

Subsea erosion and corrosion monitoring system

UltraMonit[®] Retrofit

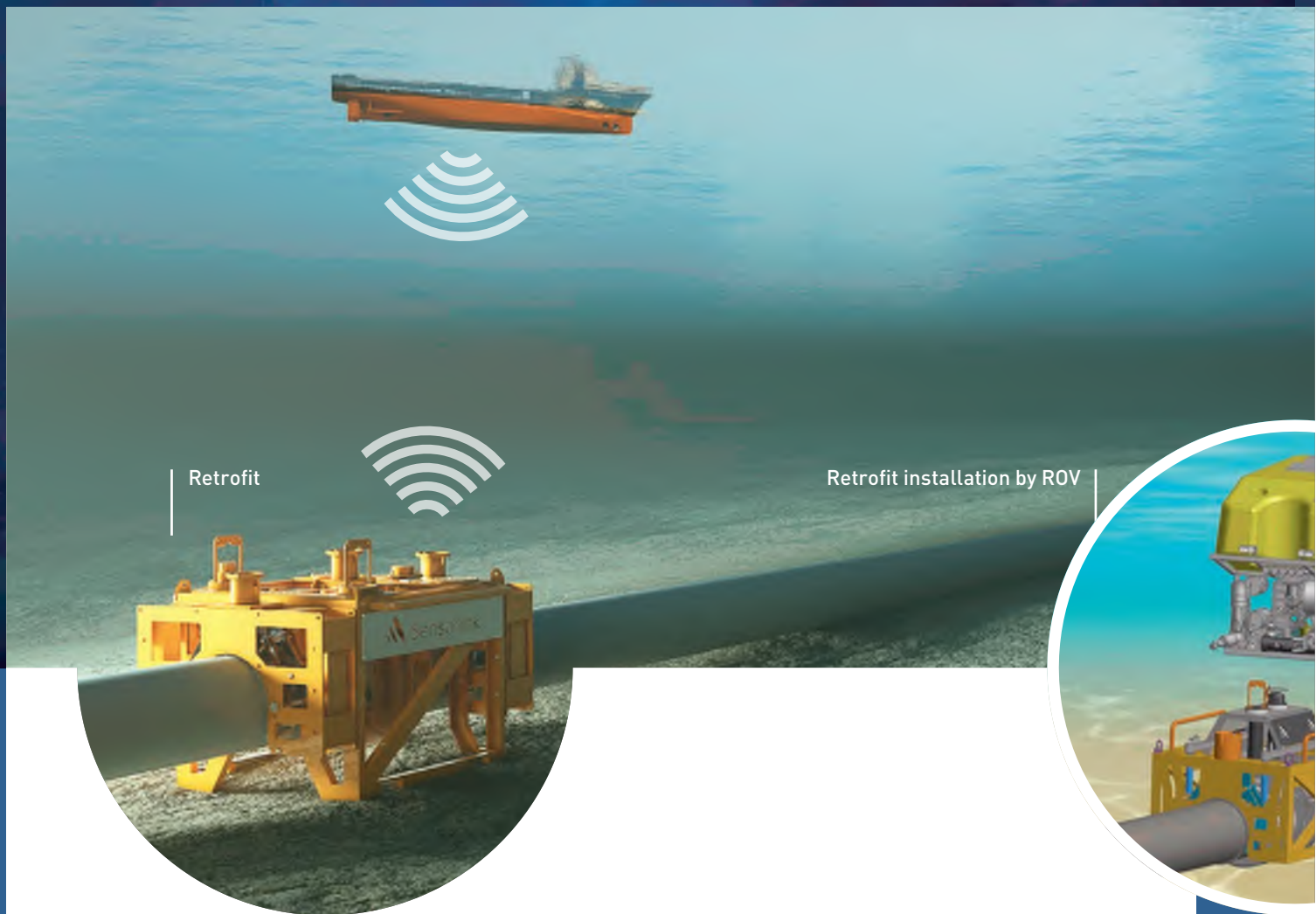
The UltraMonit[®] Retrofit is an ultrasonic subsea erosion and corrosion monitoring tool providing high resolution online pipe wall thickness data. It is non-intrusive and can be installed on new and existing pipe spools and pipelines.

