

Brazil: One MD-3 shaker outshines 3 in successful South America debut

“The MD-3* shaker exceeded our expectations in performance, reliability and screen life. The one test unit we have installed is capable of handling almost the entire volume that until now we had distributed to four dual-deck units. The MD-3 shaker is a positive advancement in solids control technology. The M-I SWACO team has been there to assist us in the installation, testing, evaluation, training our crews and maintenance of operational integrity. We are very pleased with the test results. We are so pleased, in fact, that we have committed with confidence to replacing our four dual-deck units with only three of the MD-3 shakers.”

Jeff Lewis, Ocean Star Operations Manager

Well Information

Location Campos Basin, Brazil

Well Name 1-OGX-28-D-RJS

Operator OGX

Well type Exploratory

Interval/Lengths (total documented in report 8,241 ft (2,512 m)) 12 ¼ in. 5,823 ft (1775 m)
 8 ½ in. 2,418 ft (737 m)

Mud Type / Density PARADRIL*/ 9.0 - 9.2 lb/gal (1.08 - 1.10 s.g.)

The Situation

The new-generation M-I SWACO MD-3 triple-decker shaker was engineered to provide operators an ideal combination of high efficiency, adaptability, improved work environment and reduction in space requirements. Operating in both the progressive and balanced elliptical motion, the compact MD-3 shale shaker is unique in that it can adapt quickly as drilling conditions and cuttings volumes change.

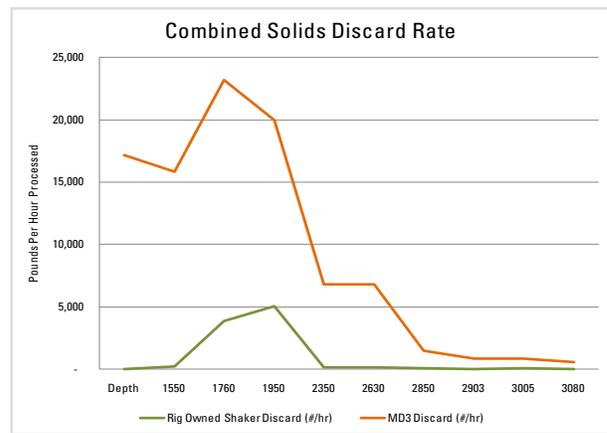
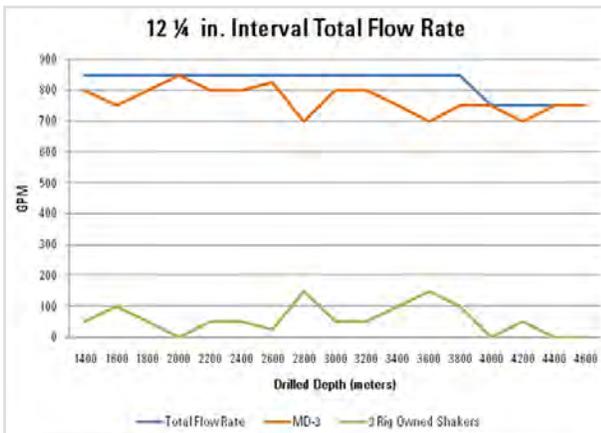
To quantify the performance and cost benefits of the MD-3, compared to conventional shale shakers under the ever-changing drilling conditions and requirements, an aggressive comparative field trial was undertaken on the Diamond Ocean Star semi-submersible rig, which typically employed four cascade shakers. The test would be carried out during the remainder of the OGX 1-OGX-28-D-RJS exploration well in Brazil’s Campos Basin. The field test represented the first use of the MD-3, offshore in South America.

The Solution

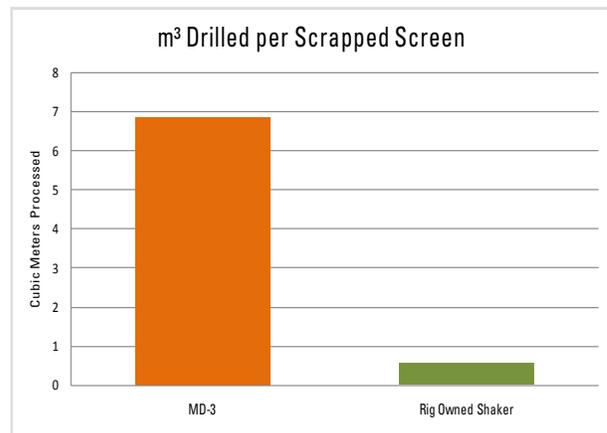
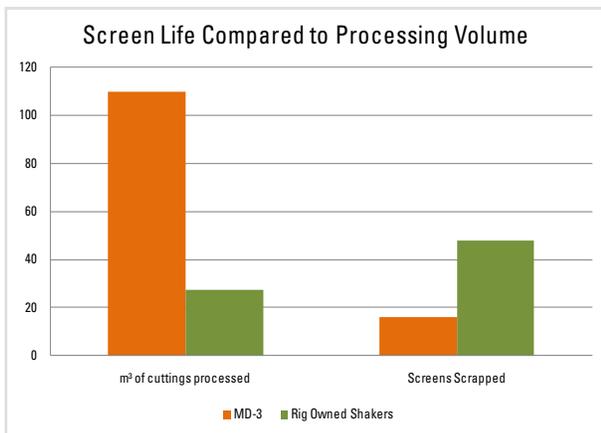
For the comparison, one of the existing rig cascade shakers was removed and replaced with an MD-3, which was installed with no HSE incidents. This configuration allowed the three rig shakers to be used in conjunction with the MD-3, thus enabling the collection of aggressive comparison data. The primary objectives of the test were:

