



@balance Xpress

Mobile MPD services

Mi SWACO
A Schlumberger Company



Drill faster and reach farther with @balance Xpress mobile MPD services

In operations around the world, M-I SWACO enables customers to improve drilling efficiency and reduce costs with managed pressure drilling.

Achieve drilling objectives with closed-loop systems

MPD provides a closed-loop circulation system in which pore pressure, formation fracture pressure, and bottomhole pressure are balanced and managed at surface. @balance Xpress* mobile MPD services deliver a customized combination of hardware, control technologies, and experience-based knowledge that helps operators to achieve their drilling objectives.

Improve drilling efficiency, wellbore stability, and kick response

Traditionally, MPD systems have helped operators “thread the needle” in tight drilling windows, enabling them to complete wells that rank among the world’s most challenging. In today’s competitive drilling environment, wells of all types can deploy MPD to improve drilling efficiency, manage wellbore stability, and improve kick detection and management. Downhole pressure plays a critical role in any drilling scenario—MPD enables operators to manage pressure to improve drilling performance.

Manage pressure values

MPD provides operators with a “mud-weight-on-demand” circulation system—a system that is faster and more effective compared with conventional methods of mud-weight alteration. The practice of applying and adjusting pressure on the wellbore results in

- reduced frequency of stuck pipe incidents and the time to resolve them
- decreased mud losses and associated costs
- rapid, controlled response to pressure changes such as kicks and ballooning.

The technology, software, and personnel deployed by M-I SWACO to solve MPD challenges help prevent drilling problems at the field level, not just the well level.



@balance Xpress services

To meet the needs of high-volume land operations, M-I SWACO delivers MPD services via @balance Xpress services. The mobile platform enhances the flexibility of an MPD installation by providing key pressure control components required to complete MPD operations in efficiency-driven drilling environments.

Unlike with traditional MPD equipment, @balance Xpress services transport, deploy, and operate all MPD components from an integrated trailer or skid. This streamlined approach reduces rig-in and rig-out time at the wellsite and enables rapid, efficient, and cost-effective MPD operations.

@balance Xpress Services Platform Components

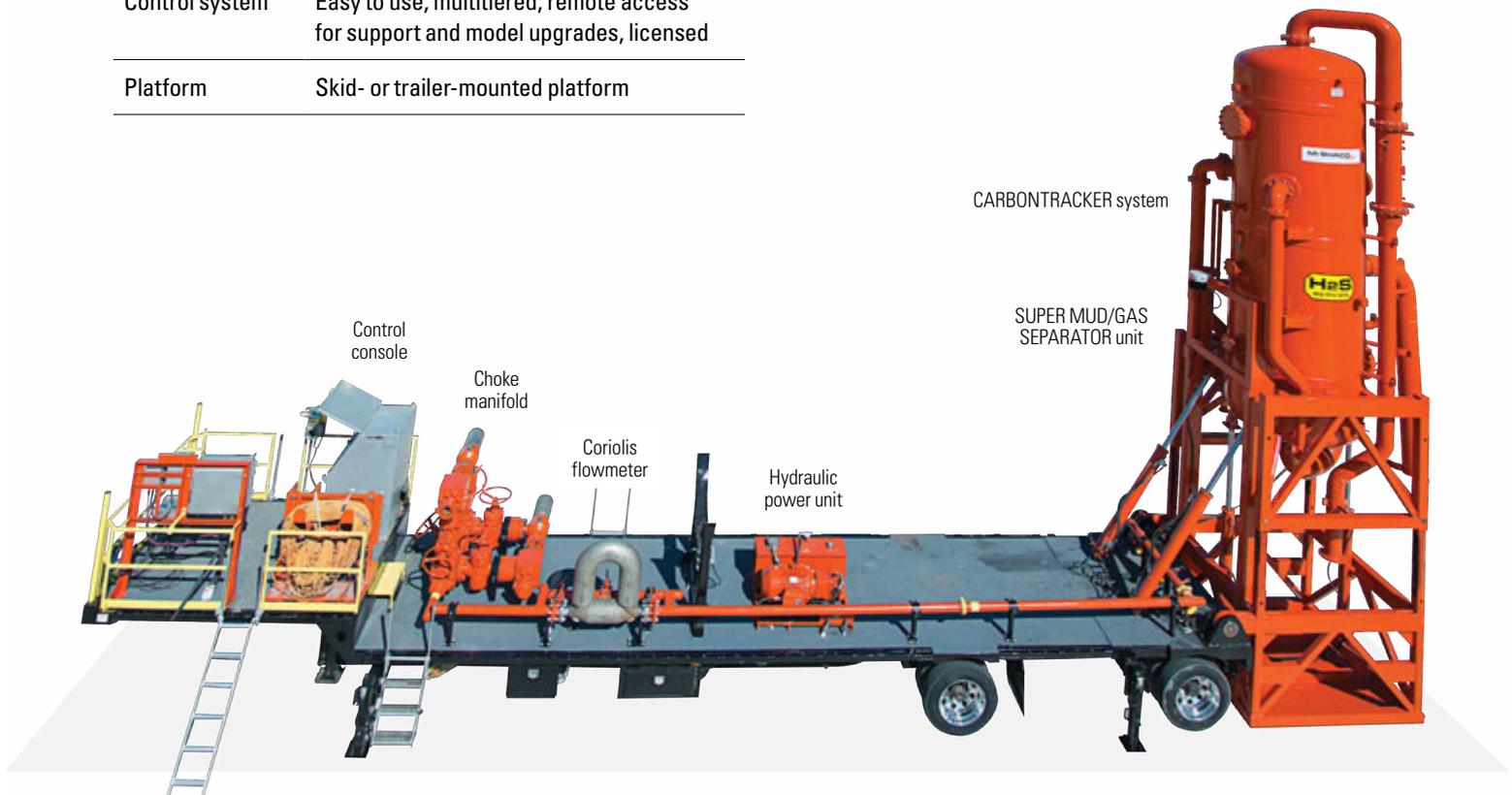
Rotating control device	Easy to operate, hydraulic clamping, rated for the application pressure, refurbishment service (bearing and element)
Manifold	Original equipment manufacturer, multipurpose options (MPD only or MPD and well control integrated with isolation and redundancy)
Chokes	Multipurpose, optional actuators
Separator	Fit-for-basin specification (SUPER MUD/GAS SEPARATOR unit for high flow and high gas content, custom design, existing rig equipment), fluid height sensors, self-erecting
Metering	Options for CARBONTRACKER* gas flow measurement system, Coriolis flowmeter, mud-gas separator
Sensors	Multiple pressures, flow of fluid and gas, separator height, choke position, choke pressure
Control system	Easy to use, multitiered, remote access for support and model upgrades, licensed
Platform	Skid- or trailer-mounted platform

