

Flow Testing Services

A portfolio of products and services







Flow testing services

TechnipFMC is a global leader in oil and gas products, technologies, systems and services. Our offerings range from individual products and services to fully integrated solutions with a single interface to ensure seamless execution. By bringing together complementary skills and innovative technologies, we can boost efficiency, reduce costs and accelerate schedules. We provide expertise across three distinct segments: subsea, onshore/offshore, and surface projects.

TechnipFMC's flow testing products and services successfully combine modular flexible options for all completion and production testing needs. Our diversified solutions offer versatility to accommodate various particle sizes and solid concentrations in different fluid/reservoir characteristics.

Our technologically advanced Flow testing products and services have evolved to provide the most cost-effective solutions and are designed for oil and gas operators who need a safe and reliable method to separate solids at all stages of the production testing process. Our cost-conscious process prevents wear and tear to flow components, cuts manpower needs and reduces Non-Productive Time (NPT).

Using configurable and proven technologies, TechnipFMC provides cost efficiencies for solids separation. As no two completion conditions are the same, our regionally located sales and technical representatives add value by recommending the right equipment for the right situation.



Benefits of TechnipFMC's flow testing services include:

- ▶ Lower CAPEX
- ▶ Reduced complexity
- ▶ Greater flexibility

Frac assist



The frac assist phase encompasses hydraulic fracturing operations. Our cross-trained personnel assist with flowback, pressure bleed-offs, and greasing operations during the frac. We offer integrated solutions for customers seeking to increase efficiency and simplify their job site. Our solution combines frac assist with fracturing equipment rental and can extend into the production phase with a series of unique solutions. Our technicians and equipment support and interface with coil completions.

Our cross-trained personnel perform pressure bleed-offs and greasing operations.

Flow processing

TechnipFMC designs and manufactures flow processing products of the highest quality. We are guided by the strictest standards to ensure the safety of our employees and clients and the integrity of the environment.

Applications and features

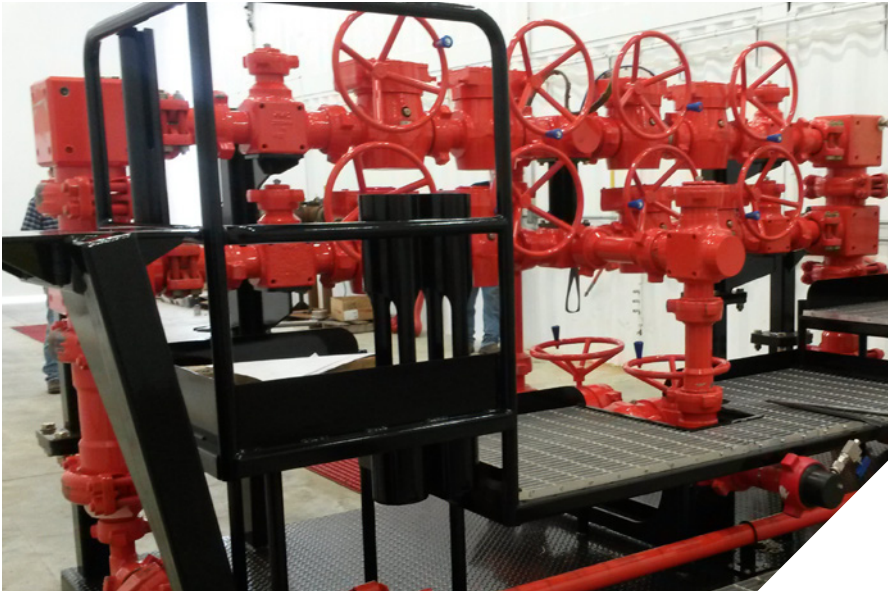
- ▶ Frac support
- ▶ Drill out packages
- ▶ Scalable safety systems
- ▶ Remote hydraulic systems
- ▶ Multi-well tie-in manifolds
- ▶ Online live view systems
- ▶ Advanced separator designs and configurations
- ▶ LEL detection systems
- ▶ Portable Lab grade C1-C9 Gas chromatographs
- ▶ Zero emission instrumentation
- ▶ Adjacent well frac monitoring system
- ▶ Annular pressure regulating
- ▶ Green completion



TechnipFMC's flow processing services on location.

