

Test Report: SureMate Connector



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SUBJECT: CONNECTOR PIN WEAR ON SUREMATE VS. STANDARD NON-TOLTEQ CENTRALIZER

PRODUCT: TOLTEQ SUREMATE CENTRALIZER, INTEGRATED SUREMATE CENTRALIZER

DATE: FEBRUARY 3, 2014

AUTHOR: PRODUCT IMPROVEMENT DEPARTMENT

SUMMARY

The purpose of this test is to establish a performance baseline for SureMate functionality and identify any design/production flaws in the connectors that would require improvement. All devices were tested on the same test fixture in-house at Tolteq. The actual testing spanned 53 days, from November 11, 2013 to February 3, 2014.

ABOUT THE TEST

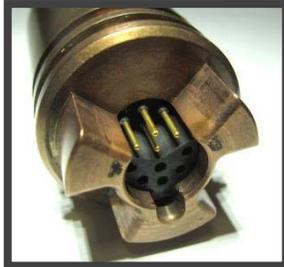
This test, hereafter referred to as the Rotation Test, was designed to reveal weak points in centralizer mating and associated connector wear by inducing prolonged rotation, thereby accelerating wear-and-tear on said product.

For the purpose of this particular Rotation Test, a SureMate centralizer and an industry standard "half-moon" style centralizer were set-up for observation and comparison. Both centralizers were rotated 45 degrees back and forth 11 times a second to accelerate wear on the sub-sea connectors.

Test Report: SureMate Connector



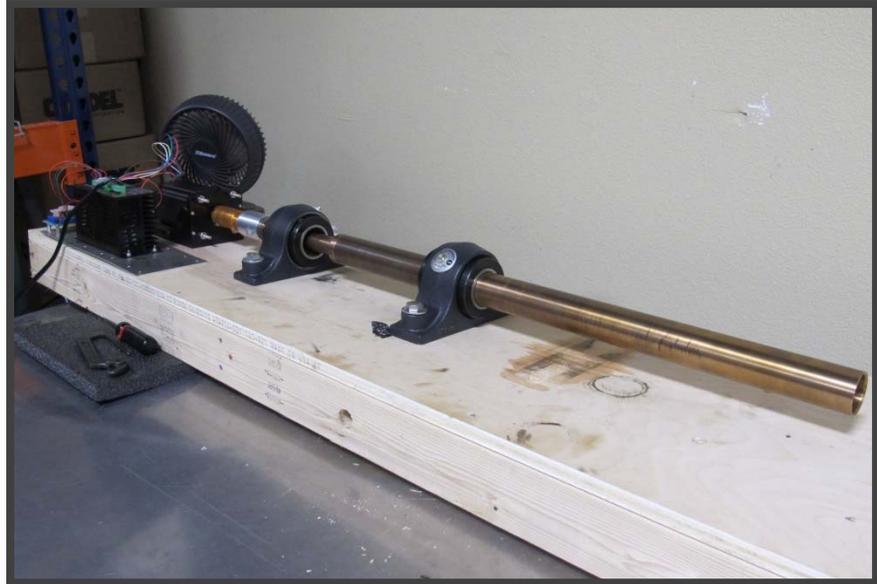
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SureMate Centralizer



Standard Centralizer



Rotational tester with a tool and centralizer

TEST SETUP

Each centralizer was connected to a tool, and positioned inside a rotational tester, a purpose-built numerically controlled device. The centralizer assemblies were rotated back and forth 970,000 times over the course of one day. Macro images of the connectors were then taken. The total duration for testing each centralizer style was 96 hours.

Connector mating force was tested before and after the Rotation Test, using a force gauge and computer controlled actuator for consistent results. Five sets of connectors were tested before the Rotation Test was started to establish a baseline for the force required to un-mate connectors. After pull testing, this average was established at 69.2 ounces.

Note: Standard half-moon style centralizers have a loose tolerance between the two faces of the half-moons, leaving a gap of up to 1/16" when the centralizer is rotated back and forth. SureMates are designed specifically to allow the connectors to stay mated and to move independently from the rest of the assembly, in order to reduce or even eliminate connector wear.

Test Report: SureMate Connector



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Force gauge fixture removing a connector

TEST PROGRESSION

After 96 hours of rotation, the connectors were removed from their respective housings and subjected to 7 pulls. The pulls were then averaged.

