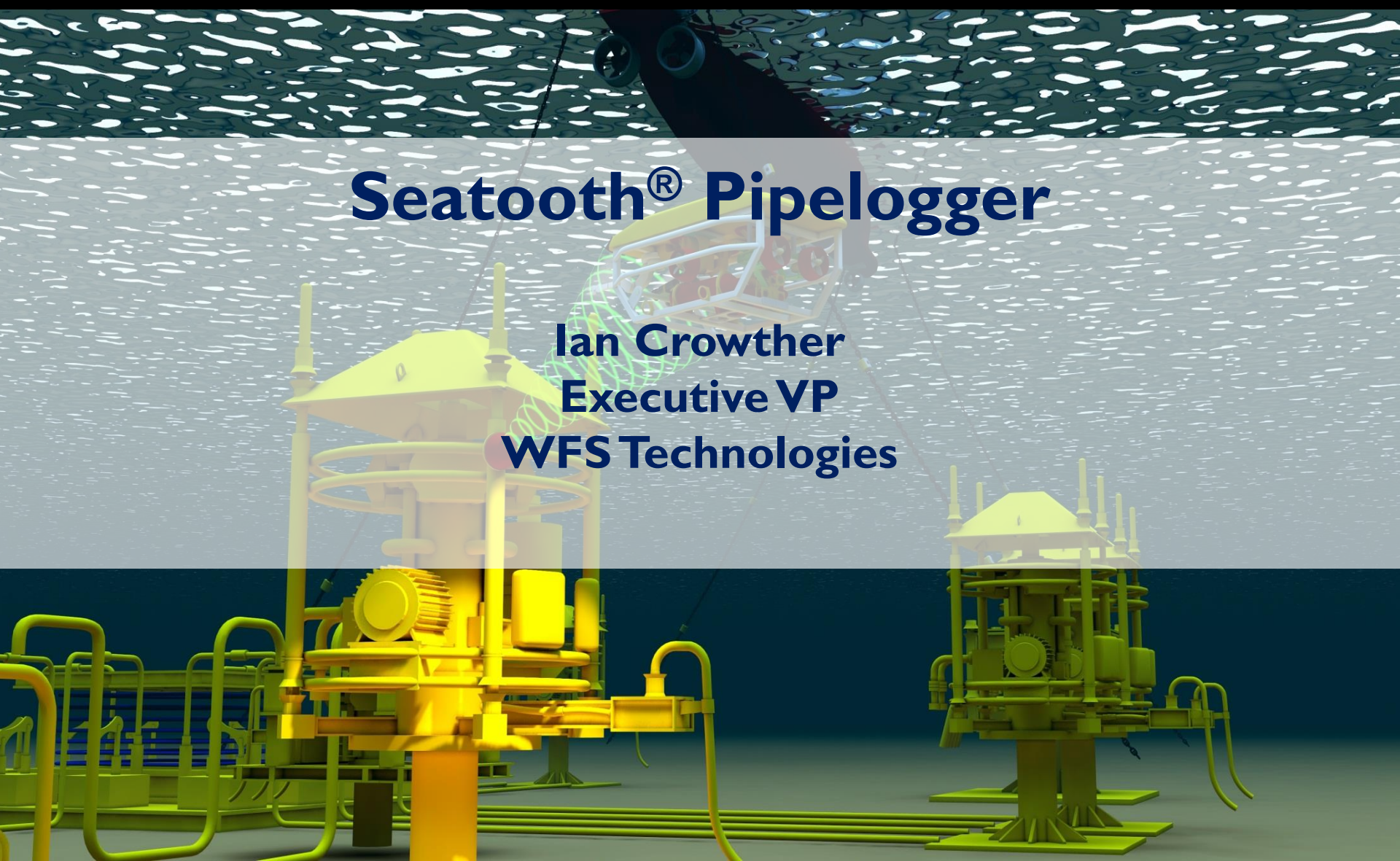


# Seatooth<sup>®</sup> Pipellogger

**Ian Crowther**  
**Executive VP**  
**WFS Technologies**



# About WFS Technologies



## WFS – Wireless For Subsea

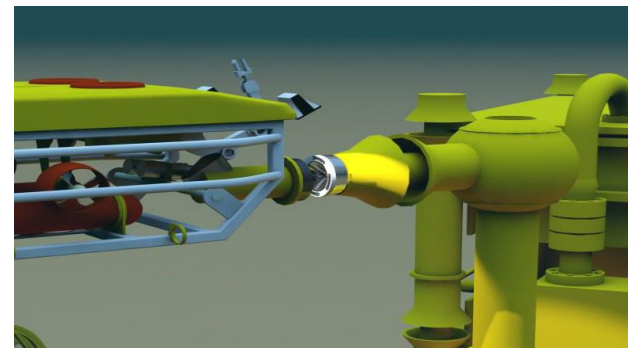
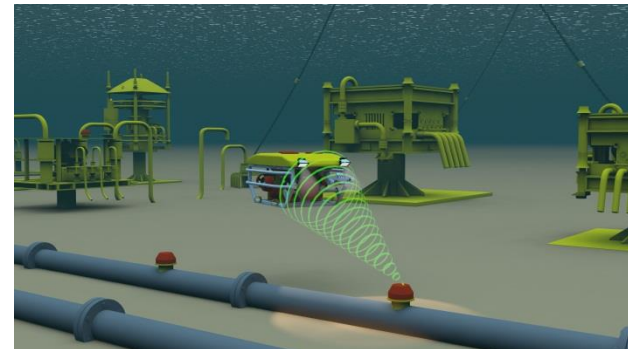
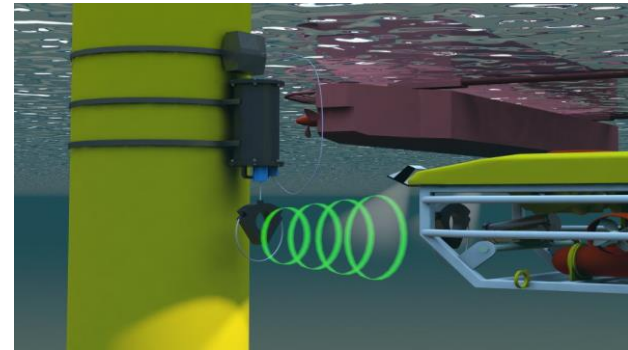
- Founded 2003
- Operations in UK & USA

## 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<sup>®</sup> 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<sup>®</sup> Pipellogger

## Specification



**Seatooth<sup>®</sup> Pipellogger** 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 pipew
- 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



### DRU Specification:

Power	Data Connection
18 – 30VDC	RS232/RS485

### PipeLogger Specification:

Bandwidth	Temperature Sensor	DataLogger Memory	Upload Rate	Battery Life	Seawater Range
2.4kbps	+/- 200°C	400,00 data points	1000 samples per minute	Up to 10 years	5m

