

Well Integrity Services

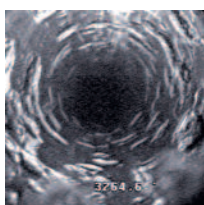


Excellence in Operations

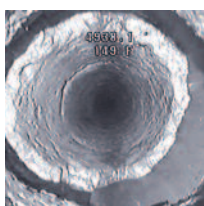


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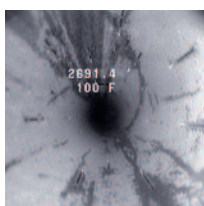
The loss of well availability due to well integrity issues has a direct impact on profitability, so management of well stock is fundamental to good performance.



Well Integrity is not solely an issue of well availability. A combination of Corporate Social Responsibility and developments in government legislation are driving a renewed focus on the topic of Well Integrity.



From the wellhead to the sandface, poor condition of wells has potential HSE consequences, as some operators have discovered. Ensuring the integrity of critical barriers in a well is of the utmost importance.



While new wells cannot be ignored, particularly in challenging environments such as HPHT or deepwater, mature brownfield assets are the traditional focus for well integrity issues. For fields in long term decline, operators are challenged as to how the decline curve can be slowed. Extending field life, however, only increases the scale of well integrity issues to be dealt with.



As a global well services provider, Expro is uniquely positioned to provide a comprehensive range of services to maximise well availability and productivity whilst minimising regulatory and HSE issues.

Rather than simply providing reactive services on request, Expro can provide operators with a full range of Well Integrity services from initial well completion design and well integrity management systems, through to wireline deployed diagnostic and remedial services.

Combined with its Production Optimisation services, Expro's Well Integrity capability can provide operators with a cost-effective solution to the challenges of managing an ageing field.

The life cycle approach

Throughout the well life cycle, from initial design through to eventual abandonment, Expro Well Services provide a broad range of integrity skills and experience to Operators.

Expro Well Services are involved with well integrity at every stage. From conceptual design, through well construction and operations, to abandonment, Expro Well Services provide the services and capabilities to maximise well availability and minimise residual risk.

Our high-calibre engineers are backed up by advanced processes, systems and support. Knowledge management systems based on over 300 well operations a year over more than a decade, ensure that our engineers have instant access to a wealth of experience.

Our services are tailored to the client's needs. The engineers can either work on a stand-alone basis or as an integral part of a client team. The workscope can be on a project basis or a life of field basis.

Expro Well Services' well integrity capabilities are supported by our Integrity Manager™ software. Integrity Manager has been designed by well engineers for well engineers and provides operators with an efficient means to manage their well stock.

Integrity Manager can be utilised on a well, rig, field or geographical basis. As dedicated well integrity software, it eliminates the problems with locally designed spreadsheets or modified, generic software. By providing easy access to data via a user friendly interface, Integrity Manager allows operators to maximise the value of their assets.



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.

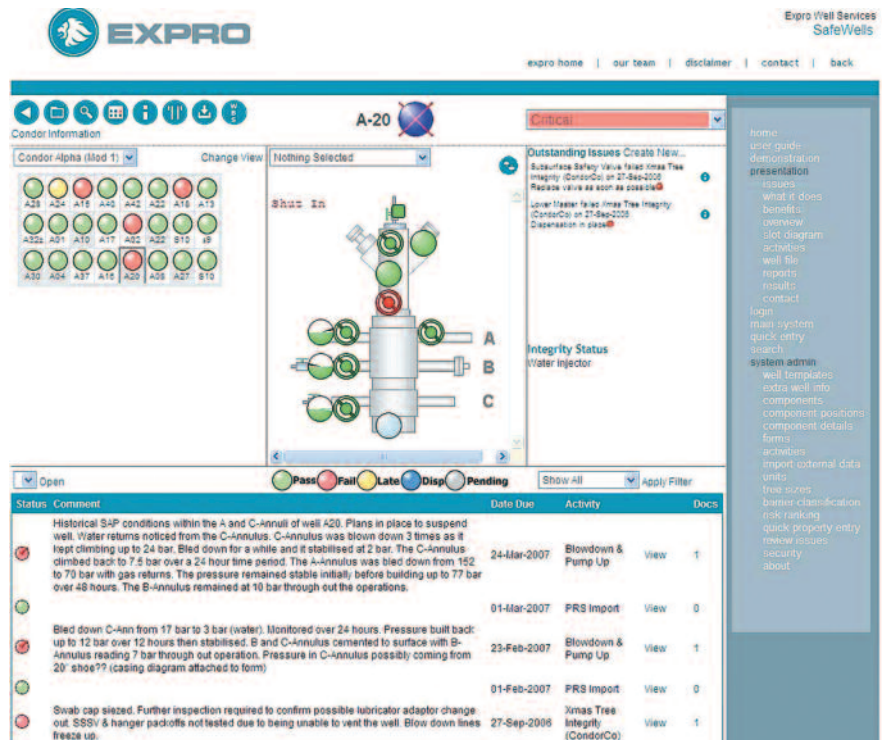
The raw well test data is entered at the well site by the integrity crew.