Full MPD functionality in a callout package

The trailer-mounted @balance Xpress services platform is ideal for callout in high-volume markets including US land, Canada, Saudi Arabia, Argentina, and Mexico. Operators using skidding rigs to complete pad drilling projects can leverage fast and flexible @balance Xpress services to deploy MPD capabilities on each well. The innovative, self-erecting SUPER MUD/GAS SEPARATOR* high-capacity unit enables faster, safer, and smarter installation in a compact footprint ideal for smaller locations.

Innovative and integrated MPD equipment delivery

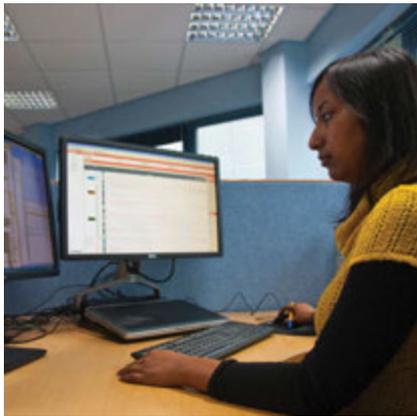
@balance Xpress services platforms are outfitted with an integrated suite of pressure control equipment capable of handling a range of MPD projects. The platforms feature multipurpose chokes for both MPD and well control and easily shifts between MPD and conventional drilling operations.



Well engineering and project management

Experienced M-I SWACO MPD engineers analyze, plan, install, and execute MPD operations through customizable well engineering and project management workflows. From completing rig-in and rig-out of the @balance Xpress services platform at the wellsite to monitoring the progress of the MPD plan, we are dedicated to enabling optimal drilling performance.

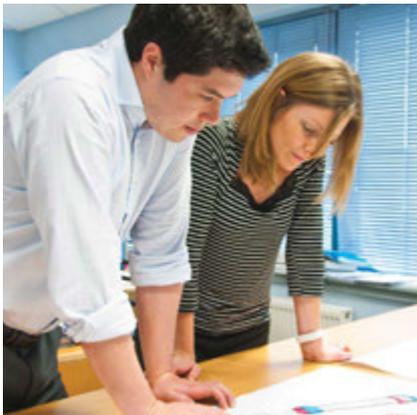
With collaboration from the wellsite to the office, M-I SWACO provides top-to-bottom drilling support focused on increasing drilling efficiency and achieving customer objectives.