Drill-out

Following fracturing operations, drill-out commences during which we remove the frac plugs from the well and complete an initial well clean-up. Our Closed-Loop Drill-Out Package provides a high-pressure system that can remove 90% of solids in flowback fluids while reducing emissions.



Closed-Loop Drill-Out Package

Applications

- ▶ The Closed-Loop Drill Out Package improves on current equipment by advancing operational safety, saving time and money and minimizing the potential for environmental issues.
- ▶ The system complies with local, state and federal regulations.

Benefits

- ▶ Green completion system reduces emissions, complying with environmental regulations.
- ▶ Effective solids removal reduces equipment damage, resulting in less downtime and lower repair and replacement costs.
- ▶ Portable equipment lessens the operational footprint compared to other systems, reducing locational space requirements and transportation costs.
- ▶ Hydraulic choke system increases operational efficiency.
- ▶ Increased efficiencies through multi-stage gas and liquids separation results in less waste and higher revenues.

Features

- ▶ 2000/1440 psi Test Separator is used for high efficiency gas and liquids separation.
- ▶ Secondary storage vessel is utilized to reduce emissions.
- ▶ 10K FMC DeSander PRO removes higher solid and particle content during the drill out phase.
- ▶ 10K DeSander cleans stream from the finer solids that pass through the DeSander PRO.
- ▶ 10K Hydraulic Choke Manifold and Command Trailer enable remote operations that provide a safer and more efficient drill out operation compared to manual choke systems.
- ▶ Hydraulic blowdowns installed on the DeSander Pro eliminating risks associated with manual valves.

Well testing

The final step is to flow the well and test its production potential, and, if needed perform an extended clean up. This is the transition point from completion to production. TechnipFMC provides well testing services utilizing mobile production testing equipment.

Benefits

- ▶ Cleans remaining frac fluids and solids from wellbore
- ▶ Measures initial well production
- ▶ Transitions to client's production equipment

Services

- ▶ Green completion / closed loop system
- ▶ Production testing
- ▶ Abandonments
- ▶ Bleed-offs
- ▶ In-line testing
- ▶ Drill stem testing
- ▶ Snubbing support
- ▶ Well control
- ▶ Swabbing
- ▶ Acid recovery
- ▶ Early production facility



To ensure the safe operation and reliability of our pressure equipment and compliance with safety codes, we employ methods for effectively managing the integrity of our pressure equipment throughout its lifecycle. From design and construction, to NACE standards and installation, through service life (operation, maintenance, repairs, alterations, integrity assessments, etc.) to decommissioning. An effective Integrity Management System process optimizes integrity assessment, reduces downtime and ensures appropriate control of pressure equipment assets.

This is achieved through a combination of procedures, best practices and management systems defined in the Pressure Equipment Integrity Management System (PEIMS) manual. The manual applies to all pressure vessels and pressure piping systems containing an expandible fluid above 103 kPa (15 psi) as defined by the Province of Alberta Safety Codes Act. Our equipment meets government regulations for the states and provinces in which we operate.



TechnipFMC's offers separator vessels for any size project.

Separators

Used for separation of gas, oil, water and solids produced from the wellbore, large separators also are utilized for liquid stabilization, containment and hazardous vapors control.

- ▶ Low to high pressure and temperature vessels (285psi, 500psi, 720psi @400°F, 1440psi @400°F , 2000 psi)
- ▶ Storage separators - 60m³/200psi @385°F
- ▶ Automated equipped products
- ▶ Nace specification sour rated
- ▶ Trailer and skid mounted

Solids separation

Conventional solid removal units have less than 50% efficiency in the removal of solids, causing clogging of flowlines, erosion of chokes and accumulation in separator vessels and requiring continuous monitoring with possible intervention. This leads to costly repairs and throwaways, operational shutdowns, additional manpower and parts, and the carryover of solids into water and oil streams after separation.

