



HDS™ for Hydrogen Pipeline Monitoring: Advanced Fiber Optics & Machine Learning Algorithms

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Hifi Engineering: Who We Are

- Market leader in turn-key distributed fiber optic sensing (DFOS) solutions
- Pipeline monitoring focus; deployed or under deployment on over 2,000 km
- In-house development of custom machine learning algorithms tailored for pipeline leak detection
- Creators of the highest-fidelity DFOS system available today - Hifi HDS™ - integrating acoustic, temperature & strain/vibration sensing in one cable



Hifi provides the most advanced pipeline monitoring and leak detection technology

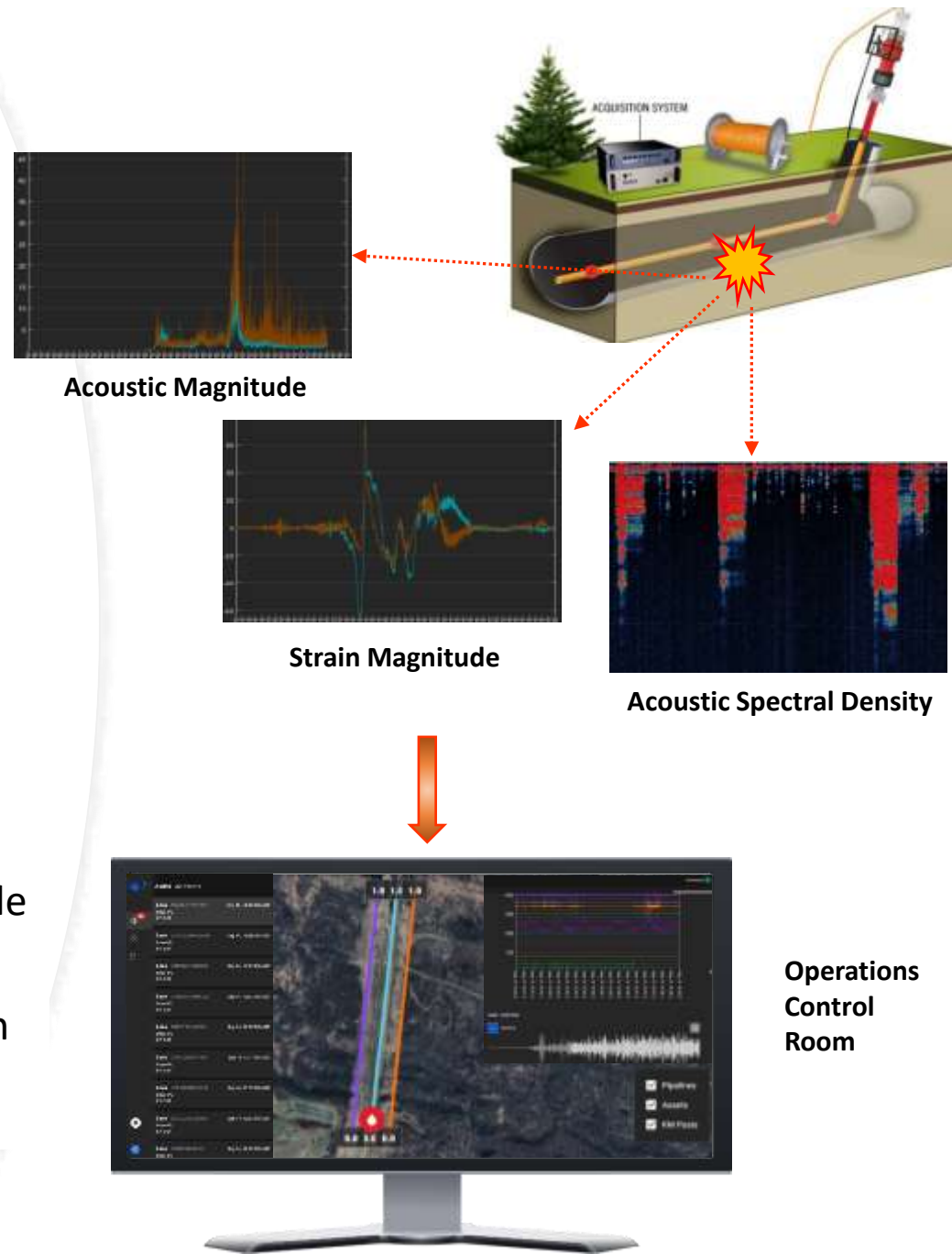


Learn more at hifieng.com
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Hifi Engineering: What We Do

