



EXPRO

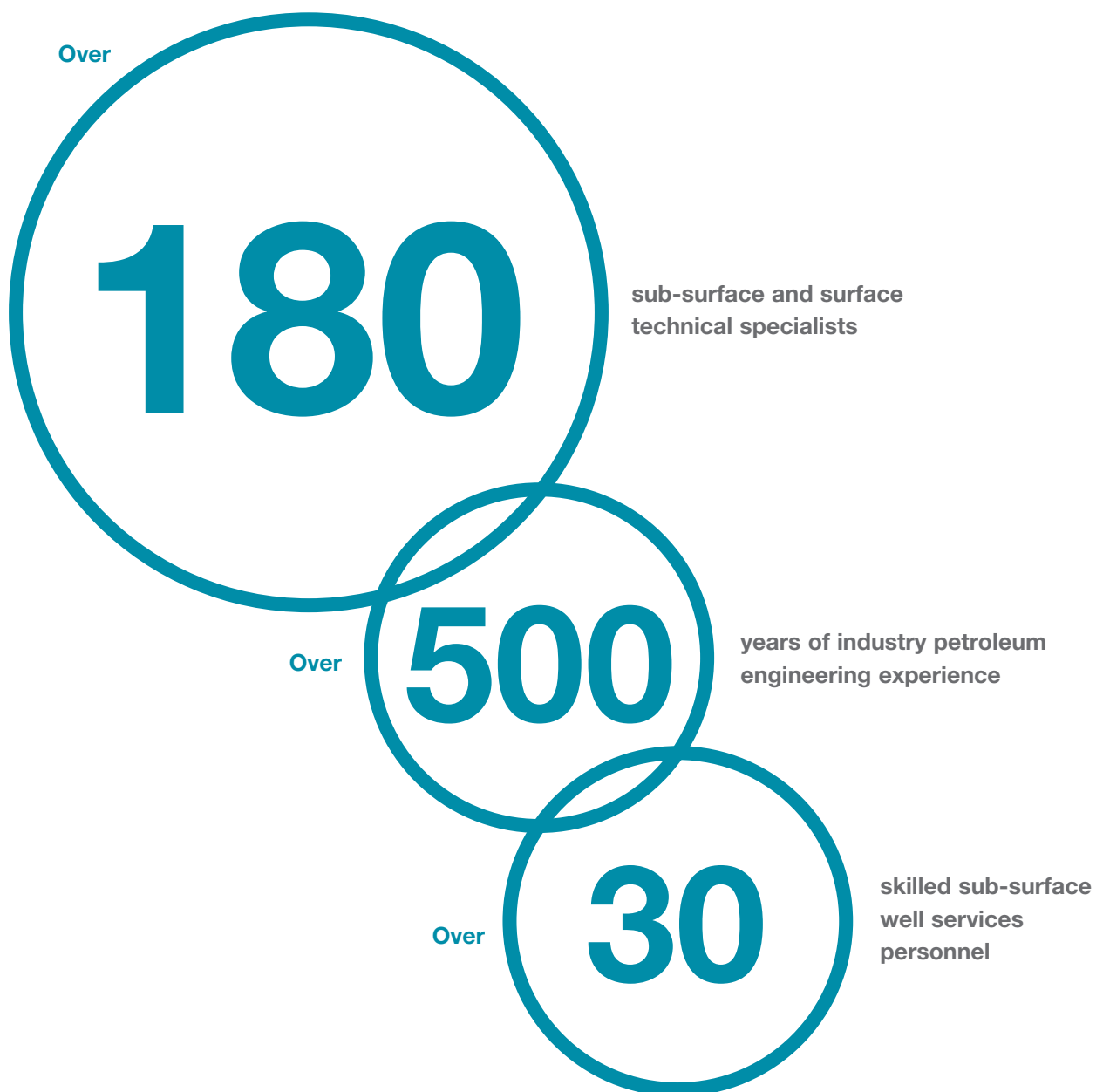
WELL FLOW MANAGEMENT™

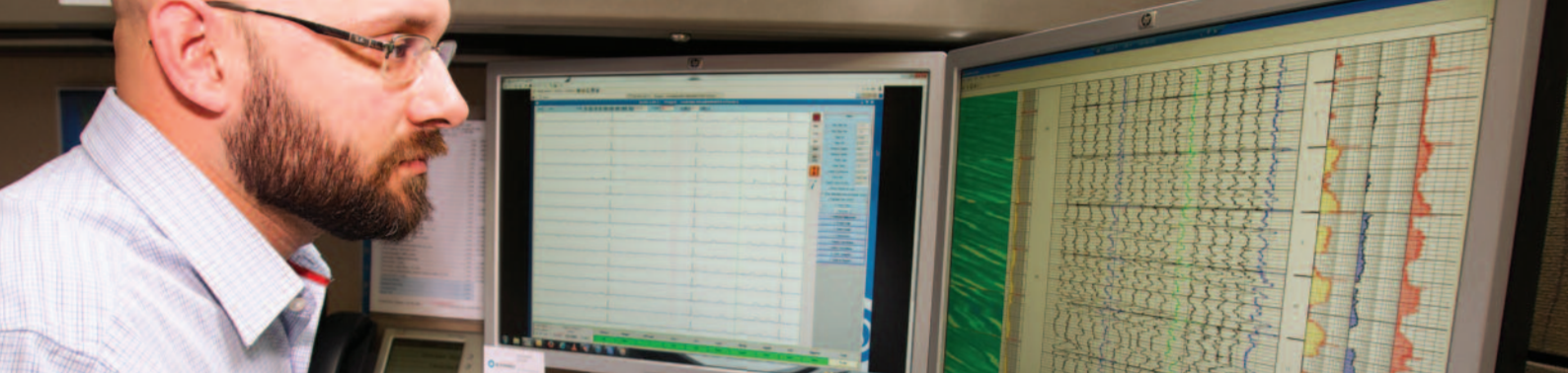
/ Petroleum Engineering Services

Bespoke petroleum engineering expertise, designed to maximise your well flow management capabilities



Expro provides a range of **petroleum engineering expertise** to support its well flow management capabilities. With broad **sub-surface** and **surface technical strengths** in reservoir engineering, well engineering and production technology, Expro are able to offer a range of well test design, transient pressure analysis, well design, production, well integrity, log interpretation, fluid interpretation and analysis services.





What we offer

Expro is a leading provider of well flow management services, built on a solid foundation of petroleum engineering expertise, to address our client's sub-surface and surface needs.

This includes expertise across four key areas:

Reservoir engineering

Expro provides a range of reservoir engineering expertise to support its well test, reservoir monitoring and perforating businesses. This includes well test design, well test interpretation and pressure transient analysis. For perforating design, Expro can also provide reservoir inflow modelling to evaluate optimum perforation design.

Log interpretation and analysis

Expro provides comprehensive log interpretation capabilities to support its cased hole evaluation business. These capabilities have been built over the years, based on Expro's memory production logging and tubing and/or casing caliper services.

Fluid analysis

In addition to comprehensive PVT analysis services, Expro provides a range of analytical fluid analysis services relating to the composition of hydrocarbons, produced water and/or solids. Specific areas of expertise include mercury analysis, sulphur speciation, water analysis, enhanced oil recovery and CO₂ injection and scale prediction. Many of Expro's fluid services are accredited to ISO 17025.

Production

Expro can provide a range of production related services including process simulations, modular facility design, equipment sizing, flare radiation studies etc. to support its production systems capabilities. These studies are typically used to support Expro's extended well testing, early production, production optimisation and production enhancement services.

Well engineering

From a well engineering perspective, we can provide a range of services relating to the integrity of a well. For well integrity, Expro is able to support with the creation of well integrity management systems, engineering studies and well examinations. Expro Well Engineers act as Operations Engineers in client offices for operations support including workover/intervention programme planning and supervision of operations.

Reservoir engineering

Pressure-temperature survey/pressure transient test analysis

Expro provides reservoir pressure and temperature data collection services through its market-leading wireline downhole gauges. These gauges can be provided in memory, cable and wireless telemetry versions for drill stem test; surface well test; or longer term reservoir, production or abandoned well monitoring applications.