The UltraMonit[®] system uses an array of pulse-echo ultrasound transducers providing reliable high precision wall thickness measurements at selected locations.

SOME KEY ADVANTAGES ARE:

- Non-Intrusive direct wall thickness measurement
- Can be installed post pipe lay (no rotation issues)
- Online and real-time feedback on corrosion inhibitor effectiveness
- Reduces or eliminates the need for intelligent pigging
- Selection of less expensive pipe material through increased monitoring
- Can discriminate corrosion rates between weld, pipe wall and HAZ corrosion
- Battery powered or powered by cable
- Works through solid external coatings (PE, 3LPP, FBE, etc.)
- Improved pipeline integrity management
- Life extension and improved safety margins for late life pipelines
- Removable, movable and replaceable throughout the lifetime of the tool

UltraMonit® Retrofit



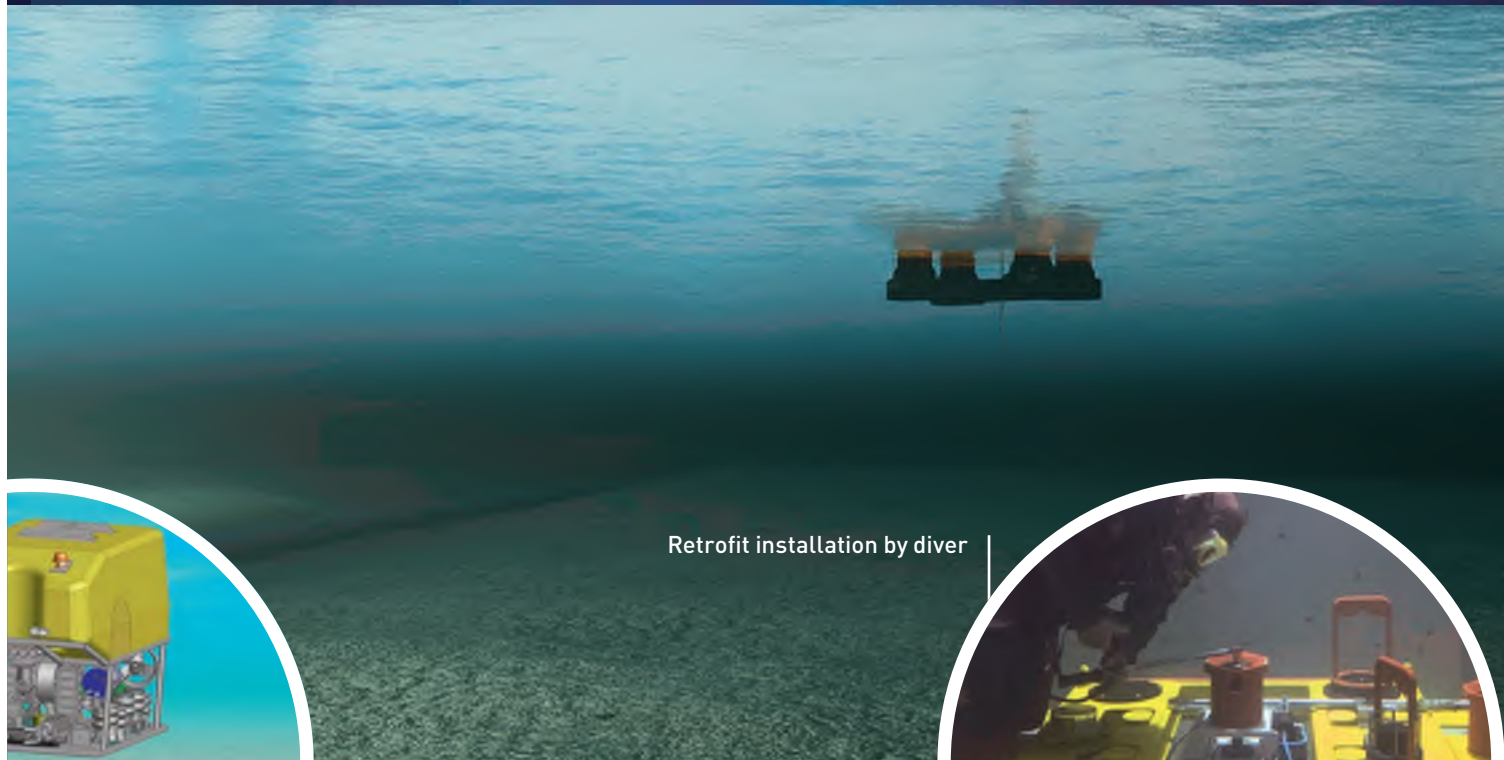
How does it work?

