Logging Services

EXPRO

Innovative technology
Excellence in operations

Logging services

The global oil field is an environment where the only constant is change. **Changing markets, changing standards, changing technologies.** Expro is continually developing new technologies and re-evaluating its existing portfolio and structures to ensure that we can deliver to our customers an effective service tailored to their individual needs.

The market is seeing a trend of ever smaller reservoirs being discovered and developed. This places a requirement on the service companies to supply more flexible, cost-effective, solutions on a larger scale in order to meet the demands of this new market.

From its position as a well servicing company specialising in well flow technologies, Expro provides the full range of slickline and electric line logging services. By focusing on the integration of these disciplines, Expro can provide a service that is more responsive, and can accommodate a larger range of services with smaller overall crews.

Expro delivers all the services you need.

Production monitoring

Operators need flexible solutions in ever-more challenging environments. Expro has the production optimisation capability to meet those needs.

The range of Expro's wireline intervention portfolios ensures that the latest tools are always available and the customer is offered the optimal solution.

Production logging tools

Expro has established itself as the global market leader in cost-effective memory production logging since introducing the first memory production log into the North Sea in 1985.

Electric line services using mono- or multi-conductor cables are commonly used where customers require real-time data for time-critical decisions. The on-site acquisition services are backed up by data analysis centres, which provide expert analysis to fit customer needs.

Expro's production logging strings can be deployed via slickline, coil tubing, electric line and with Expro's SmarTract™ tractor system in vertical, deviated or horizontal wells. A range of sensors can be incorporated depending on the customer needs.

Production logging

Horizontal logging tools

Wells are continually being drilled deeper and further every year and so the number of horizontal wells increases. Measuring flow and fluids using standard production logging tools on horizontal wells can be problematic.

Traditional production logging tools place the sensors in the centre of the well bore and assume the fluid is uniform in composition and speed across the full cross-section, and this can result in errors in deviated wells. Expro uses the industry's latest tools to place the measurement sensors around the entire well bore circumference to ensure all fluid phases are measured all of the time.

Horizontal logging

Contact: productionmonitoring@exprogroup.com

Expro's philosophy is rooted in a continuous cycle of measurement, intervention and assessment at a field and well level where Expro ensures the tool string deployed is designed to provide the information required for accurate and confident decision making.

Expro's full range of slickline, electric line and tractor deployment capabilities, ensures that our customers' requirements are fully met every time.

Gauges

Gauges

Expro's downhole memory gauges have established a global reputation for reliability, providing the industry with bottom hole pressure and temperature data of the highest integrity. Expro's downhole gauge fleet covers a complete range of applications including HPHT testing at 20,000 psi and 200˚C, extended surveys in excess of one year's duration and short gauges for side pocket mandrel installations or restricted height rig-up applications.

High accuracy quartz crystal sensors are used to provide high resolution combined with low drift for enhanced reservoir analysis.

WIT

Water Investigation Tool

The Expro Water Investigation Tool (WIT™) combines a downhole video camera with several logging sensors to give a tool that is designed to pinpoint hydrocarbon and water entry points in wells where water cuts are in excess of 50%.

In such high water cut wells, traditional electronic sensors used for determining water hold up and phase composition are less than accurate. By using a camera as the primary sensor, it is easy to see where hydrocarbon is entering a water phase while the temperature/pressure/spinner tools are used to identify any water ingress points.

Integrity monitoring

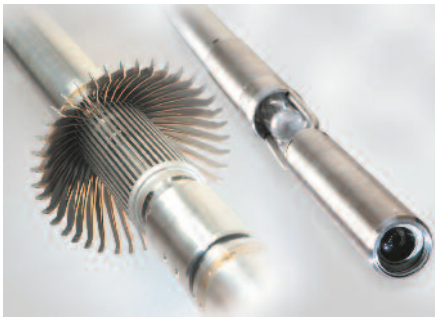
Ensuring that well bore integrity is not compromised by corrosion, scale or mechanical damage and that optimum production rates are maintained is a key issue for all operators. A planned corrosion monitoring program ensures that appropriate measures are implemented before any situation becomes critical.

Caliper and video (CalVid)

The Expro CalVid system combines the accuracy of an electronic multi-finger caliper with the visual images of a downhole video camera, resulting in a more accurate representation of well bore conditions.

Expro's software package allows visualisation of these complementary data-streams by integrating the digital caliper data with the individual frames from the camera ensuring the complementary information can be fully utilised.

The combined caliper and video string, CalVid, allows well bores to be measured and visualised at the same time giving operators a fuller understanding of the well bore. Critical decisions regarding their well and production integrity can then be made based on a complete and accurate assessment of the entire well bore.



