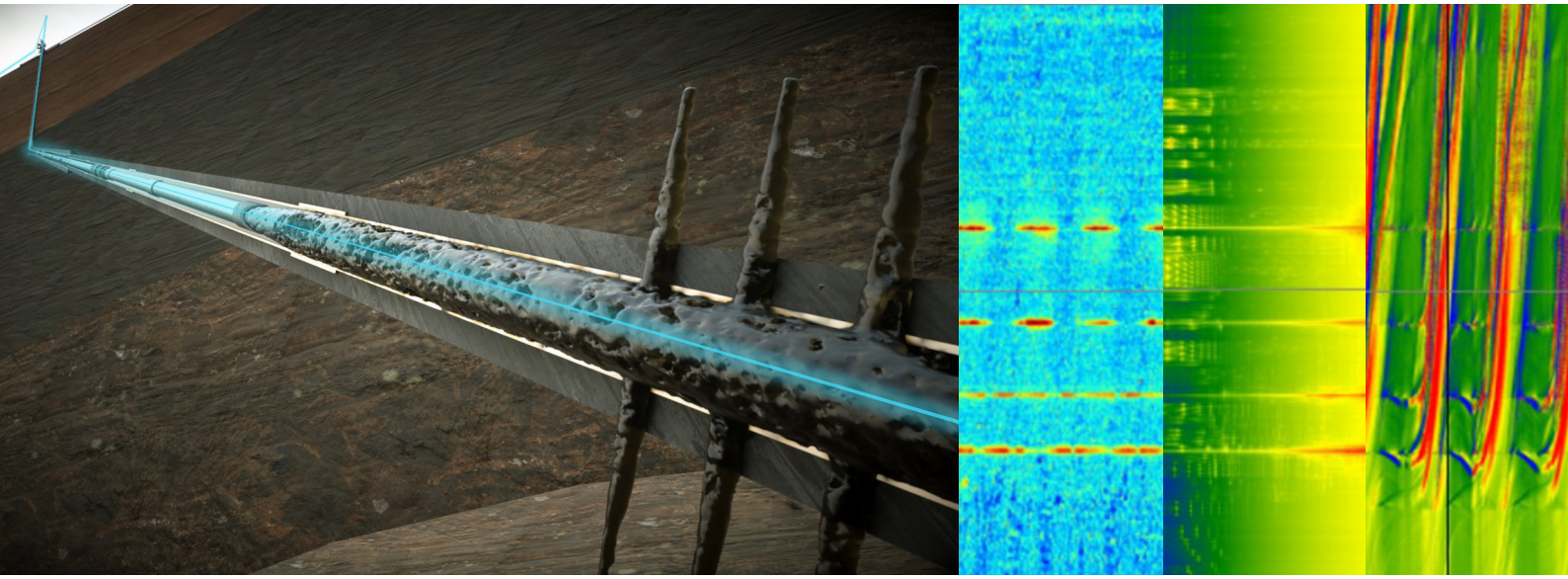
DFOS eXtract™

Distributed Fiber Optic Sensing (DFOS) Data Processing Software

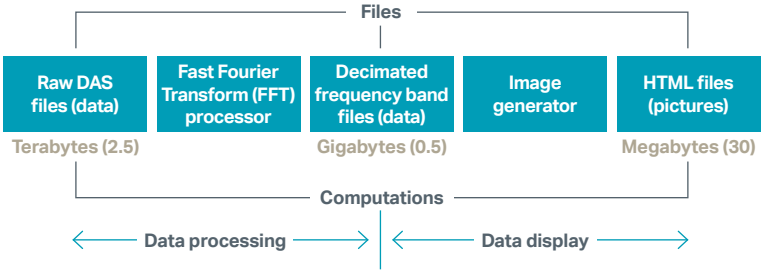


Well surveillance using DFOS technology has gained acceptance within the industry, however, the full digitalization potential of the data is often not realized. A key reason for this has been the lack of commercially available software that can easily and rapidly process and display the DFOS data, therefore allowing timely decisions to be made on it while it is still representative.

Expro's DFOS eXtract™ software package (formerly known as HotDAS) provides a well site capability to process and generate multiple outputs for visualization and exporting of data. Complimentary to the DFOS eXtract™ software is the QikView™ software which provides the DFOS data integration and display capability.

DFOS eXtract™ is a simple to use and fast application for dealing with large DAS data files at source. It is an intuitive tool and can be applied to most commonly available DAS interrogation units. It involves a two-stage process, the first for the decimation and extraction of attributes into a small portable file, and the second for generation of images and logs of the data. The application is MS Windows based. The decimation and data extraction is done at the wellsite using advanced extraction algorithms, shrinking the raw DAS data by over 500 times. The processed files are used to generate multiple images of the data including user selected frequency bands along with advanced feature detection algorithms that help enhance image quality. As well as multiple frequency band plots in the depth and time domain, data can also be displayed as noise logs and spectral plot formats.

The output image and log data can be used as a stand-alone product or combined using Expro's QikView™ software for integration and visualization, along with other well and survey information.