The following images provide a head-to-head comparison of the two centralizers, with the Tolteq connector on the left and the half-moon centralizer on the right. The damage imparted to the half-moon centralizer was visible after day one, and worsened markedly as the days progressed. After four days, the difference in wear-and-tear between the two connectors is significant.

Test Report: SureMate Connector



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DAY 1: SureMate
67.2 oz. to disconnect



DAY 1: Half-Moon
53.1 oz. to disconnect



DAY 2: SureMate
66.7 oz. to disconnect



DAY 2: Half Moon
41.9 oz. to disconnect

Test Report: SureMate Connector



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DAY 3: SureMate
67.0 oz. to disconnect



DAY 3: Half-Moon
25.5 oz. to disconnect



DAY 4: SureMate
67.4 oz. to disconnect



DAY 4: Half-Moon
22.8 oz. to disconnect

Test Report: SureMate Connector

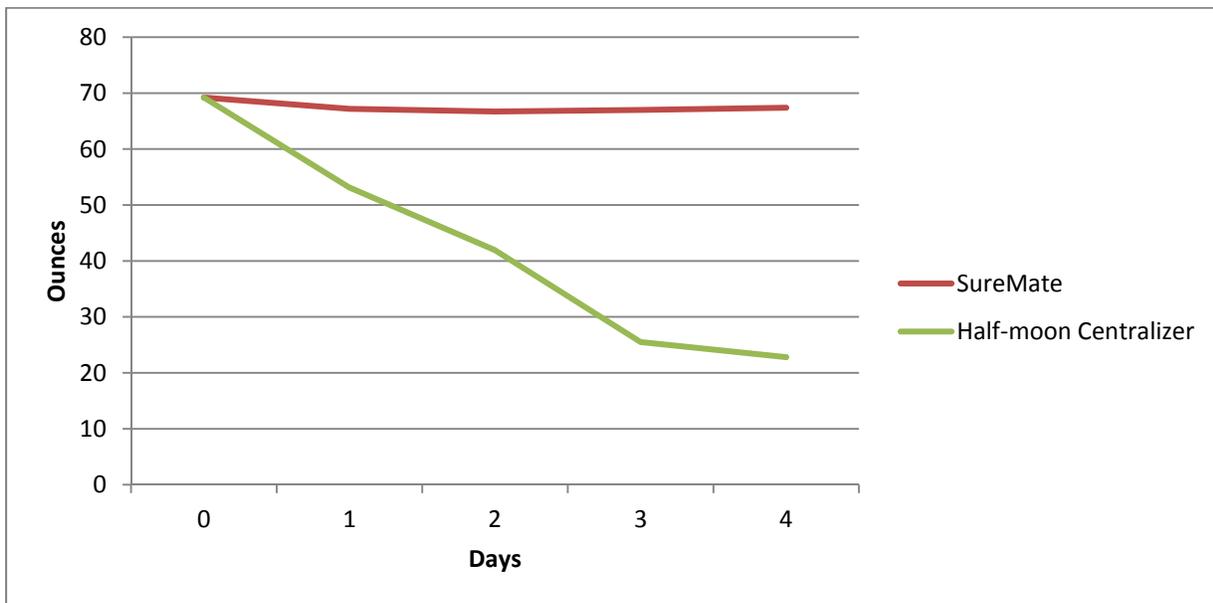


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TEST RESULTS

The SureMate showed no fretting of the pins, just minor burnishing. The pulls from the SureMate averaged 66.7 oz, 2.5 oz less than average. After one day, fretting was apparent on the half-moon centralizer pins. By day two, the pins showed major damage, and pulls averaged 41.9 oz, 27.3 oz less than average. By day four, the half-moon style centralizer was down to 22.8 oz, 46.4 oz less than average.

PULL FORCE: SureMate vs. Half-Moon



Test Report: SureMate Connector



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CONCLUSION

The Tolteq SureMate and Integrated SureMate is an innovative and rugged centralizer that features several design benefits that have been proven to minimize or eliminate common issues that have plagued MWD tool strings. Although many Tolteq customers have attested to the reliability and performance of the SureMate, our in-house testing further validates the performance of these great centralizers.



Tolteq Integrated SureMate Centralizer (top) and SureMate Centralizer