- Test the flow handling capacity of the MD-3 shale shaker compared to the current rig cascade shakers
- Prepare a qualitative assessment of the solids handling and conveyance capacity of the MD-3 shale shaker compared to the current rig cascade shakers
- Measure the screen life of the MD-3 shaker and compare it to the screen usage of the current rig cascade shakers and historical MD-3 screen usage data

The Results



- Three tests were conducted including performance, screen life and QHSE perspectives, the single MD-3 shaker surpassed the three existing rig shakers in all of the head-to-head comparative evaluations. Even when outfitted with higher API designation screens, the MD-3 did not experience the normal flow restrictions of the previously used four-cascade shaker configuration and successfully processed at the full well flow rate. The MD-3 exhibited its capacity to adapt easily to the fast ROP encountered in both the top and intermediate well intervals.
- During drilling of the 12 1/4 in. section, all of the shakers removed a cumulative 561.75 bbls (89.311m³) of cuttings, excluding any washout of the open hole. The single MD-3 shaker processed 75%, amounting to 421.31 bbl (66.98 m³) of the total cuttings removed from the 12 1/4 in. hole, while the three rig cascade shakers combined processed the remaining 140.44 bbl (22.33 m³).



- Further, throughout 12 1/4 in. interval, the screens of the three existing cascade shakers experienced catastrophic failures, while the MD-3 screens were repaired easily and returned to service. While the MD-3 processed 75% of the total flow in both the intervals tested, compared to the three cascade shakers it accounted for only 33% of the damaged screens that had to be scrapped. When calculated for comparative screen life, the MD-3 screens realized a 12-fold higher service life and utilization compared to the rig cascade shaker screens, thereby saving significantly in associated screen cost.
- From a QHSE perspective, rig personnel cited the incorporated fume extraction hood on the MD-3 as reducing considerably the noxious fumes that had accumulated in the shaker house during previous wells, even though the hood was not yet connected to the central HVAC system. The MD-3 also exhibited operational simplicity, specifically with regard to the ease of changing out screens and deck angle adjustments, both of which performed exactly as expected.



The Details

Upon installation parallel to the three cascading shakers, the MD-3 was used in the 12 ¼ in. hole, which was being drilled with a 9-9.2 lb/gal paraffin-based PARADRIL drilling fluid system with a viscosity range of 55-70. The same drilling fluid was used in the subsequent 8 ½ in. interval.

To begin the test in the top hole, the MD-3 shale shaker was dressed on the top deck with an API 35 (30 MG) screen and both primary decks were dressed with an API 100 (165 XR) screens. This set-up was used to test the flow rate handling capacity of the MD-3 shale shaker with the following results:

- During drilling of the upper 12 ¼ in. section, the MD-3 processed an average of 750 gpm of the total 850 gpm circulating volume (88%). The average ROP was 262 ft/hr (80 m/hr) with an instantaneous ROP of 328 ft/hr (100 m/hr).
- When utilizing API 120 screen in the lower portion of the 12 ¼ in. hole, the MD-3 was able to process 700 - 800 gpm; the shaker processed 750 gpm with a 98 - 131 ft/hr (30-40 m/hr) ROP when API 140 screens were used.
- To compare the screen life, at the conclusion of the 12 ¼ in. section a true scrap rate was determined for each screen type. A scrap rate of 22% for the MD-3 screens compared to a scrap rate of 87% for those of the three rig cascade shakers. A very conservative estimate of 75% of the total circulating flow was received and processed by the MD-3.
- During drilling the 8 ½ in. section, the MD-3 processed an average of 425 gpm of the 575 gpm circulating volume (74%) at an average ROP of 10 ft/hr (3 m/hr) with an instantaneous ROP of 16 ft/hr (5m/hr). In the later part of the 8 ½ in. section the MD-3 shaker was screened up to test the capacity with finer mesh screens on the two lower primary decks. API 140 (230 XR) screens and API 170 (270 HC) mesh screens were installed and tested during the 8 ½ in. interval. The three competing shakers used API 170 (200 mesh) screens.
- The ability to process the full planned flow rate with the MD-3 installed was extremely beneficial compared to the typical flow rate restrictions that were present previously with the four rig cascade shakers.

Summary

The overall performance of the MD-3 during the comparative field trial was nothing short of remarkable, effectively validating its operational and economic advantages. During the trial, a single MD-3 effectively processed nearly 300 more bbl of cuttings than three cascade shakers combined with the utmost in reliability and screen life.

Questions? We'll be glad to answer them

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

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P.O. Box 42842
Houston, Texas 77242-2842
www.miswaco.slb.com
Email: questions@miswaco.slb.com