

MD-3 Triple-Deck Shaker Completes Field Trial in Holland

“During the trial of the MD-3* Shaker the solids-control system showed significant improvement—the best results by the rig thus far. This was apparent from the reduced amount of drilling fluids used.”

Peter Rijnen, Wells Fluids Interface Manager, NAM/ONEgas^



THE PROBLEM

Efficiency and cost savings is needed in solids separation. Efficiency comes from higher capacity flow and solids handling and from less space needed for shaker equipment.

THE SITUATION

An operator allowed M-I SWACO to carry out a land field trial of the MD-3 Triple-Deck Shaker.

THE SOLUTION

The MD-3 Shaker uses three decks, in this case in a parallel configuration.

The Situation

The MD-3 Shaker underwent a field trial on a major operator land drilling site. The main trial objectives were to test the flowrate handling capacity and make a qualitative assessment of the solids handling and conveyance capacity of the MD-3 Shaker. Shaker screen life was also measured and compared to historical benchmarks.

The operator development well was drilled in a J-shape standard slim well, including a cemented 3½-in. completion using the measured drilling parameters in Figure 1.

Figure 1: Main Drilling Parameters

Hole size	AHRT (m)	TVRT (m)	Casing OD (in)	Mud System	Av ROP (m/hr)	Flow rate (LPM)
12 ¼"	1175	1004	9 5/8"	KCI	28	1500-3400
8 ½"	3054	2825	7" liner	OBM	6-7	1600-2200
6"	3511	3238	5" liner	OBM	5/15	650/850
4 ⅛"	3705	3421	3 ½" CC	OBM	2/20	450/550

The Solution

The MD-3 Shale Shaker is a multi-deck shaker engineered to provide efficient solid separation. The shaker was set in a parallel configuration, meaning the bottom decks were running in parallel with each other and using the same mesh (for the majority of the test). For this trial, the MD-3 unit was installed between the shaker cutting tank and the first fluid storage silo. Tests were conducted on 12¼-, 8½- and 6-in. sections.

THE RESULTS

The MD-3 Shaker handled approximately 95% of the total flow over the duration of the well.

- Flowrate handling capacity was measured at up to 3,400 L/min in the 12¼-in. section with 38/84 mesh screens. Capacity was 2,300 L/min in the 8½-in. section with 38/230 to 270 screens.
- Qualitative assessments of the solids handling and conveyance capacity showed excellent throughput characteristics

The Results

12¼-in. section: The MD-3 unit was rigged up to take 100% of the flow from the bell nipple, with the three rig-owned units on standby, but isolated. The mud system was KPM, a KCI polymer system. 28 gumbo screens with 0.8 x 118 mm openings were used on the scalping deck and the middle and bottom decks were dressed with 84 XR* screens. HC* screens were later used in the section due to their superior performance in sticky clays. For the first 40 m (131 ft) drilled, the MD-3 unit was able to handle the complete flow rate of 2,500 L/min. At 40 m (131 ft), the screens partially blinded in unconsolidated sands and the total flow rate was reduced to 1,250 to 1,500 L/min. The MD-3 unit was able to handle 750-900 L/min of the total flow (60%). This result was historically better than previous wells, where flow was usually limited to <1,000 L/min in total due to excessive blinding across the three rig shakers.

Once into the Breda, Rupel and Asse clay formations the flow rate was increased to 3,000 to 3,100 L/min in total, with the MD-3 unit treating 2,000 to 2,700 L/min (66 to 88% of total flow). Once into the lower Tertiary clays and Upper Cretaceous chalk, the MD-3 unit was able to treat up to 3,400 L/min (100% total flow) with 84/105 (need to specify HC or XR) mesh on the primary decks.

8½-in. section: After a successful cementation of the 9½-in. casing and the installation of the BOP the section was started with the MD-3 unit rigged up. The scalping deck was dressed with 38 XL* screens, while the middle and bottom decks were dressed with 165 XR and 165 HC screens, respectively. The shoe track was drilled out with the previous KPM water-based mud and then during the drilling out of the cement the well was displaced to 1.25 SG VCM. Once the mud was displaced, drilling of the fresh formation started. The mud system was VCM, a VERSACLEAN* LTOBM system.

From the beginning of the 8½-in. section the MD-3 unit was able to process the total flow rate from the well. The flow ranged from 1,600 L/min during rotary drilling mode, up to 2,200 L/min while drilling in sliding/steering mode. The MD-3 unit was positioned at the side of the 40 m³ rectangular cutting tank and with 100% of the flow and a dry discharge, the cuttings were stacked in a small area and potentially overflowing the cutting tank. Most of the time the cuttings were manipulated to the sides to keep the shaker running, but at night the third-party cuttings-moving equipment was not available so flow was occasionally switched to the rig shakers to spread the cuttings across the length of the tank.

6-in. section: The 7-in. liner was successfully cemented and BOP pressure-tested. The section was started with the MD-3 unit rigged up. During the drilling out of the cement the mud was weighted up to 1.55 SG. Once the mud system weight reached 1.55 SG an FIT was performed and drilling continued. The section was terminated early due to well-control problems requiring increasing mud weights, and finally requiring a liner to seal off a high-pressure zone. The mud system was VCM., a Versaclean LTOBM system.

From the beginning of the 6-in. section, the MD-3 unit was able to process the total flow rate. The flow ranged from 500 L/min up to 900 L/min. The MD-3 unit was positioned at the side of the 40 m³ rectangular cuttings tank with 100% of the flow and a dry discharge; the cuttings were stacked in a small area and potentially overflowing the cutting tank. Most of the time the cuttings were manipulated to the sides to keep the shaker running, but at night the third-party cuttings-moving equipment was not available so flow was occasionally switched to the rig shakers to spread the cuttings across the length of the tank.

4⅞-in. section: After the successful running and cementation of 5 x 5½-in. liner at a depth of 3,511 m (11,519 ft) the well was displaced to VCM mud with a weight of 1.0 SG. Following a positive flow check and leakoff test, drilling ahead was permitted. Drilling ROP was recorded from 1 to 20 m/hr. One bit trip was required and a fresh bit finished the well rapidly at a TD of 3,705 m (12,155 ft). The scalping deck was dressed with 38 XL screens and the middle and bottom decks with 230 HC screens.

The Results (continued)

The MD-3 unit was able to process the total flow rate. The flow stayed at 500 L/min for the duration with rotary drilling mode as there was no MWD tool in the hole.

Summary

The MD-3 Shaker handled approximately 95% of the total fluid flow over the duration of the well. Primary objectives of the test were met or exceeded, including:

- No major QHSE concerns under normal rig operations
- Flowrate handling capacity was measured at up to 3,400 L/min in the 12¼-in. section with 38/84 mesh screens. Capacity was 2,300 L/min in the 8½-in. section with 38/230 to 270 screens.
- A qualitative assessment of the solid handling and conveyance capacity showed excellent throughput characteristics
- Shaker screen life was measured and compared with historical benchmarks. The coarser meshes had screen life extending to 120 hr operating, and the finer meshes showed life spans of up to 120 hr in some cases.

Questions? We'll be glad to answer them.

If you'd like to know more about the MD-3 Triple-Deck Shaker and how it's performing for our other customers, please call the M-I SWACO office nearest you.



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