Well analysis

We first seek to understand the needs and risks present in a planned well to deliver a comprehensive drilling solution. Working with customer drilling engineers, M-I SWACO MPD engineers analyze various drilling scenarios to determine the optimal pressure limits, fluid hydraulics, and mud weights for a given project. This analysis forms an engineered MPD basis of design, including drilling and pressure control procedures, contingencies, and required training.

One of the greatest strengths of our well engineering services is the vast, proven suite of M-I SWACO software resources. In prejob planning, MPD engineers use VIRTUAL HYDRAULICS* drilling fluid simulation software to evaluate and design critical drilling hydraulics under simulated downhole conditions.



Wellsite deployment

When the @balance Xpress services platform arrives at the wellsite, experienced M-I SWACO MPD engineers ensure that the equipment is installed proficiently and in a timely manner. The reduced rig-in and rig-out time and crane-free deployment of the @balance Xpress platform enable customers to spend less time installing equipment and more time drilling.

Project execution

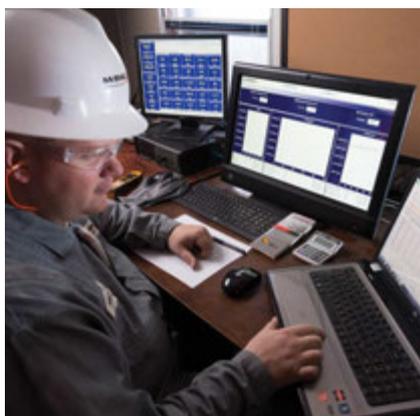
When MPD system components are in place, our MPD engineers execute the plan using dedicated resources. At the wellsite, we leverage PRESSPRO RT* real-time downhole performance measurement software to monitor and optimize downhole pressures. As the job is executed, prejob modeling is compared with encountered conditions to ensure that optimal drilling performance is achieved and informed responses are made rapidly if circumstances change.

With powerful software and years of experience, M-I SWACO enables operators to turn many MPD decisions from reactive to proactive.



@balance Control systems

Downhole pressure management is all about the ability to control applied annular pressure precisely and proactively. The @balance Xpress services platform can be equipped with an MPD control system to meet the needs of any drilling project. From simple, low-tier control with the LOW-PRESSURE AUTOCHOKE* precision drilling choke console to automated, high-tier MPD services with the i-balance* real-time, automated managed pressure drilling control system, the flexibility of the @balance Xpress services platform means that the right control system is always on location. Through @balance Control* MPD systems, the platform can be equipped with the following MPD packages:



Fully automated pressure control with the i-balance system

For drilling operations that require a high degree of downhole pressure control, M-I SWACO offers the i-balance system. This advanced system provides real-time automated MPD control with numerous additional features—including trip pressure management and early kick detection—that add value to drilling operations. By linking choke control to sensor inputs and a real-time hydraulics model, the i-balance system responds quickly and effectively to changing pressures and flow rates to maintain the target bottomhole pressure.

Because the i-balance system traps annular pressure on connections, an auxiliary backpressure pump is no longer necessary, making the system ideal for tight locations and offshore rigs with limited deck space.



Semiautomated pressure control with the e-balance partially automated MPD control system

When fully automated pressure control is not required, the e-balance system is available to provide streamlined pressure control. The e-balance* partially automated MPD control system follows a simple, editable ramp schedule to deliver the desired backpressure at any flow rate. The system can also be operated in manual mode, enabling the choke operator to manage the required choke position and pressures via the human machine interface (HMI) on the rig floor. When cost is a priority, the system may be licensed to the operator to reduce crew size, with a customer drilling engineer or wellsite supervisor taking ownership of MPD control.

The e-balance and i-balance systems are delivered on a common equipment platform, enabling a simple transition between automated and semiautomated pressure control as drilling requirements change in different hole sections.



Manual pressure control with the LOW-PRESSURE AUTOCHOKE console

The LOW-PRESSURE AUTOCHOKE console delivers accurate and economical pressure control for low-surface-pressure MPD and underbalanced drilling operations. This system offers choke control via digital remote or direct mechanical actuation. In either setting, the console enables operators to transition between AUTOCHOKE* pressure-balanced drilling chokes while controlling two units simultaneously.

The console's sunlight-readable touch screen panels ensure accurate readings in any weather condition and allow for precise pressure inputs to the AUTOCHOKE chokes. Screens display additional operating parameters including casing and drillpipe pressures, pump rates, strokes, and diagnostics.



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