

# Engineered Drilling System Successfully Underreams Kazakhstan Well, Saving Up To Two Runs

Rhino XS hydraulically expandable reamer performs hole enlargement while drilling to enable smooth casing run

## CHALLENGE

Drill 12¼-in vertical well while enlarging to 13-in for the larger 10¾-in casing.

## SOLUTION

Use Rhino XS\* hydraulically expandable reamer for hole enlargement while drilling (HEWD) with a BHA designed by i-DRILL\* engineered drilling system design for optimal performance with PowerV\* vertical drilling system and Mi516 PDC drill bit.

## RESULT

- Saved an estimated 1 to 2 rig runs for hole opening by performing HEWD the 2,792-m section.
- Mitigated risks associated with drilling dynamics with BHA design and proper drilling parameters, sustaining minimal wear and maintaining proper hole shape.
- Maintained verticality with maximum inclination of 0.20° to TD at 2,659 m.



## Salt section causes shock and vibration, well instability

An operator developing a gas condensate field in Kazakhstan was drilling a vertical well through claystone, halite, and anhydrite formations and needed a reamer to open the hole to run a larger casing size. Axial, torsional, and lateral shock and vibration were anticipated, so the operator contacted Schlumberger to optimize drilling performance through the troublesome sections and mitigate drilling dynamics.

## Engineers design BHA for HEWD operation

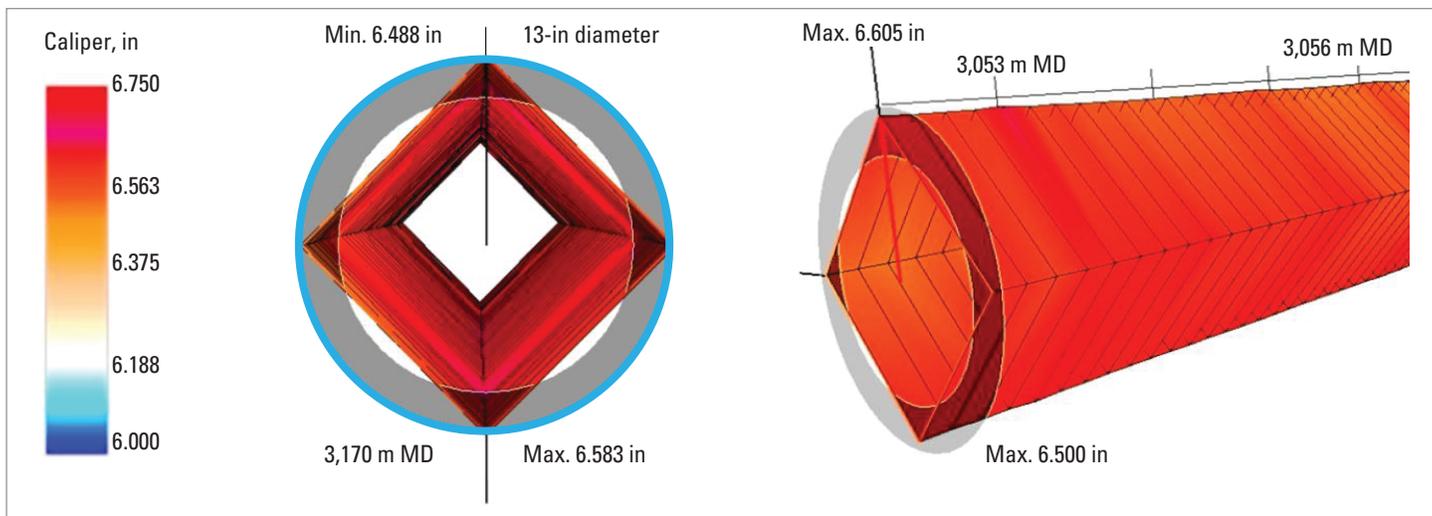
Schlumberger recommended HEWD through the section from 1,871 to 4,663 m. At a total of 2,792 m, the challenging length of the salt section required a durable BHA to maintain performance to TD, and the Rhino XS hydraulically expandable reamer was selected for the job. The team used i-DRILL engineered drilling system design to conduct a vibration study and simulate bit design and cutting structure based on drilling the salt. This study enabled engineers to select the optimal components and configuration of the BHA, including drive system, with analysis of drilling parameters—all prior to drilling the well.

The Rhino XS reamer equipped with PDC cutter blocks was incorporated to underream the borehole while drilling with a 12¼-in standard Mi516 PDC drill bit from Smith Bits, a Schlumberger company. The PowerV vertical drilling system, designed specifically to maintain verticality, was selected for continuous control—even in the event of drillstring dynamics—and to keep the trajectory within the planned maximum 1° inclination.

Schlumberger optimized WOB and rpm to reduce shock and vibration and maintain the desired ROP. This configuration enabled the PowerV RSS to maintain verticality as planned, reaching a maximum of 0.20° during the interval.



## CASE STUDY: Rhino XS reamer performs HEWD to enable smooth casing run



Four-point wireline caliper data indicated the Rhino XS reamer successfully enlarged the borehole to 13 in.

### Well stability increased in minimal time

After the well was drilled to TD at 4,666 m, a subsequent wireline run with a 4-point caliper verified that the Rhino XS reamer achieved a high-quality 13-in borehole through the 2,792-m salt section. It took only 366 hours in two runs with ROP ranging from 52–88 ft/h to complete the drilling operation, which is minimal for the length of the interval. The BHA components endured minimal wear as prejob planning and analysis enabled the selection of highly durable tools to fit the project needs. The smooth wellbore allowed a more efficient casing run and provided a conducive environment for a secure cementing operation.

After the success of applying the engineered drilling system in the field, the operator chose to use a similar BHA design for future wells.

Contact your local Schlumberger representative to learn more.



A 12 1/4-in standard Mi516 PDC drill bit was used in the drilling operation.

[slb.com/drilling](http://slb.com/drilling)