DeSander

A groundbreaking advancement in separation technology, TechnipFMC's Wellhead DeSander is land-based, compact and mobile and can eliminate 90 to 99% of incoming sand from a flowback stream.

Conventional sand traps have a 50% efficiency rating, limiting the amount of sand removed from the flow stream and presenting an erosion threat to downstream equipment such as manifolds, chokes and valves. In addition to operational inefficiency and increased costs, choke breakdowns can lead to safety and environmental hazards.

The TechnipFMC Wellhead DeSander is specifically designed to eliminate 99% of proppant larger than 100 microns, during initial and extended testing deployments. The DeSander employs generic, easy to replace parts that keep costs down and encourage long system life. It was developed using technology designed by our Separation Innovation and Research Center in Arnhem, The Netherlands.

Benefits and features

- ▶ Incorporates mobile skid design
- ▶ Applied in flowback and production applications
- ▶ Reduces downstream equipment erosion
- ▶ Customized liners (internals) accommodate specific flow ranges:
 - 4" Liner - 4525 to 13575 BPD
 - 3" Liner - 2260 to 6780 BPD
 - 2" Liner - 1130 to 3394 BPD
- ▶ Improves efficiency of oil and water separation
- ▶ Accelerates time to production by potentially reducing flow testing
- ▶ Eliminates potential safety and environmental hazards related to choke breakdowns and the need for interventions
- ▶ Minimizes sand in production facilities and ensures optimal performance of process equipment

DeSander PRO

TechnipFMC's solids removal technology is innovative and designed to accommodate different flowback stages, reservoir considerations and fluid properties. The DeSander PRO offers field-proven cyclonic technology that can be used during drill-out applications.

During qualification trials of the DeSander PRO, 700+ stages were completed with minimal erosion. During the qualification of the technology, our results showed 90 to 95% efficiencies in our solids separation.

Benefits and features

- ▶ Effective technology for drill-out operations
- ▶ Incorporates mobile skid design
- ▶ Reduces downstream equipment erosion
- ▶ Handles sand concentrations of up to 50 percent
- ▶ working pressure to 10,000 psi

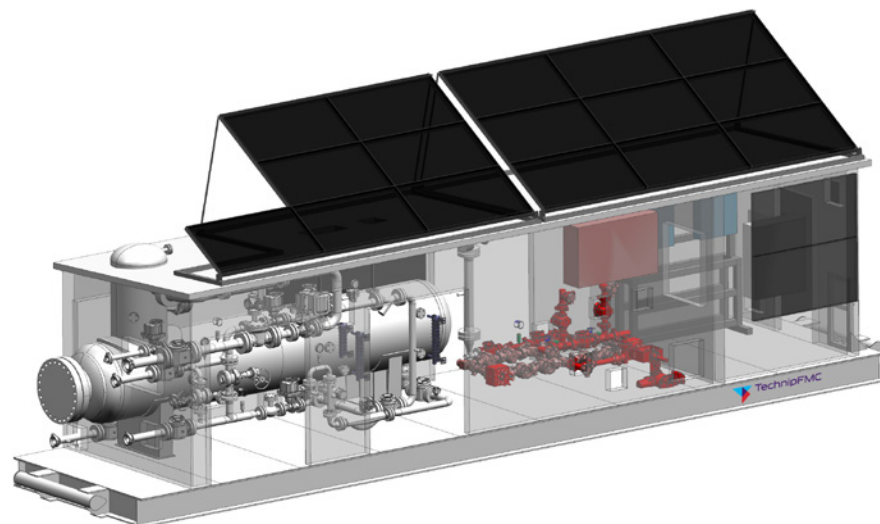


TechnipFMC

TechnipFMC's
Desander

Automated solutions

Our automated solutions offer technology to reduce on-location manpower needs. This patented, field-proven technology provides reliable, real-time data to the client.