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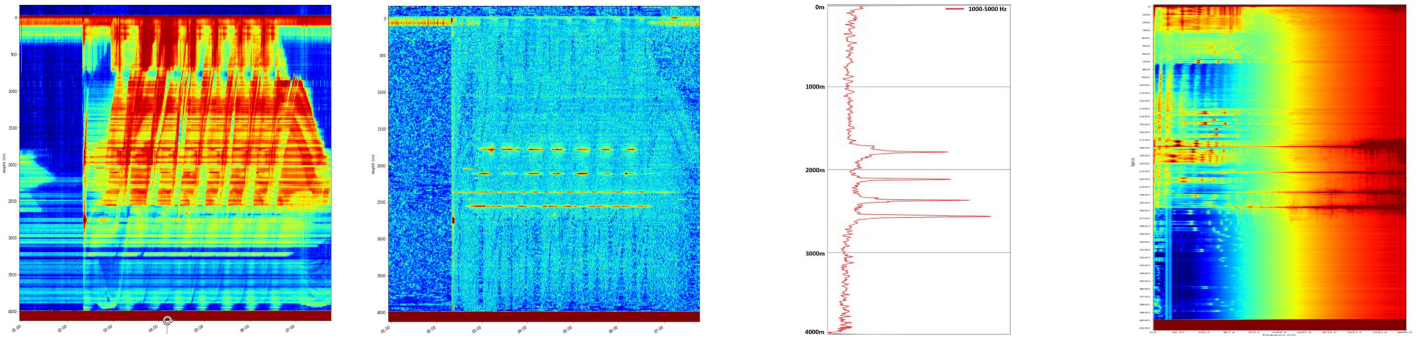
Feature extraction and image display formats using HotDAS

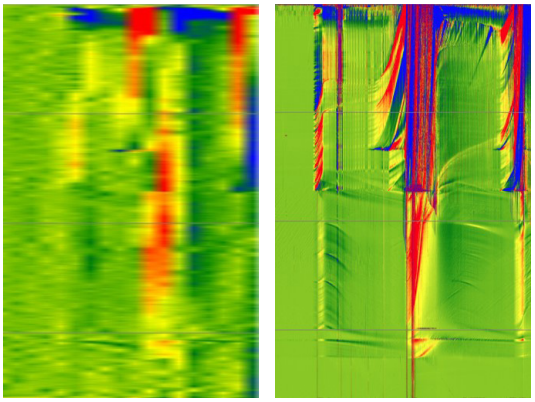
Plots for each frequency band as well as different feature extraction options are generated offering the user a wide range of data views including noise logs and spectral plots.



DFOS eXtract™ features a software component called eXDTS which is an innovative technique that enables a step change improvement to the resolution of the distributed temperature data measurement during a DFOS survey.

Conventional DTS uses a Raman backscatter measurement with the temperature traces being created for the entire well every 5–10 minutes. The Raman measurement is statistical and many pulses are needed to be stacked to achieve a temperature resolution of ~0.15°C. This sometimes makes conventional DTS coarse in terms of responsiveness to small temperature fluctuations.

Expro's eXDTS processing uses a different technique to extract the temperature data, which has a much higher signal strength resulting in faster trace refresh rates and significantly improved temperature sensitivity. This finer resolution makes eXDTS much more useful when looking for very subtle temperature changes or for tracking and monitoring rapidly changing dynamic flow conditions. eXDTS therefore has a significant impact to the quality of the interpretation carried out on the DFOS Survey data in terms of smaller leaks being identified, assessment of dynamic flow events and fluid velocity tracking.

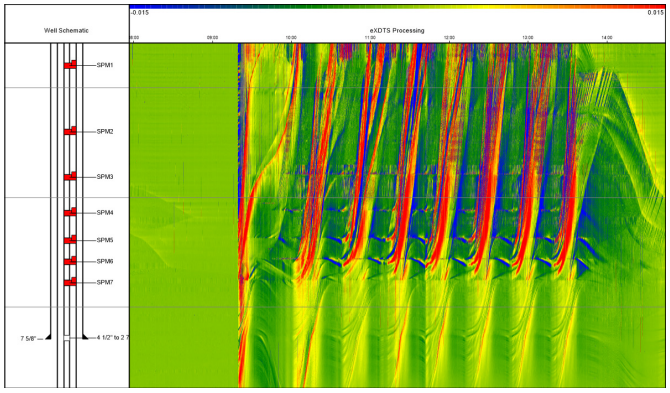


Conventional DTS data | eXDTS processed data

Case study - eXDTS for a well on gas lift

The figure on the right shows the eXDTS data from a gas lifted well. When observing the eXDTS data, the higher data resolution is useful when looking at subtle temperature changes and tracking dynamic flow conditions. Cyclic heating and cooling of fluids can be observed in the well which gives an indication that the well is slugging. The gradient of the features is directly proportionate to the velocity of the fluid movement in the well, so can therefore be calculated.

The DFOS eXtract™ software therefore addresses some of the main challenges that have hindered the widespread uptake of a highly valuable technology, with these issues resolved this now means customers can evaluate well integrity and well performance issues far more efficiently and effectively in a single DFOS survey, enabling remediation to be carried out soon after.



Well diagram | eXDTS processed data

DFOS eXtract™ software features and benefits

- DFOS eXtract™ deals with the challenges associated with the size and handling of raw DFOS data files generated during a DFOS intervention.
- The software is Acquisition Unit agnostic, unit translators are built into the application for automatic recognition of different file types.
- Extraction algorithms help pick out features of interest.
- The output image and log data can be used as a stand alone product or combined using the QikView™ software for integration and display along with other well and survey data.
- eXDTS enables the detection of far smaller temperature changes and therefore fluid movements vs conventional DTS.
- The digitalization potential of the DFOS data can be realized more effectively.

Find out more: wellintervention@expro.com or visit: www.expro.com/wellintervention