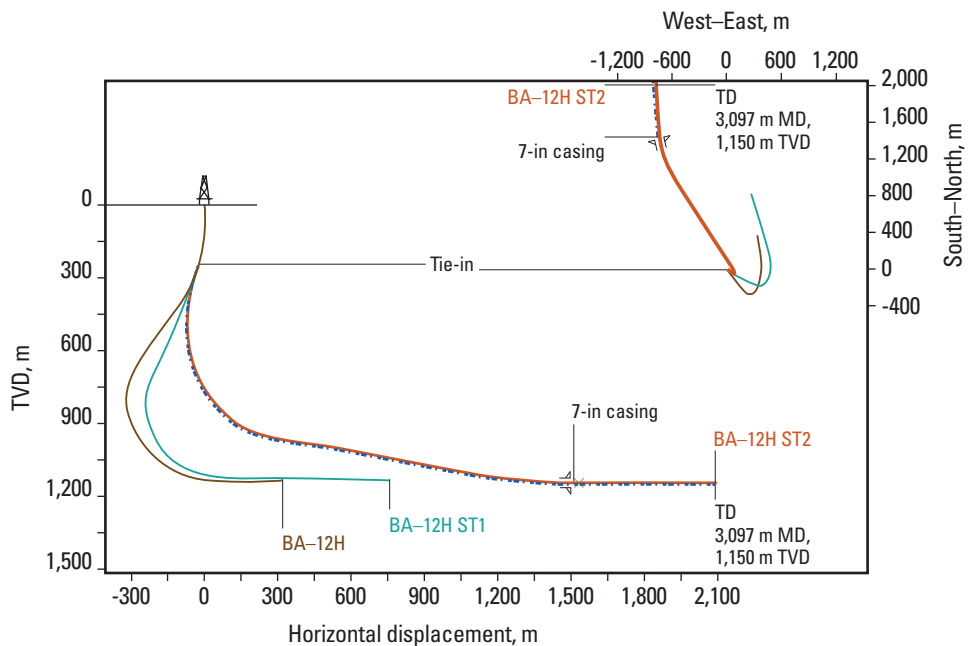


## Drill horizontal sidetrack well to boost oil production

Salamander Energy planned to drill a horizontal sidetrack well, BA-12H ST2, to boost average daily oil production from a shallow reservoir in Bualuang field in the Gulf of Thailand. The well plan called for kicking off the 8½-in section at an inclination of 13° through a window milled in the 9½-in casing, building angle to 80°, drilling a 1,000-m tangent, and then building angle to 90° to land the section near the top of the reservoir. Following that plan would allow the 6½-in horizontal section to be placed near the roof of the reservoir to help minimize water breakthrough. Salamander wanted to drill each section in a single run and reduce the risk of stick/slip, vibration, and poor hole quality in the soft formations.

