

Mi SWACO

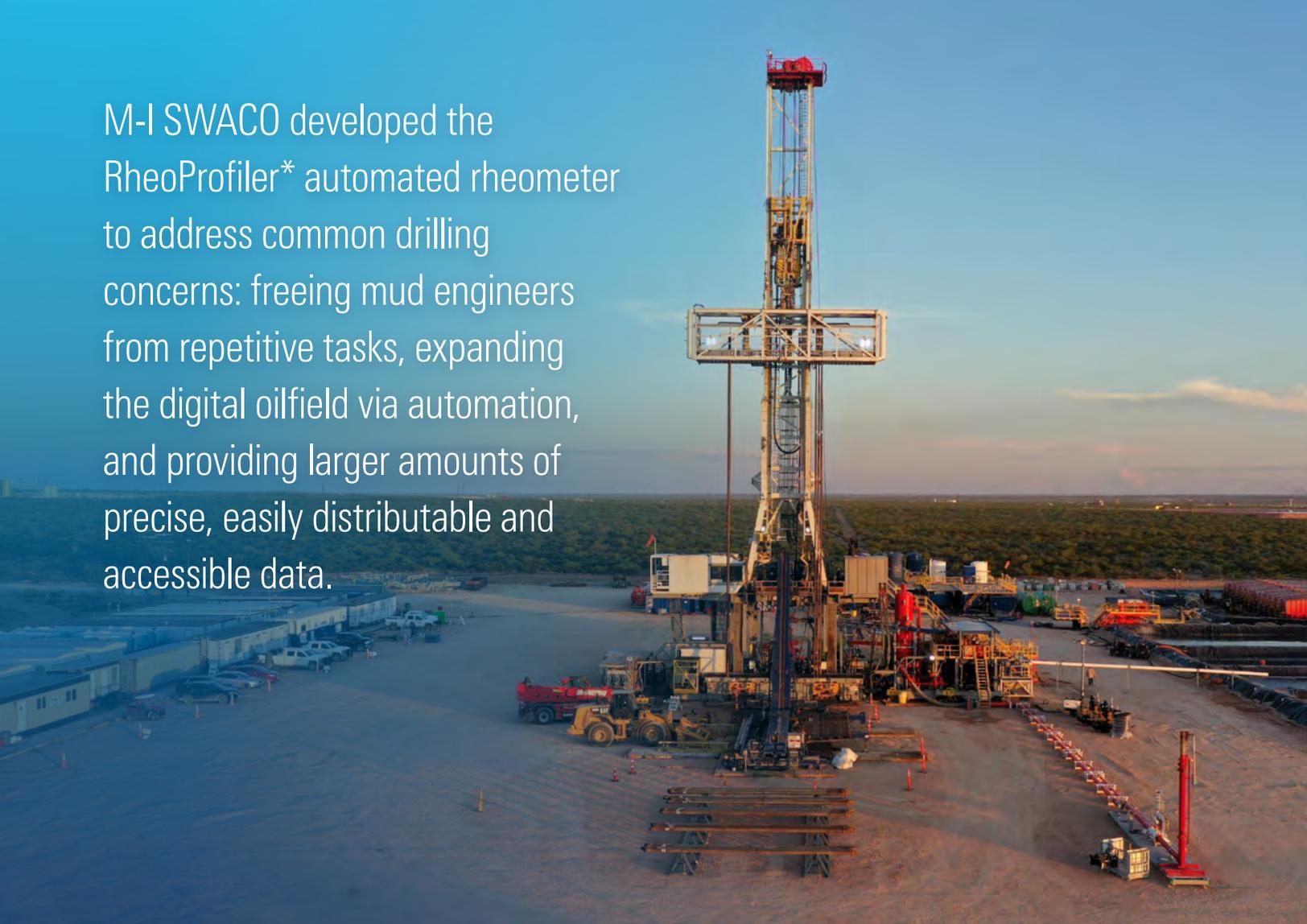
A Schlumberger Company

RheoProfiler

Automated rheometer



M-I SWACO developed the RheoProfiler* automated rheometer to address common drilling concerns: freeing mud engineers from repetitive tasks, expanding the digital oilfield via automation, and providing larger amounts of precise, easily distributable and accessible data.



RheoProfiler

automated rheometer

Due to the time-sensitive nature of drilling fluid properties while drilling a well, current fluid testing protocols limit the quantity, accuracy, and distribution of critical data. This data is obtained throughout a workday and occupies fluid engineers with repetitive tasks.

- Although fluid engineers are capable of easily performing a complete fluid test, the test must be routinely performed up to four times a day, using up a significant portion of their time.
- Precision, accuracy, and repeatability of tasks and tests can be impacted by equipment or human factors.
- The data recorded by the fluid engineer must be uploaded and distributed to the necessary stakeholders, potentially resulting in time being wasted during information distribution and communication delays.

The RheoProfiler automated rheometer provides a thorough, yet straightforward system capable of testing density and rheological characteristics of all fluid types. API Recommended Practices 13A and 13B define the standard procedures to be used for field testing drilling fluids. The RheoProfiler automated rheometer meets these requirements with its heating and cooling capabilities, its ability to run various gel tests, and its capacity to test any fluid sample.

An operator uses the touchscreen interface, which functions with or without gloves, to input sample details for testing, track data and trends, and monitor the system. The RheoProfiler automated rheometer is a semiautomated system that tracks user input with tests that require no further human contribution to reduce the quantity of work with which fluid engineers are tasked.

The device represents an integration of hardware and software components that contributes to the expansion of the digital oilfield by improving the digital well construction cycle. Critical component information along with high-quality data unite in a timely fashion to enhance well construction.