CalVid

Fibre optic camera

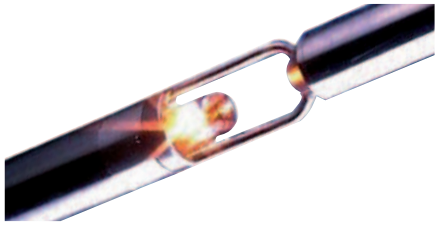
Real-time, full-motion downhole video services provided by Expro's Downhole Video utilise a fibre optic telemetry system that allows distortion-free transmission of clear, sharp video from downhole at 30 frames per second. The key to the system is the dedicated fibre optic logging cable containing an optical fibre for transmitting video from the downhole camera to the surface equipment over long cable lengths. Continuous 'live broadcast' quality video to depths of 14,000 ft viewed real-time in the logging truck are made possible by this fibre optic transmission system. The optic fibre also facilitates a small diameter $^{7}/_{32}$" O.D. cable allowing easier entry into wells with high surface pressure.

Fibre optic camera

HawkEye electric line camera

The HawkEye electric line video system is a portable video inspection system that incorporates technology from the fibre optic video system, including the $1^{11}/_{16}$" backlight camera, but operates on virtually any conventional single or multi-conductor wireline cable.

A ringlight system is also available for smaller diameter tubings. HawkEye was developed to overcome cable limitations of the fibre optic cable and provide video surveys in wells that previously could not be surveyed with the fibre optic system.



HawkEye electric line camera

Contact: integritymonitoring@exprogroup.com

Expro is one of the market leaders in providing a complete solution for all customers' well integrity needs using a combination of calipers, logging tools and downhole video cameras. All of these services can be deployed on:

- **electric line**
- **slickline**, or
- **tractors**

to ensure the customer is offered the maximum versatility.

ViewMax camera

ViewMax incorporates a second camera in Downhole Video's patented backlight camera lighthead. This second camera is pointed sideways and rotates, allowing unobstructed and undistorted views of the wall of the pipe or openhole formation.

ViewMax allows operators to acquire the traditional down view ahead of the tool and/or to view the pipe wall on the same trip in the well.

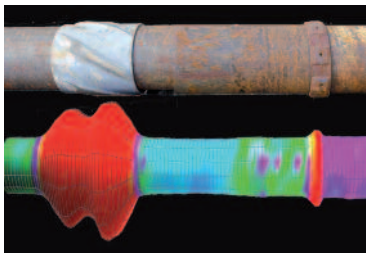
By providing images of the pipe wall, ViewMax can provide operators with more information on the causes of failures in their wells. The tool works with the fibre optic video system and the HawkEye electric line camera.

ViewMax camera

Magnetic thickness tool

This tool is designed to investigate variations of metal thickness within downhole tubulars. It is run centralised within the well bore, ideally combined with a multi-finger caliper tool. The tool has an array of 12 specially developed, miniature magnetic sensors mounted on the inside of a set of bowsprings. Each sensor of the array measures a magnetic value and all 12 values are simultaneously transmitted to the surface where the waveform is recorded. Optional imaging software is available to create and display a 3D representation of recorded data.

Magnetic thickness tool



Magnetic thickness tool comparison

Deployment

Every campaign and every intervention in a well requires a subtly different solution to ensure that all operations performed are optimised to make sure they achieve all of their objectives. The range of factors that have to be considered include type of well, deviation, cost, time in well, production down time as well as a range of others. Only when these objectives and challenges are fully understood can you arrive at a practical solution.

Expro embraces this holistic approach supporting all the key deployment methods – slickline, electric line and tractor.

Each method helps our customers to fulfil different objectives. Only once you have them all at your disposal can you provide a complete integrated service.

Slickline

Expro is the leading global provider of mechanical slickline services with more than 25 years' experience. A complete range of slickline intervention services is provided, backed-up by industry-recognised training and quality programs to ensure the highest level of personnel competency.

Slickline units and cables are available in a range of styles to meet customers' needs, such as Zone II-rated units, 0.160" heavy duty slickline fishing units. Surface computer systems record and store well information, line history, maximum pull and depth run for each job.

Electric Line

Expro believes logging services and associated data acquisition is core to the management of an oil or gas reservoir. Whether it is pressure surveillance, production logging, well bore integrity monitoring or explosive services.

Expro can provide the following surface read out electric line logging services:

- **Production Logging Tools**
- **Caliper Services for Well Integrity**
- **Perforating System**
- **Down Hole Tractor Services**
- **Down Hole Video Services**

Expro provides electric line services with state-of-the-art wireline and logging units.