SafeWells 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.



SafeWells main screens

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".

Monitoring and diagnosis

Expro provides a range of well intervention services for proactive monitoring and problem identification. Once a problem has been diagnosed, Expro can provide a suite of wireline deployed solutions to identify and resolve well integrity issues.

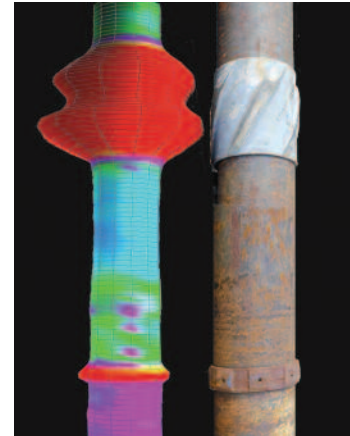
Expro's well integrity services can be deployed on slickline, electric line, coil tubing or well tractor depending on the application.

Multifinger calipers provide the traditional means of monitoring the internal condition of tubulars. With a history back to 1913, Expro provides a complete range of caliper services from high-pressure/high-temperature (HP/HT) mechanical tools to state-of-the-art electronic calipers. The combination of the latest technology Magnetic Thickness Tool with an electronic caliper enables the operator to identify internal and external metal loss and to plan remedial actions before well productivity is impacted.

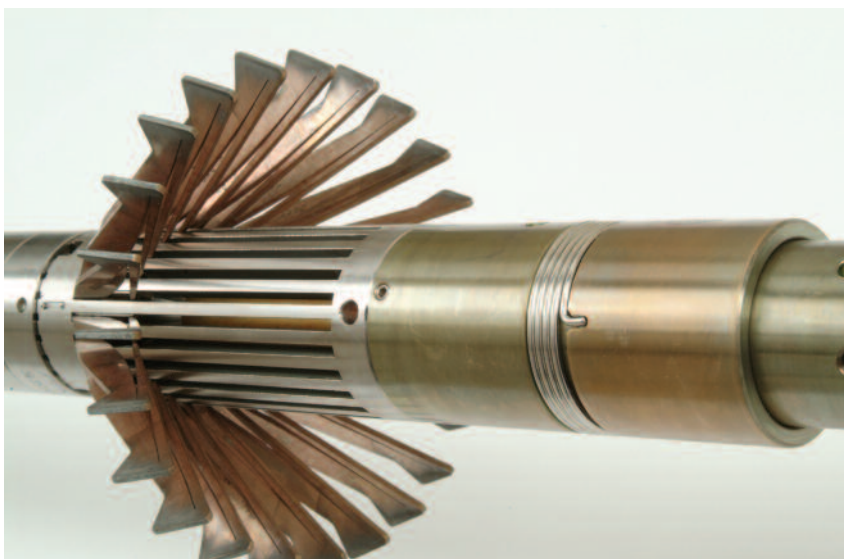
Innovation to deliver cost-effective solutions in well integrity is at the heart of Expro's approach. The use of Downhole Video to deliver high-quality digital pictures of the actual wellbore removes guesswork. As the clear market leader, Expro's downhole cameras can answer questions that are difficult to resolve using traditional methods. Seeing is definitely believing!

Where monitoring is required over a longer period, Expro's CaTS™ system (Cableless Telemetry System) provides clients with an alternative to cabled systems. Ideal for applications where pressure is required below a barrier, CaTS can deliver data from places where it was not previously possible.

With a well integrity tool box second to none and a global footprint, Expro provides a comprehensive suite of fit-for-purpose services ranging from a single call-off service through to a fully integrated project-based approach combining Expro Well Services knowledge systems with operational excellence.



Expro provides a complete range of caliper services from HP/HT mechanical tools to state-of-the-art electronic calipers.