The UltraMonit® technology is among the best on the market with respect to precision, accuracy and speed of detection for non-intrusive wall thickness monitoring, corrosion rate estimation and corrosion profile estimation.

The UltraMonit® consists of a matrix of pulse-echo ultrasound transducers that are clamped to the outer pipe wall. The transducers measure wall thickness over time and provide high resolution data on material wall loss. Fixed sensors combined with advanced signal processing make the UltraMonit® detect wall loss of less than 0.1 mills (2.5 micrometres). The sensor matrix is optimized to suit the expected corrosion/erosion phenomena and can be configured according to user requirements.

The UltraMonit® data logger is retrievable. It stores the raw signals, and the raw signals can be collected and post processed for detailed and advanced analysis (i.e. evaluation of pitting growth).

UltraMonit® Retrofit



Retrofit installation by diver



Installation

The UltraMonit® Retrofit is ROV and diver installable. The smaller sizes can be made "neutral" in water (< 50 kg). Larger units need additional buoyancy or require a heave compensated crane during installation. There is no need for calibration during the installation; the sensors are fixed to the pipe wall, the speed of sound in steel is known, and time of flight is measured using the ultrasound transducer. The performance of the single element transducers is not influenced by the wall thickness, nor to solid external pipe coatings. This allow installation without compromising the pipe integrity, and allow a very easy marine operation.

Upon completed installation the ROV will activate the data logger and the data logger will commission the UltraMonit® and confirm successful installation.

Operation

The UltraMonit® Retrofit can be made fully autonomous by fitting a battery package. An acoustic communication package can be added enabling any surface vessel or nearby platform to collect data via an acoustic modem without the assistance from a diver or ROV. If there is access to a subsea control system, the Retrofit can also be integrated into this, and be powered from the control system. Typical communication of data is via RS485, Ethernet (SIIS level 3), Modbus, Can bus (SIIS level 2) or just about any know protocol.

All data will be processed locally and the calculated wall thickness, pipe wall temperature and battery status (if applicable) is communicated through the available interface. The data can be fed into the clients control system or can be viewed using the PipeView® software.

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PRODUCT SPECIFICATIONS

TECHNICAL DATA

Output data:	Wall loss or corrosion rate
Design life:	20 years
Flow temperature:	-20 to +150 °C (-4 to 194 Fahrenheit)
Water depth:	up to 2 000 meters/ 6 000 ft
Pipe size:	>4 inch OD (0.1 meter)
Wall thickness:	>3 mm
Wall material:	Steel
Coating material:	PE/PP/FBE
Repeatability:	2.5 µm (0.1 mils)
Absolute accuracy:	0.1 mm (4 mils)
ISO 13628-6 qualified:	Yes
Satisfies ISO 13268-8:	Yes
Transducer configuration:	Optional
Non-intrusive:	Yes

ELECTRICAL DATA

Power:	24 VDC, <10w consumption. – battery solution possible
Cabled communication:	SIIS level 3 (Ethernet), SIIS level 2 (Can bus), RS485, Modbus TCP/IP and Modbus RTU, OPC
Wireless communication:	Acoustic modems, ROV retrieval of Datalogger

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