By working closely with company engineers, we design bespoke tests to meet the exact objectives of each individual client. We achieve this by reviewing the reservoir model and production history of the well to create simulation models that allow the test procedure to be optimised.

Once data from the test is successfully collected, Expro can provide flowing and static gradient survey reports, including gas lift evaluation. Detailed pressure transient analysis is also performed, with answers provided in a fast and efficient manner utilising Saphir software (a licensed Kappa product), combined with our own in-house software.

Reservoir evaluation/reservoir modelling

Expro can also provide detailed pressure transient analysis services that allows complex reservoir evaluation to be conducted for:

- **Multi-layered systems**
- **Multiple well reservoirs**
- **Analytical and numerical reservoir modelling**
- **Real-time production analysis modelling**

By working closely with company engineers, we derive the most accurate and complete evaluation of your specific reservoir. This is particularly effective in deep water operations, using the pressure data collected from permanently installed pressure gauges to model and continuously update the model over the life of the well(s).

This is achieved through a range of market-leading software, including Saphir, Topaze, Diamant and Rubis.

Production logging/leak detection

Production logging and leak detection services are extremely important for managing and optimising a well's performance, which is why these capabilities lie at the heart of Expro's log interpretation and analysis services.

Expro production logging tool strings usually contain sensors such as:

- **CCL (casing connection log)**
- **Gamma ray**
- **Pressure**
- **Temperature**
- **Spinner flow meter**
- **Capacitance**

Expro's interpretation capability for these tools allows operators to diagnose well problems, detect unwanted communications, evaluate the performance of production or injection zones, determine fluid characteristics and calculate detailed product or injection profiles.

Using a combination of production logging and pressure build up, Expro can provide a breadth of valuable information that maximises well and reservoir performance and evaluation, supported by key software such as Emeraude and Warrior.

Well integrity

Well integrity services are offered by Expro through the provision of caliper surveys and downhole video camera services. Expro interpretation capabilities for these services provide well owners the opportunity to identify tubing and casing corrosion, wear, obstructions, deformity and downhole abnormalities.

Multifinger caliper surveys are performed to indicate the severity of corrosion and erosion, which aids in evaluating our client's wireline and workover options. Caliper surveys are also run to locate holes, splits, and severe bends in the tubing strings so remedial decisions can be orchestrated. With over 80 years of experience, our data analysis team has an in-depth knowledge of multifinger caliper data, wellbore environments and tubing/casing configurations. We actively strive to provide a precise and flawless analysis of the wellbore to aid our clients with well flow management.

Analysis services provided:

- Kinley calipers including:
 - **Micro, Baseline, Mega, Pipeline and Tandem options**
- **Sondex caliper**

Fluid analysis

Fluid properties

Expro have extensive bottom hole and surface fluid sampling capabilities that are supported by a range of fluid analysis services, which apply across the life of the reservoir from exploration and appraisal through to secondary / tertiary recovery. These services, both laboratory and field based, can provide the client with hydrocarbon identification and geochemistry, detailed PVT properties and fluid composition, solids (wax, asphaltenes and hydrates) deposition potential and water chemistry. Other specialised services we offer include injection gas / reservoir fluid miscibility studies.

Analytical data services (ADS)

We provide a range of water chemistry and investigative laboratory and onsite chemistry services. Water chemistry services can be conducted on pressurised samples and include chromatography and detailed elemental analysis. Investigative laboratory services include unknown solids identification, environmental analysis and contamination investigations. Onsite chemistry services include everything from basic fluid analysis tests through to detailed mercury and sulphide speciation tests.

Multiscale

Expro MultiScale Simulation Software was launched in 1993 and is used extensively worldwide for scale simulations by major operating companies, research centres (universities) and chemical producers. An optimal scale simulation result depends on accurate data and the correct type of samples. Erroneous simulation may be due to poor sampling technique, loss of sample integrity and incorrect analysis methodology. Expro can offer the full range of sampling and analysis services to ensure this essential data is provided accurately and efficiently.



Well engineering

Well design and operations

Expro provides a wide range of well engineering services including; onshore management, expertise and systems, well-site services, supervision and support. Our well engineers will work stand alone, embedded in the client's operations team as part of a specific project, or in a continuous well engineering support function.