Calipers are the core tool for the identification of:

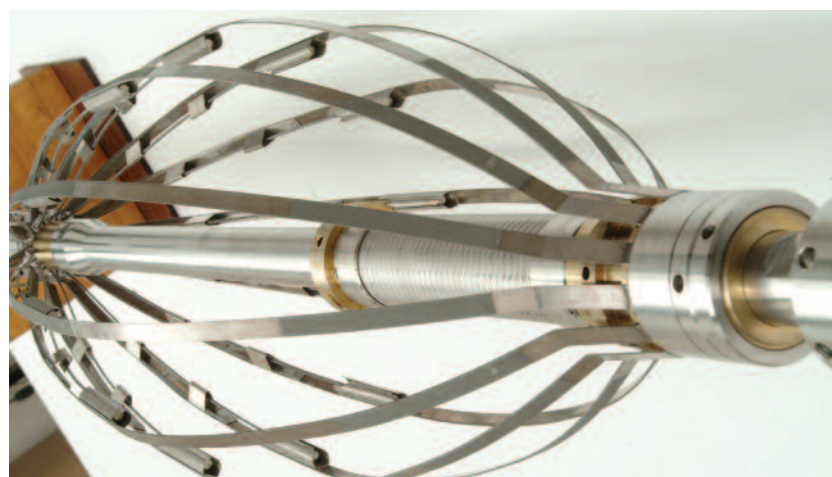
- Holes in the casing or tubing
- Wear profiles due to wireline, coil tubing or drill pipe
- Scale build-up
- Mechanical damage
- Time-lapse monitoring

Calipers

Expro's Kinley multifinger calipers have been setting the standard for corrosion and deformation measurement since 1913. Today Kinley calipers provide a cost-effective, slickline deployed caliper measurement for tubulars from 2 3/8" to 13 3/8". The all-mechanical Kinley calipers provide high reliability and are uniquely suited to HP/HT wells with a temperature rating of 600°F. The DigiCalSM service provides rapid turn-around wellsite logs, enabling on the spot decision making.

Complementary to Expro's suite of Kinley calipers, is its range of electronic calipers. Deployed on electric line, slickline or coil tubing these use state-of-the-art technology in the form of either 1 11/16" 24 arm tools or 2 3/4" 40 arm tools. These provide a radial resolution of 0.005" and a vertical resolution of 0.14" at 50 feet per minute logging speed.

Expro's Data Analysis Centres (DAC) support both electronic and Kinley calipers, providing rapid turnaround detailed analysis using 3D imaging software. The raw data is processed to remove tool and wellbore effects to provide the operator with a three dimensional view of the tubulars plus a detailed analysis of any anomalies.



Magnetic Thickness

Calipers can also be combined with Magnetic Thickness Tools (MTT) to quantify the thickness of metal in the casing or tubing and thus provide an accurate internal and external profile of the wellbore. Twelve miniature magnetic sensors mounted on bow springs investigate variations of metal thickness within the downhole tubulars.

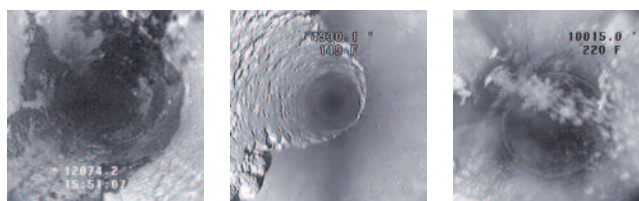
3D visualisation software can then be used to provide powerful images of well condition, which allow both internal and external pitting and gradual wall loss to be detected.

Downhole Video

Whereas calipers and thickness tools provide a qualitative log which then has to be interpreted, Downhole Video gives a real picture of the wellbore. Allowing scale, perforations or holes in the tubing to be seen rather than inferred, enables correct decisions to be made first time round.

Extremely portable, the HawkEye III downhole camera can be deployed on any electric line and transmits up to 1 picture per second. The slickline camera, which can take 200 pictures per run, is ideal for looking at specific objects. Expro's Downhole Video technology combined with our engineers' expertise ensures that we deliver quality downhole pictures.

- Identifying damage and restrictions
- Locating holes and pitting
- Scale and wax build-up
- Size, location and condition of perforations
- Monitoring screen condition
- Corrosion identification
- Chemical treatment verification
- Whipstock and window inspection



Expro's downhole cameras can answer questions that are difficult to resolve using traditional methods.

CalVid™

Expro's CalVid service combines its electric line deployed 40 arm electronic caliper with its HawkEye III video system to give a complete picture of the tubular internals. When running in the well, a picture of the wellbore is taken every second. When bottom is reached the caliper is opened and logged out of the hole, providing a traditional caliper log.

