



# Well & Reservoir Monitoring Using DFOS

## The Challenge

Distributed Fiber Optic Sensing (DFOS) technology has emerged as a powerful tool for well and reservoir monitoring in the oil & gas industry. By providing real-time data on parameters such as temperature, acoustic signals and strain, DFOS offers unrivalled spatial coverage and valuable insights into well integrity, reservoir behaviour, and production performance. DFOS systems in the O&G industry face the challenge of providing rugged, user-friendly systems of exceptional quality while efficiently analyzing large amounts of real-time data for accurate and actionable operational insights.

## The Innovation

AP Sensing’s solution for various downhole O&G operations offers the combination of Distributed Temperature Sensing (DTS) and Distributed Acoustic Sensing (DAS) technologies, utilizing fiber optic cables that can be temporarily or permanently deployed in the well. The powerful, integrational software package offered by Interpretive Software Products (ISP) completes our AP Sensing monitoring solution, allowing users to analyze both DTS and DAS data.

## World-Class DFOS Systems

AP Sensing’s unique technologies such as single receiver design, Code Correlation Concept, and 2P

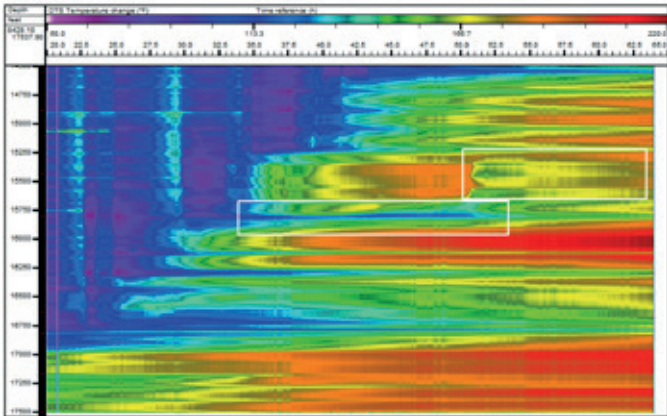
Squared technology enable us to offer you world-leading DFOS solutions. These solutions not only excel in precision and range, but ensure long-term measurement stability.

Known for exceptional quality, system robustness, and an easy to use interface, our DFOS systems are designed to address a wide range of downhole O&G applications. Among them, our DTS N45-Series and DAS N52-Series stand out, consistently delivering exceptional performance.

Based on excellent measurement data and ISP’s powerful software solutions, we deliver an unparalleled level of precision due to the physics-based approach underpinning all software provisions – ensuring optimally accurate interpretations in all areas of operation.

**PLATO-DTS** is designed to visualize and interpret DTS data from any well in order to obtain production and injection profiles. PLATO-DTS uses an enthalpy balance model that accounts for heat transfer due to both conduction and convection of temperature. Frictional heating, Joule-Thompson cooling, skin effect, and phase changes that contribute to temperature changes are naturally predicted by the model. With added features to optimize DTS data, from visualization to permanent

monitoring, PLATO-DTS is the standard in the industry when it comes to temperature modelling.



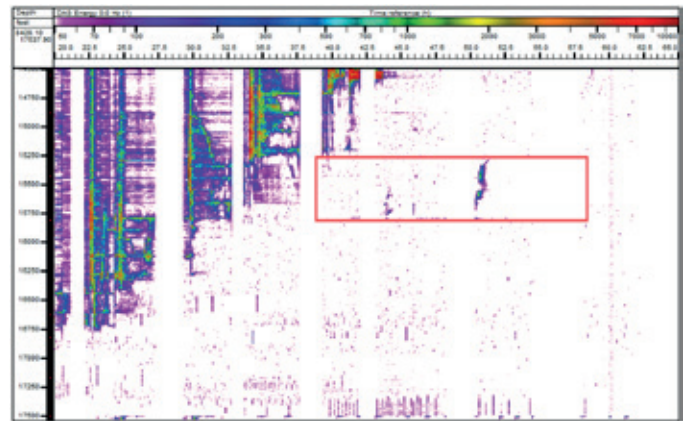
**PLATO-DTS features include:**

- An extended dynamic database that allows over 15,000 traces to be imported into one PLATO project
- Various DTS data visualization modes, including wcurves, animation, color gradients, depth cross-plots, and station plots
- Quantitative production/injection profiling using probabilistic modelling (Global Optimization)
- Intended for production, injection, shut-in wells and capable of handling complex geometries
- Reliable results in fractured wells during warmback (fracking) and flowback (Geotherm Automation)
- Suitable for permanent well monitoring

ARIANE-SP2S enables real-time DFO data processing and offers unlimited, multi-scale, high-definition visualization. ARIANE-SP2S is a comprehensive solution for DAS monitoring which dynamically displays any acquisition duration in real-time without any limitations.

**ARIANE-SP2S features include:**

- Frequency Band Energy plots (FBEs) and Spectrum on-site extraction in real-time from AP Sensing DAS acquisition systems for well monitoring
- Data storage reduction by a factor of 8,000
- In-depth visualization and qualitative analysis
- Direct synchronization of DAS and DTS data
- Advanced time and depth scrolling and zooming capabilities
- Easily extendable for data visualization of Distributed Pressure Sensing, Distributed Strain Sensing, and Distributed Chemical Sensing
- Remote monitoring without supervision enabled



**Why AP Sensing?**

- Industry-leading monitoring solution comprising DTS, DAS and software for system configuration and data acquisition that offers excellent performance.
- Various solutions for integration into third-party software or custom cloud-based solutions provide real-time access to your data.
- 40+ years of experience, network of regional partners and experts, and proven deployment in all regions of the world.



**Why ISP?**

- Trusted software solutions for the upstream oil and gas industry for 30+ years, endorsed by major oil and gas operators.
- Specialized solutions for DTS production/ injection profiling – the leading interpretation software for DFOS.
- Accurate interpretations, relying on physics- based model and statistical optimization techniques, which delivers a competitive advantage.