Contact: deployment@exprogroup.com

Data analysis centre

A key component of Expro's logging and data acquisition services is the ability to provide the customer with a complete interpretation and analysis of the acquired data. With data analysis centres based in Aberdeen, Houston and Al Khobar, interpretations can be provided on the complete range of production enhancement solutions, reservoir surveillance solutions and log analysis services. The data analysis centres complement Expro's field activities by providing comprehensive support not only with the analysis of the data but also with job planning and tool selection.

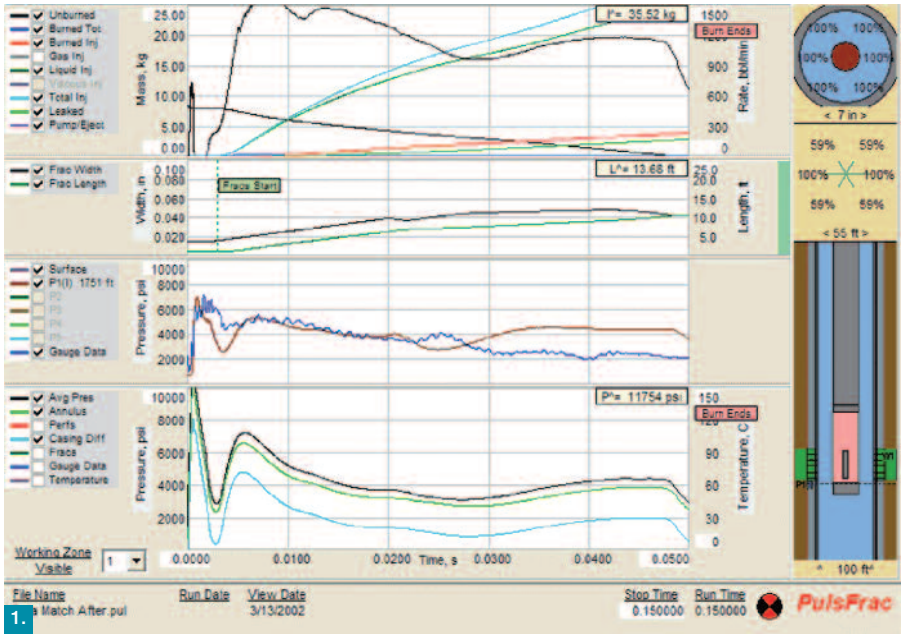
Extensive involvement in production logging and caliper logging has shown that many customers require a comprehensive data interpretation service to complement/enhance customer in-house capabilities. Expro retains the culture and flexibility to respond quickly to customer needs, with an emphasis on quality and attention to detail.

The data analysis centre offers a cradle-to-grave service which relies on close liaison with our customer during all stages of a project, from inception through to completion. All aspects of the operation are given careful consideration before a well-specific data acquisition programme is designed to meet the operation's objectives.

By developing such acquisition programmes, the customer receives the best value for money solution to their logging and data analysis requirements.

The centre now exists to provide all operating locations with the following services:

- Caliper survey planning/analysis/reporting
- Production logging planning/analysis/reporting
- Pressure Transient survey planning/analysis/reporting
- Production Decline analysis/reporting
- 'Pulse Frac' Stim Model
- I-Drift data interpretation
- Echometer data interpretation
- Cerberus well intervention modeling



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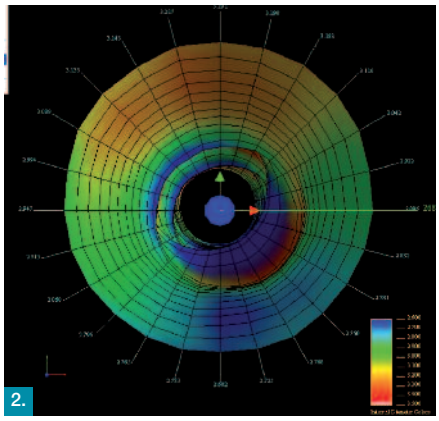
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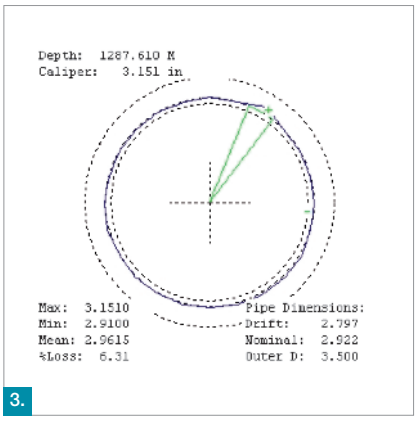