These well engineers prepare well programmes for our clients across a complete range of well services activities, including:

- **Completions**
- **Workovers**
- **Well tests**
- **Well intervention operations**
- **Well abandonment planning**
- **Wellhead maintenance scheduling and planning**

As part of the completion design, Expro can offer a range of inflow performance modelling, tubing stress analysis and quantitative and qualitative risk assessment services.

Well integrity

Expro is uniquely positioned to provide a comprehensive range of services to maximise well availability and productivity, whilst minimising regulatory and HSE risk. Rather than simply providing reactive services on request, Expro provide operators with a full range of well integrity services including well integrity training, WIMS, GAP analysis, engineering studies, maximum allowable pressure (MAASP) reviews and well examinations.

Combined with its log interpretation and analysis services, Expro's well integrity capability provides operators with a cost-effective solution to the challenges of managing an ageing field.

Supporting Expro's well integrity services is SafeWells, a pioneering new well integrity data management solution. Developed by Expro in collaboration with industry, this software provides a clear overview of operators' well integrity status. to address many of the challenges experienced relating to integrity data. By providing a central repository of well integrity data, SafeWells provides a solution to many of the elements required for a company's well integrity management policies. SafeWells can be customised, enabling operators to configure the system in accordance with their policies and procedures and in alignment with legislation and industry best practices.



Perforation and stimulation simulation

Expro provides a number of simulation services to model the performance of our perforating services.

Perforation tunnel modelling using PE Mosely 'WEM' software

WEM utilizes API 19b published test data along with reservoir data to simulate the perforation tunnel geometry for a given application.

Nodal analysis modelling using PE Mosely 'GEM' software

GEM uses the data provided from WEM modelling and models well performance. The software works on the principle that it is possible to characterise reservoir inflow and wellbore outflow as functions of flow rates.

Torq and drag modelling using 'Cerberus' and 'WellCat'

Cerberus is state of the art software used for modelling operations involving running DST/TCP tools into and out of wells. Cerberus analyses the cumulative forces acting down-hole at each stage of the operation, and is able to determine whether the target depth can be reached, the desired task performed and the equipment safely returned to surface. It's most important feature is the ability to model conditions in deviated and horizontal wellbores.

Gun shock modelling using 'Pulsefrac'

Pulsefrac is a software modelling package that simulates dynamic downhole forces and reservoir behaviour during perforating. The software simulates internal and external pressure surges on tubulars, and compressive loading on packers.

Dynamic underbalance modelling using 'Pulsefrac'

In this case, Pulsefrac uses the gun volume and additional 'surge chambers' to create a downhole flow surge without flow to surface. This surge lasts only one to two seconds, and has been proven to increase performance in longer perforation zones by ensuring distribution of clean perforation tunnels.

StimGun / StimTube modelling

Expro also use Pulsefrac to ensure that the most efficient and effective amount of propellants are used in our StimGun/StimTube applications.



Expro's mission is **well flow management**. We provide services and products that **measure, improve, control** and **process** flow from high-value oil and gas wells, from exploration and appraisal through to mature field production optimisation and enhancement.

With a specific focus on **offshore, deepwater** and other **technically challenging environments**, we provide a range of mission critical services across **three key areas**:

- Well Test & Appraisal Services
- Subsea, Completion & Intervention Services
- Production Services

Our vision is to be the **market leader** in well flow management, using the industry's best people, to deliver the highest standards of **safety, quality** and **personalised customer service**.

We provide a range of solutions including:

- Exploration & Appraisal Testing
- Subsea Safety Systems
- Drilling & Completion
- Flowback & Clean-up
- Production
- Well Integrity & Intervention

Expro's **40+ years** of experience and innovation empowers the company to offer **tailor-made solutions** for customers across the energy sector. With over 5,400 employees in over 50 countries, Expro offers a **truly global service solution**.



Contact us:

Reservoir engineering

Pressure-temperature survey / pressure
transient test analysis
Reservoir evaluation / reservoir modelling

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Log interpretation and analysis

Production logging / leak detection
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