CHALLENGE
Optimize offshore drilling efficiency at a remote, new platform and achieve sufficient DLS in a soft, unconsolidated formation.

SOLUTION:
Use PowerDrive Xceed* ruggedized RSS and various M-I SWACO services—including VIRTUAL HYDRAULICS† software, MEGADRIL† and ULTRADRIL† systems—on 16-in section across three wells, a first in Indonesia.

RESULTS:
■ Saved USD 2.8 million drilling costs and 5.6 days off AFE.
■ Drilled each section to TD without an unplanned trip and without any tool failures.
■ Increased average ROP by 78%—from 113 ft/h to 203 ft/h—drilling the well to TD 21% faster than planned.
■ Completed the campaign without HSE or service-quality (SQ) incidents.

Achieve sufficient DLS in soft, unconsolidated formation
Premier Oil kicked off an integrated drilling campaign at the Naga offshore platform located in the Natuna Sea of Indonesia by batch drilling three 16-in and 12¼-in sections to satisfy commitments to supply gas to both Singapore and Batam. In previous drilling campaigns, similar development wells were batch drilled in the area. Conventional push-the-bit RSS technologies had difficulty achieving sufficient DLS in the soft, unconsolidated formation. Other challenges included hole packoff and bit balling.

Optimize solution using a ruggedized RSS
PowerDrive Xceed RSS was chosen for the integrated drilling campaign for dogleg assurance in the 16-in, 55° tangent sections while ensuring good hole cleaning and improved fluid control compared with results experienced by previous technologies.

These RSSs are engineered to be accurate and reliable in challenging drilling conditions, including harsh, rugged environments as well as soft, interbedded formations. The fully rotating, point-the-bit system, which has internal steering mechanisms, extend the benefits of RSS drilling to applications that exceed the performance limits of externally steered tools and reduce dependence on wellbore contact for steering.

Lessons learned from offset wells were taken into consideration, and extensive modeling and simulation was performed to propose the best set of drilling parameters and help achieve the well objectives with the highest chance for success.

Collaborative efforts between Premier Oil, Schlumberger, and M-I SWACO, a Schlumberger company, ensured drilling synergy across the project. VIRTUAL HYDRAULICS software evaluated critical well drilling hydraulics under simulated downhole conditions; the MEGADRIL system used in the 12¼-in reservoir sections with One-Mul† liquid emulsifier delivered a single-drum synthetic-base drilling fluid solution; and the water-base ULTRADRIL system used in the 16-in sections reduced waste volumes with the ability to be discharged on land and offshore.

During the integrated drilling campaign, the three wells drilled saved 13%, 21%, and 28% off AFE, respectively.
Saved significant time and cost off AFE, achieved drilling objectives

Premier Oil efficiently drilled the three wells to TD, beating the planned AFE by more than 5.6 days and saving more than USD 2.8 million. Each section was drilled to TD without tripping for BHA components.

Compared with the closest offset wells drilled during previous campaigns using push-the-bit RSS technologies in the 16-in section, this campaign achieved record results. The BHA with the PowerDrive Xceed RSS was capable of achieving greater than 5°/100-ft DLS in the top hole section and had an average on-bottom ROP of 203 ft/h, an ROP increase of 78%. The closest four offset wells drilled using other technologies were capable of an average 3.5°/100-ft DLS and ROP of 113 ft/h. This drilling improvement enabled reaching TD 21% faster than planned.

Additionally, more than 20,000 bbl of MEGADRIL synthetic-base and ULTRADRIL water-base system fluids and potassium chloride brine was transported to the rigsite for frac-pack batch completions without HSE or SQ incidents or delay. Tight collaboration with local government officials ensured the safe movement of product to the remote location.

The closest four offset wells drilled using conventional technologies achieved an average ROP of 113 ft/h. The BHA with the PowerDrive Xceed RSS recorded an average on-bottom ROP of 203 ft/h, an ROP increase of 78%. This drilling improvement enabled reaching TD 21% faster than planned.