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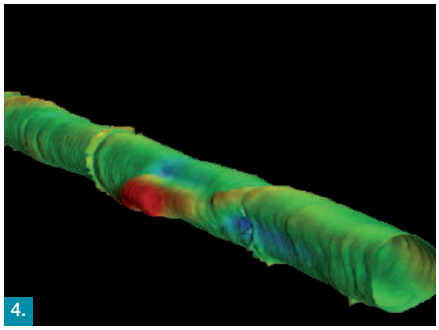
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1. Data Output – PulsFrac
2. 3D 'Fly-Down' View from Mips Caliper Analysis Software
3. Cross-sectional View from Mips Caliper Analysis Software
4. 3D External View from Mips Caliper Analysis Software

Contact: DAC@exprogroup.com

Safewells

Expro's SafeWells software has been specifically developed to deliver an effective well integrity management solution. It is a bespoke software system that monitors and reports on the wells' integrity performance and has been successfully deployed by major operators globally.

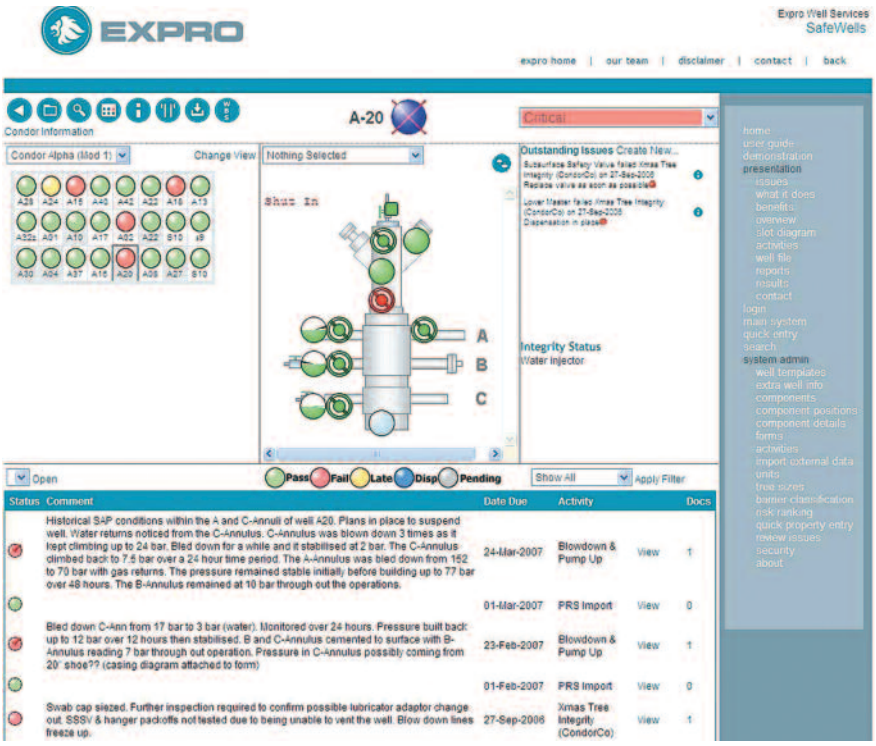
SafeWells provides a real time view of current well integrity status, problems and prompting remedial actions at the time the issues arise.

The system records information on the effectiveness of; sub-surface safety valves, xmas tree and wellhead valves and casing and tubing annuli, enabling the operator to readily demonstrate compliance with legislation and their well operating policies.

The software can be configured to suit the customers' specific requirements, existing reporting and documentation processes as well as the addition or removal of new wells and trees.

The integrity status of each well and valve is immediately apparent via a traffic light colour coded system.

The raw well test data is entered at the well site by the integrity crew.



SafeWells main screens

SafeWells provides a clear picture of the well status and scheduled remedial work. Operators can therefore plan their well intervention programmes in the surety that they are compliant with their policies.

They are also able to demonstrate their effectiveness at monitoring and tracking their wells' status.

SafeWells is a more effective and accurate approach to ensure that the well integrity data is captured in a central database.

The web-based management system is simple to use as it does not require any additional software to be installed on individual computers.

Major Benefits

- Improved safety
- Reduced costs
- Reduced downtime
- Improved communication
- Auditability
- Data security
- Improved data quality

Key Features

- Maintenance scheduling.
- Automatic notification of failures to designated personnel.
- Responsibilities defined.
- No duplication of data input.
- Historical operations records.
- Multiple report options.
- Single set of secure well files.
- Topside and downhole integrity managed in "real time".

Expro's business is well flow technologies and specialised services, and our mission is to:

- **measure**
- **improve**
- **control** and
- **process**

flow from high-value oil and gas wells.

Our expertise is marketed through five segments:
Well Testing & Commissioning, Production Systems, Wireline Intervention, Connectors & Measurements and Deepwater Intervention.

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