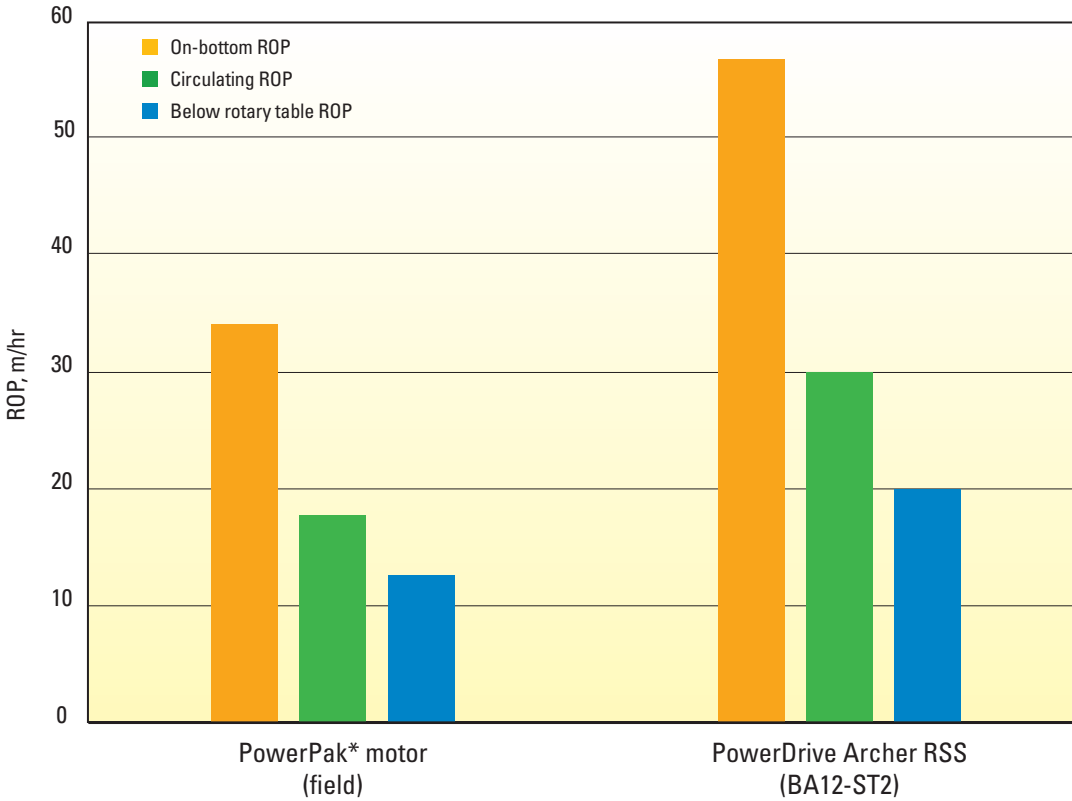
## Design an integrated BHA

Schlumberger designed an integrated drilling solution that incorporated LWD tools, a rotary steerable system, and an application-specific PDC drill bit from Smith Bits, a Schlumberger company. The 8½-in section was drilled in a single run using the EcoScope LWD service, a PowerDrive Archer high build rate RSS, and an 8½-in MDi519LBPX PDC bit with 19-mm PDC cutters. The bit's compatibility with the high build rate RSS was validated using the IDEAS\* integrated drillbit design platform to analyze how the bit, BHA, drillstring, well profile, drilling parameters, and geology would affect steerability, stability, ROP, and durability.

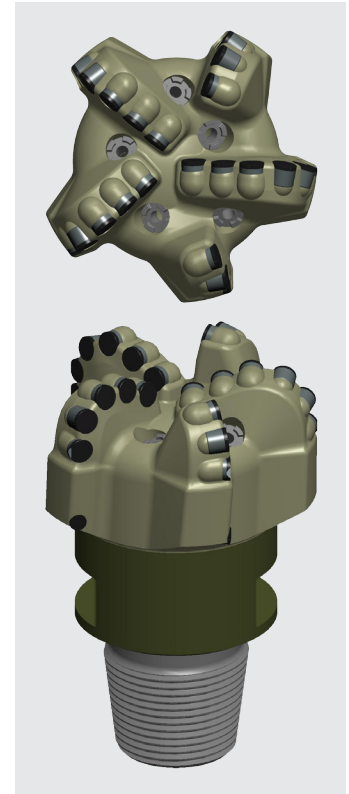


Horizontal sidetrack well BA-12H ST2 was drilled as planned, in just two runs.

**CASE STUDY:** Integrated solution combines RSS and PDC bit to maximize performance



The 56.8 m/h ROP achieved with the PowerDrive Archer RSS was a 66% increase over the 34.2 m/h field average ROP with positive displacement motors.



An application-specific MDi515LBPX PDC bit with 19-mm cutters was selected for this project using IDEAS platform analysis.

The PowerDrive Archer RSS—designed to deliver high build rates from any inclination—allowed precise steering in the soft formations where sediment washouts from mud flow can reduce BHA steering capabilities. Geosteering data from the EcoScope service, which colocates gamma ray, resistivity, density, and neutron measurements in one collar close to the bit, enabled the team to identify markers and land the well smoothly in the correct location in the reservoir.

The 6½-in horizontal section was also drilled in a single run with a BHA that incorporated a PowerDrive X6 RSS and a PeriScope bed boundary mapper. Using information from the mapper to geosteer the RSS enabled the team to make quick corrections and place the wellbore within 2 m of TVD of the top of the reservoir, as planned, while maintaining a smooth wellbore trajectory that ensured ease of completion running.

**Increase ROP 66%**

The PowerDrive Archer RSS and Smith Bits PDC bit drilled the 8½-in section in one run at an average ROP of 56.8 m/h—a 66% increase over the 34.2 m/h field average ROP with positive displacement motors—and delivered a quality wellbore with an average DLS of 4 to 5°/30 m that allowed smooth running of the 7-in liner to TD. Because of the success of the integrated solution, Salamander Energy plans to use the same approach on future wells in the Bualuang field.

Contact your local Schlumberger representative to learn more.

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Other company, product, and service names are the properties of their respective owners.  
†Japan Oil, Gas and Metals National Corporation (JOGMEC), formerly Japan National Oil Corporation (JNOC), and Schlumberger collaborated on a research project to develop LWD technology that reduces the need for traditional chemical sources. Designed around the pulsed neutron generator (PNG), EcoScope service uses technology that resulted from this collaboration. The PNG and the comprehensive suite of measurements in a single collar are key components of the EcoScope service that deliver game-changing LWD technology.  
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