

# Kazakhstan: SWITCHBACK MILL operated 'On Demand,' offering further versatility to the Specialized Tools range

“The Drilling Director was very satisfied with the performance of the SWITCHBACK MILL\* operation and the service quality provided by Specialized Tools. It will be used for all similar upcoming wells!”

Lars Tjaland (Regional Operation Manager CAG), M-I SWACO Specialized Tools

## Well Information

Location ..... North West Providence, Kazakhstan  
 Casing Sizes ..... 7 in - 26 lb/ft  
 Total Depth ..... 16,232 ft (4,948 m)  
 Drilling Fluid ..... 10.35 lb/gal (1.24 s.g.) Water-Base Mud

## The Situation

A new client for M-I SWACO required a solution to drill out a Diverter-Valve (DV) tool used in two-stage cementing operations, and scrape an area to set a whipstock required to sidetrack and drill the 6 in section. The operation entailed mechanically functioning the Diverter-Valve tool to the required position and drilling it out using a Smith SUPER JUNK\* MILL (SJM), running in hole to the whipstock setting area, drilling excess cement and scraping the entire area clean. The final operation would involve milling the Diverter-Valve tool area to remove any burrs and excess cement the SUPER JUNK MILL left behind, so that the whipstock and subsequent completion packer could be deployed. The client was looking to carry out the operation in one run rather than the normal two or three.

## The Solution

M-I SWACO Specialized Tools has developed a range of switchable tools that can be run in hole 'dormant' then activated when required, including the SWITCHBACK MILL\*, using the proven expandable ball seat technology. To meet the client objectives the following tool string was proposed and run:

- 6 in SUPER JUNK MILL
- 7 in MAGNOSWEEP\* magnet
- 7 in SWITCHBACK MILL & BYPASS BALL CATCHER\*
- 7 in RAZOR BACK\* scraper
- 4 ¾ in Drill Collars
- 3 ½ in Drillpipe

## The Results

The required set-down weight was applied to the Diverter-Valve tool, which was successfully manipulated and drilled out with the SJM. The target depth, 16,232 ft (4,948 m) was reached after drilling out approximately 154 ft (47 m) of cement and the area scraped clean. When the ball was dropped to activate the SWITCHBACK MILL, a shear pressure within specified parameters was observed and the area cleaned to required specification using the activated tool. The subsequent running of the whipstock was carried out without issues.

## The Details

Due to difficulties seen during the cementing of the 7 in liner, the client required a solution to mechanically function the Diverter-Valve tool set at 12,123 ft (3,695 m). This was normally achieved using dart bombs. As per the Diverter-Valve tool manufacturer guidelines a weight of 25 MT (55,115 lbf) is required to shift the internal sleeve. Using the recommended string it was possible to apply the required weight, with a positive indication seen on the weight indicator when the sleeve moved into position.

The internals of the Diverter-Valve tool was drilled with debris seen at the shakers as well as subsequently recovered on the MAGNO SWEEP tool. The rest of the string, SWITCHBACK MILL and RAZOR BACK tool passed through the Diverter-Valve tool area and was run to the target depth. The whipstock had to be set at the precise depth of 16,232 ft (4,948 m) in order to get the required kick-off point (KOP) to reach the reservoir depth. The SUPER JUNK MILL and RAZOR BACK tool were used to drill out and scrape approximately 154 ft (47 m) of cement sheath from the inner diameter of the 7 in (16 ft) casing to ensure the whipstock would be properly positioned.

Once the required depth was reached the string was pulled out of hole to 5 m above the Diverter-Valve tool area. A 1.76 in ball was dropped and allowed to freefall to the SWITCHBACK MILL. Due to rig limitations it was not possible to pump at the minimum rate of 2 bpm. After 45 minutes the ball was 'observed' landing on seat. A hold pressure of 166 bar (2,407 psi) was seen and held for 1 minute, and the ball subsequently sheared through at 206 bar (2,987 psi). When the pumps were brought online the initial pump pressure of 49 bar (710 psi) was seen indicating the ball had cleared the seat. The SWITCHBACK MILL was then rotated through the Diverter-Valve tool area several times to remove the remains of the internal sleeve, cement to ensure the required inner diameter. The weight indicator showed a half-ton increase in drag, indicating the SWITCHBACK MILL was activated and therefore cleaning the area.

When the tools were recovered to surface the SWITCHBACK MILL pads were confirmed to be in the activated position and the MAGNO SWEEP tool had recovered 3 kg (6.6 lb) of junk.



SWITCHBACK MILL Pads Activated



Recovered debris on  
MAGNO SWEEP tool

The whipstock was run to depth without incident, and the next section drilled as planned.

This is the first time the SWITCHBACK MILL has been run globally and it performed as designed. As well as being the first run of the MAGNO SWEEP tool in Kazakhstan, this was also the first clean-up run with this client for M-I SWACO. The drilling director operator was very satisfied with the performance of the tool and the service quality provided by M-I SWACO Specialized Tools. As well as agreeing to utilizing the SWITCHBACK MILL and MAGNO SWEEP tool for future similar applications, he is looking for other engineered wellbore cleanup solutions for their subsequent wells.

## Questions? We'll be glad to answer them.

If you would like to know more about the SWITCHBACK MILL tool and how it is performing for our customers, please call the M-I SWACO office nearest to you.

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