Unique Engineering for Simplicity, Precision, and Distribution

The RheoProfiler 200 automated rheometer weighs 83 lb [38 kg] and provides a key advantage in ease of mobilization. In addition, initial installation can be completed quickly with fewer than five components requiring setup during initial configuration. The rheometer and densitometer are encased in a lightweight yet robust aluminum case that safely houses all components. The housing of these components within this casing ensures that damage done to the case will not impede the testing abilities of the system. Most regular maintenance can be performed quickly and easily on the unit's few exterior components. For the unit interior, the touchscreen display provides an interface to run self-cleaning and self-maintaining procedures to reduce the quantity and frequency of regular, time-consuming maintenance.

The RheoProfiler 200 automated rheometer can test the density and rheological characteristics of any water-, oil-, or synthetic-based fluids. The unit is capable of rapidly heating or cooling samples (in less than 10 min) from 150 to 40 degF [66 to 4 degC], respectively, to perform a range of shear stress and density testing. The heating and cooling abilities of the RheoProfiler automated rheometer and the gel tests it performs ensures the unit is API RP 13A and 13B compliant. Because all portions of these tests are automated and controlled by the computer, a reliable and repeatable method of testing can be guaranteed for any samples tested.

The RheoProfiler automated rheometer's touchscreen display coupled with the Wellsite Information Transfer Specification (WITS) data output enables both local and offsite stakeholders to immediately view the data provided by the device and make critical time-dependent decisions. The device is also capable of communicating with multiple offsite stakeholders via Ethernet connection and enables rapid data delivery to assist operators with drilling fluid challenges. In addition, the data derived by the RheoProfiler automated rheometer is run with Schlumberger DrillPlan* coherent well construction planning solution and DrillOps* on-target well delivery solution. Overall, the RheoProfiler automated rheometer provides a more precise and digitally integrated system to test the rheological characteristics of a wide variety of fluids and facilitate the daily schedules of fluid engineers.

Essential Attributes

Four essential attributes set the RheoProfiler automated rheometer apart in delivering precise performance and flexibility.

- 1 A relatively lightweight unit, with few components requiring installation during initial setup coupled with a straightforward test system, guarantees quick installation and an easy first startup.
- 2 A heating and cooling system combined with precision instruments to measure rheology data and density ensure compliance with API RP 13A and 13B standards while maintaining a high level of precision not obtainable via current mud testing methods and equipment used by fluid engineers.
- 3 A local touchscreen display combined with the WITS data output using Schlumberger software enables local fluid engineers and offsite experts to immediately receive fluid information to quickly and precisely make fluid treatment decisions.
- 4 Data received from the RheoProfiler automated rheometer does not require extrapolation to well conditions, removes additional uncertainty, reduces risk, and adds further precision to the fluid treatment process because of compliance with API RP 13A and 13B standards.

Engineered to Improve Well Construction

RheoProfiler 200 Rheometer Features and Benefits

What's Unique	How you Benefit
Rheological and density data	Reduces some of the repetitive tasks involved with fluid tests
API RP 13A and 13B compliance	Performs compliant gel tests and cooling and heating of samples
Works with all fluid types	Tests samples from a wide variety of environments
Touchscreen display coupled with a WITS data output	Relays information efficiently to stakeholders to improve visibility with a simple and straightforward interface
Lightweight (38-kg) and simple setup	Transports and installs easily
Little required maintenance	Operates steadily with infrequent maintenance downtime
Flexibility in sample point	Captures fluid information at various points in the circulating system

RheoProfiler 200 Rheometer Specifications

Unit Dimensions and Weight

Weight	83.8 lb [38 kg]
Length	13 in [33 cm]
Height	29.3 in [74.5 cm]
Width	25 in [63 cm]

Performance

Minimum measurement temperature	40 degF [4 degC]
Maximum measurement temperature	150 degF [65 degC]
Shear rates	5.11–1,022 s ⁻¹
Sample size	0.2 galUS [0.75 L]

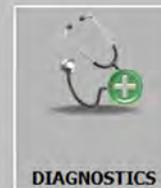
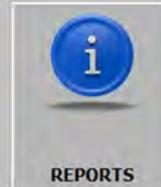
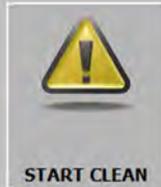
Physical Data

Voltage	110–240 V
Frequency	50/60 Hz
Ethernet	Required for data transmission



STATUS

Idle



The RheoProfiler automated rheometer home page is structured for the user to rapidly access its many functions.

Accurate Hydraulics Proved Critical in Preventing Stuck Pipe in Extended-Reach Well

RheoProfiler rheometer and PRESSPRO RT software deliver advanced hydraulics modeling

Background

A major operator was concerned about stuck pipe in an extended-reach well in which a costly BHA was installed. M-I SWACO recommended to gather and use more frequent real-time rheology and density data obtained with the RheoProfiler automated rheometer; rheology was measured at three temperatures and density every 2 h rather than the standard six intervals to feed into the PRESSPRO RT* real-time downhole performance measurement software.

The increased data intervals were used to optimize the equivalent circulating density and hole-cleaning simulations. The RheoProfiler rheometer was used in the high-risk lateral portion of the well and measurement was conducted to TD, displacement, and up until the cement job.

Technology

- RheoProfiler automated rheometer
- PRESSPRO RT real-time downhole performance measurement software

The RheoProfiler rheometer measured the extra intervals requested by the customer. The optimized PRESSPRO RT software simulations reduced the risk of NPT and aided successfully drilling the high-risk well without serious issues.



RheoProfiler automated rheometer



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