DeSander Automation

Our DeSander automation reduces safety exposure on location through an automated dump cycle based on solids level detection. The dump cycle is triggered through time-based or level-based sequences.

Remote Tank Monitoring

Our Tank Level Monitoring solution (TLM) enables an operator to remotely monitor tank levels, with system automated alarms and notifications. All information is

recorded on a per-job basis and reported using our UCOS Remote Monitoring Data Service (URDS). TLM runs as a stand-alone device or connects to other systems via secure network connections.

Automated Well Testing Package

TechnipFMC's Automated Well Testing Package provides immediate production with accurate measurement and real-time access. This solution creates an easy

transition from drill-out through initial production as upstream separation enables immediate production. The client specific requirements set through the Human Machine Interface (HMI) can be monitored onsite and remotely, allowing for rapid recognition and response to upsets like emulsions and foaming. Pressure setpoints enable monitoring and control of gas. Oil sampling and quality control enable monitoring and adjustments of separation efficiency in real time.

Well production rates are monitored using upstream metering, including flow temperature and general quality. Also, wellhead conditions including tubing, casing and choke differential pressures are monitored wirelessly. In contrast, conventional flow testing units vent gas every time a control valve is cycled.

The Automated Well Testing Package is quickly deployable, delivers advanced separation quality allowing operators to flow directly into production, and is eliminating the need for temporary tank storage and truck disposal. The unit also stabilizes flow conditions for permanent production tie-ins.

UCOS is a mature controls and automation platform with a 25 year history with global energy customers. UCOS provides interoperability with all major SCADA providers, and seamlessly integrates in the current upstream digital environment. The scalability, flexibility, and security provided by UCOS is unmatched and uniquely positioned to serve the ever expanding needs in upstream production digitization.

Technical specifications

Choke manifold

- ▶ TechnipFMC product
- ▶ 10,000 psi, 9-valve, one positive, automated chokes

Separator

- ▶ TechnipFMC design with FMC Separation Systems Internals
- ▶ Class 600, 1,440 psi, NACE, -20°F MDMT
- ▶ 100% closed loop, zero emissions
- ▶ 10,000 BPD liquid capacity
- ▶ 4 Phase including sand level detection

Skid

- ▶ Tail roll skid, building enclosure will be added - non-permitted load
- ▶ Footprint: 8.5' wide x 40' long

Measurement

- ▶ Promass Meters (Coriolis)
- ▶ Custody transfer separation and measurement

Complete system

- ▶ Guided-Wave radar level controls
- ▶ 24 VDC solar/battery powered, no fuel gas or diesel required
- ▶ Remote monitoring and data includes pressures, temperatures, flow rates, densities, levels
- ▶ InsiteX remote monitoring web portal, automated flowback reports

Benefits and features

Reduced costs

- ▶ Less equipment erosion and maintenance
- ▶ Reduced power requirement
- ▶ Reduced safety exposure
- ▶ Reduced transportation costs
- ▶ Rig-up / rig-down efficiencies

Automation

- ▶ Fully automated package including DeSander level detection
- ▶ Emergency Shutdown Device (ESD)
- ▶ Remote troubleshooting
- ▶ Real-time data
- ▶ Live readings - all process variables, valve positions, oil sampling averaging
- ▶ API and AGA flow calculations

Real-time trending

- ▶ Remote data access capabilities
- ▶ History well test logging

Rig-in

- ▶ Modular design
- ▶ Fewer connections
- ▶ Reduced trucking
- ▶ Cleaner location

School of Service Surface Americas

Flow testing training is offered through our School of Service Surface Americas, with pad training available in Tomball TX. The year-long training process, including on-the-job training, develops our personnel from novice to Supervisor. Refresher courses are offered online to reinforce our expertise in flow testing solutions.



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