Seatooth® Pipellogger

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About WFS Technologies

WFS – Wireless For Subsea
- Founded 2003
- Operations in UK & USA

Wireless Solutions
- Drilling
- Subsea Vehicles
- Asset Integrity Management

Field proven product / projects delivered in
- North Sea
- Gulf of Mexico
- SE Asia
- Australia
- W Africa
Seatooth® PipeLogger
Wireless pipeline monitoring

• Flexible retrofit pipeline sensor platform
• Measures: Temperature
  Wall Thickness
  Vibration
  Flow
• Easy deployment/retrieval by ROVs and divers using magnets or tie-wraps, for temporary or permanent solution
• Data received wirelessly by ROV, diver or AUV at a download rate of 1000 samples per minute. ROV/diver up to 5m away.
• Can be networked to collect data from sensors in difficult-to-access locations
• Compatible with insulated pipes
• Alternative to intrusive hardwired monitoring, no shut down required
**Seatooth® Pipelogger**

**Specification**

Seatooth® Pipelogger is deployed by major oil & gas operators in the North Sea.

This product is appropriate for pipeline monitoring because:

• Provides flexible retrofit of temperature sensors to monitor subsea pipework
• Wireless data recovery subsea by an ROV, AUV, Diver or topside
• Benefits:
  - Low cost deployment & recovery
  - Low cost, flexible data collection
  - Wireless sensor networks to access remote locations

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**PipeLogger Specification:**

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>Temperature Sensor</th>
<th>DataLogger Memory</th>
<th>Upload Rate</th>
<th>Battery Life</th>
<th>Seawater Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4kbps</td>
<td>+/- 200°C</td>
<td>400,000 data points</td>
<td>1000 samples per minute</td>
<td>Up to 10 years</td>
<td>5m</td>
</tr>
</tbody>
</table>

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**DRU Specification:**

<table>
<thead>
<tr>
<th>Power</th>
<th>Data Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 – 30VDC</td>
<td>RS232/RS485</td>
</tr>
</tbody>
</table>
Seattooth® Pipelogger

Applications

• Wireless Integrity Management
  – Upheaval buckling
  – Over-temperature
  – Internal corrosion monitoring
  – Internal erosion monitoring
  – FIV/VIV monitoring
  – Pig Location

• Wireless Flow Assurance
  – EOR
  – Wax build-up
  – Retrofit temperature control
  – Pig location
**Objective**
- Prevent temperature induced upheaval buckling of subsea pipelines

**Solution**
- **Seatooth® PipeLogger:**
  - Retrofit non-invasive temperature sensor
  - Monitor process temperature flows over 3 – 12 months
  - Measure temperature through thermal insulation
  - Wireless comms through seabed and concrete blanket
  - Harvest data by ROV, Diver or AUV
  - Battery life up to 10 years
Seatooth® Pipelogger
- Pipe wall thickness monitoring

**Objective**
- Identify excessive internal corrosion

**Solution**
- Seatooth® PipeLogger:
  - UT (Ultrasonic Thickness) sensor
    - Single sensor at 6 o’clock
    - Multiple sensors in ring
  - Measure wall thickness through up to 20mm pipe coating
  - Wireless comms through seabed and concrete blanket
  - Harvest data by ROV, Diver or AUV
  - Battery life up to 10 years

Seatooth PipeLogger with UT Sensor
Seattooth® Pipelogger
- FIV/VIV, Free-span Monitoring

**Objective**
- Identify and monitor Flow and Vortex induced vibration

**Solution**
- Seattooth® PipeLogger:
  - Integrated accelerometer
  - Collect data at pre-determined time intervals
  - Harvest data by ROV, Diver or AUV
- Optional local processing of data
- Integrated sensor network
  - ADCP
  - Pressure
  - Temperature
# Seatooth® PipeLogger

## Benefits

<table>
<thead>
<tr>
<th>Asset Integrity</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| **Upheaval buckling**            | • Low cost, flexible solution to for extended monitoring of pipelines  
                                  | • Verify integrity for assets subject to process change                                                                                   |
| **Over-temperature of flexibles**| • Low cost, flexible solution for long term monitoring of flexibles  
                                  | • Early identification of elevated temperatures  
                                  | • Improved data to support process EOR and process optimisation                                                                           |
| **Internal corrosion / erosion** | • Flexible method of monitoring assets at risk of accelerated corrosion/erosion  
                                  | • Optimise interventions intervals: reduce OPEX, increase availability  
                                  | • Extend asset life - increase profitability  
                                  | • Improved safety through fewer diver/ROV deployments                                                                                     |
| **VIV and FIV monitoring**       | • Low cost, flexible retrofit solution to riser, span and pump vibration monitoring  
                                  | • Extend asset life - increase profitability                                                                                               |
| **Location / movement**          | • Reduced cost of monitoring  
                                  | • Identification of asset problems avoids leaks / shut downs  
                                  | • Extend asset life - increase profitability                                                                                               |

## Flow Assurance

<table>
<thead>
<tr>
<th>Benefits</th>
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</table>
| **Enhanced Oil Recovery**                                               | • Better management of assets which leads to life extension  
                                  | • Extend asset life - increase profitability                                                                                               |
| **Hydrate Build-up**                                                    | • More data leads to better decision making  
                                  | • Extend asset life - increase profitability                                                                                               |