If zones of interest are identified, they can be inspected in detail with the camera. Both caliper log and video can then be displayed using specialist software. The combination of visual images plus accurate caliper measurements provides a strong tool for problem qualification and quantification.

Remedial actions and solutions

Expro provides capabilities beyond initial monitoring and problem diagnosis. A range of cost-effective wireline deployed solutions are available to solve well integrity issues.

Expro's slickline trigger system can be run on standard slickline and used to set a range of plugs and straddles:

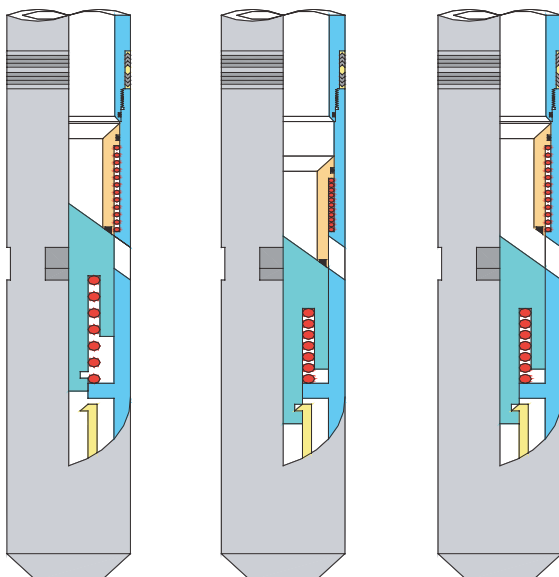
- Thru-tubing inflatable plugs
- Bridge plugs
- Straddle system
- Casing patches

All of these services can also be deployed on electric line or by Expro's SmarTract well tractor in horizontal wells.

Where well instrumentation has failed, CaTS wireline deployed tools can be retrofitted as a replacement device. If a permanent monitoring gauge has failed, a CaTS tool can be run to obtain pressure and temperature at surface using its cableless telemetry.

CaTS telemetry is also used in Expro's FlowCaT™ downhole valves. A retrofitable downhole valve is controlled from surface using the CaTS duplex communication system.

FlowCaT can be deployed via slickline as a replacement for failed downhole safety valves. A signal is transmitted from surface which keeps the valve open. If the signal stops, then the valve closes providing a fail safe system. The FlowCaT system has material advantages over traditional 'storm chokes'.



Knowing the status of your assets and implementing an effective monitoring and maintenance programme maximises return on investment.

The FlowCaT retrofit downhole valve is controlled from surface using the CaTS duplex communication system.

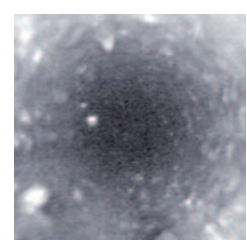
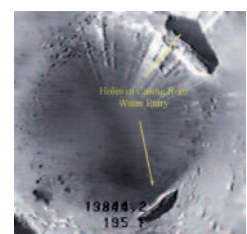
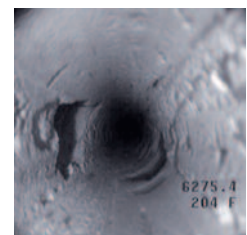
Well Integrity Services



By combining operational excellence, cost-effective deployment and innovative technology with engineering and knowledge management systems, Expro provides a total solution for your well integrity needs.

Increasing focus on improving recovery factors and extending well life means that well integrity can no longer be ignored. Best practice requires efficient management systems and fit-for-purpose operational services. Knowing the status of your assets and implementing an effective monitoring and maintenance programme maximises return on investment.

Whether it is using a downhole video camera to inspect a casing window prior to sidetracking or a complete field well integrity review, Expro can provide a tailored solution.



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.





EXPRO

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Expro Well Services

Completion planning and design
Well Integrity studies & audits
Procedures and policies
Operations planning
Well service supervision
Training
Abandonment

SafeWells

Well Integrity management systems

Calipers

Mechanical damage
Corrosion
Wax/scale build-up
Time lapse monitoring

Thickness Tool

Overall metal loss and thickness
Internal and external pitting

Downhole Video

Damage and restrictions
Locating holes and pitting
Wax/scale build-up
Size and location of perforations
Screen monitoring

CalVid™

Caliper and video combined

CaTS™

Pressure measurement behind barriers

Data Analysis Centres

Interpretation and analysis

Slickline triggers

Plugs
Inflatable plugs
Straddles
Patches

FlowCaT™

Retrofit flow control
Failed safety valves

