**CHALLENGE**
Drill an extended horizontal section in the harsh climate of a remote East Siberia field.

**SOLUTION**
Use the i-DRILL* engineered drilling system design to customize a BHA that combines rotary steerable systems (RSSs) with PDC drill bits and FLO-VIS NT† premium-grade, nondispersed xanthan gum to maintain trajectory and increase ROP in the harsh environment.

**RESULTS**
- Completed the well 4 days ahead of plan.
- Achieved an average ROP of 34.1 m/h, the highest average for any extended-reach horizontal section in the field.
- Achieved an operational rate of 6.15 d per 1,000 m.

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**Drill horizontal section in remote East Siberia field**
During development of a field in East Siberia, the operator wanted to improve drilling performance and extend drilling boundaries. The remote location, harsh weather, and the field’s complex geology created a challenging environment for drilling. The formations in the field include extended salt intervals that are prone to excessive washout, hard dolomites and limestones that produce severe vibrations, and an unstable argillite shale that results in stuck drillstrings and less directional control.

To maintain the required trajectory and increase ROP and drilling efficiency, the operator requested an engineered drilling system that would drill efficiently in the harsh environment.

**Optimize drilling performance in harsh weather**
Using the i-DRILL system, Schlumberger designed an integrated BHA and recommended the optimal drilling parameters in the inclement weather where NPT for rig repair was a common occurrence. The PowerDrive X6® 475 rotary steerable system, an MDSi613 SHARC® PDC drill bit from Smith Bits, a Schlumberger company, and Flo-VIS NT premium-grade, nondispersed xanthan gum from M-I SWACO, a Schlumberger company, were combined for the first time to drill an extended-reach horizontal section. The PowerDrive X6 RSS, designed for full directional control while rotating the drillstring, was ideal for the harsh environment because it minimizes the effect of external drilling environment factors and focuses on performance and reliability.

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**Extended-Lateral Section Performance**

<table>
<thead>
<tr>
<th>Pad</th>
<th>Average ROP, m/h</th>
<th>Meters per circulating hour</th>
<th>Distance, m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pad 1</td>
<td>22.37</td>
<td>13.4</td>
<td>400</td>
</tr>
<tr>
<td>Pad 2</td>
<td>24.02</td>
<td>12.2</td>
<td>800</td>
</tr>
<tr>
<td>Pad 3</td>
<td>29.08</td>
<td>15.89</td>
<td>1,200</td>
</tr>
<tr>
<td>Pad 4</td>
<td>23.9</td>
<td>7.3</td>
<td>200</td>
</tr>
<tr>
<td>Pad 5</td>
<td>34.1</td>
<td>17.2</td>
<td>600</td>
</tr>
</tbody>
</table>

The chart shows a comparison of drilling performance in the extended-reach horizontal sections.
On pad 23-2131, an MSi616 SHARC drill bit was used in the intermediate 12 1/4-in section, which was driven by a PowerDrive vorteX* RSS for supercharged drilling in the 8 1/2-in section. The PowerDrive vorteX RSS has an inclination hold function that allows automatic drilling of a horizontal section without intervention from the directional driller. This automatic downhole control enables accurate drilling of a hold section at higher ROP.

The SHARC bit was run on the PowerDrive X6 RSS and PowerDrive vorteX RSS to provide additional torque and accurate geosteering. The viscosifier was used because of its unique ability to produce a fluid that is highly shear-thinning and thixotropic.

**Drill complex well trajectory 4 days ahead of plan**

The customized system drilled 3,871 m, the longest well and the most complex well trajectory ever drilled in the field. Despite NPT of 30 hours caused by rig repair and harsh weather, the system achieved an operational rate of 6.15 d per 1,000 m, an improvement over the previous record of 6.33 d per 1,000 m.

The well was delivered more than 4 days ahead of the planned drilling curve.

Contact your local Schlumberger representative to learn more.

*MSi616 SHARC drill bits were run on PowerDrive X6 and PowerDrive vorteX RSSs for additional torque and accurate geosteering.*