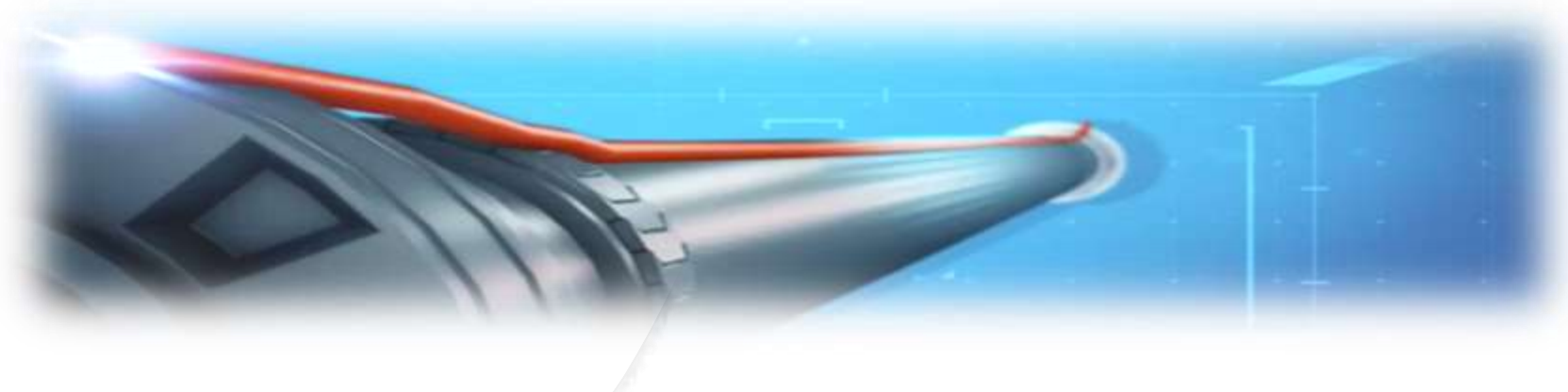
- Hifi HDS™ provides real-time, 100% asset coverage, continuously sensing every centimeter of pipeline
- Leak dynamics are highly variable & may present distinct signatures via:
 - Acoustics of escaping flow
 - Strain/vibration of pipe
 - Localized temperature changes
- Event data *verified* and *differentiated* to determine course of action (example control room alarm shown at right)
- Evolution of leak signature recognition via machine learning algorithms is critical to avoiding false alarms





Hifi & EUREKA: Optimization for Hydrogen Pipeline Monitoring

- Limited efforts to optimize DFOS for leak detection in H₂ transport
- EUREKA offers a unique opportunity to bridge this gap and support safe and efficient pipeline operations as hydrogen infrastructure grows into our cities and homes
- HDS™ represents an ideal technology platform for these efforts:
 - Highest signal-to-noise ratio (SNR) for sensing low-energy events
 - Integrated capability to detect broad range of energy signatures
 - Successful in capturing simulated leaks on buried pipe below 15 psi (0.1 MPa), with
 - **100% detection & zero false positives**
- Joint project envisions testing of Hifi HDS™ in H₂ pipeline to support customization of machine learning algorithms optimized for hydrogen leak detection





Collaborating with Hifi



Hifi's Ideal Partner

- Active in the H₂ infrastructure space (production, transmission, storage, conversion)
- Focused on asset integrity, monitoring, or reporting (owner/operator, EPC, regulator)
- Competency in synergistic technology space (asset monitoring & control, IoT, SCADA)
- Ideally has or can provide access to local H₂ infrastructure for in-situ testing

Why Hifi?

- Proven market leader with significant deployed base & large, established customer base
- Best available technology (BAT) providing highest-fidelity data for pipeline leak detection
- Development & Innovation focus with an IP portfolio of > 70 issued & pending patents powering the HDS™ technology