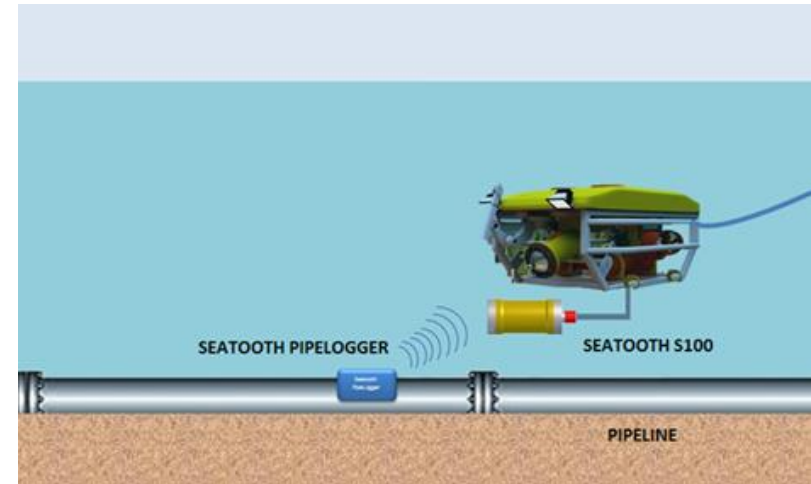


# Seatooth<sup>®</sup> Pipellogger

## 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

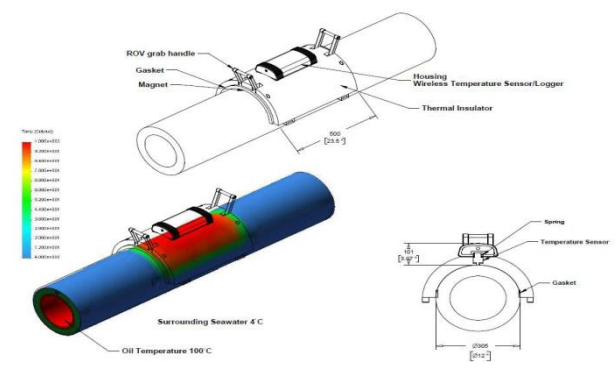
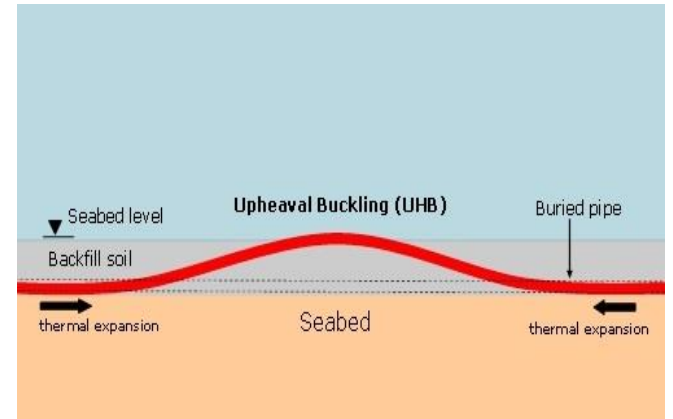


# Seetooth<sup>®</sup> Pipelgger

## - Upheaval Buckling



- **Objective**
  - Prevent temperature induced upheaval buckling of subsea pipelines
- **Solution**
  - Seetooth<sup>®</sup> 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



# Seetooth<sup>®</sup> Pipellogger

## - Pipe wall thickness monitoring



- **Objective**
  - Identify excessive internal corrosion
- **Solution**
  - Seetooth<sup>®</sup> 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



Seetooth PipeLogger with UT Sensor

# Seatooth<sup>®</sup> Pipellogger

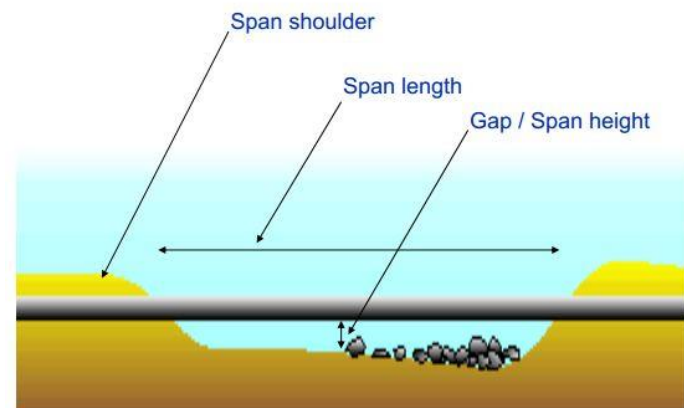
## - FIV/VIV, Free-span Monitoring



- **Objective**
  - Identify and monitor Flow and Vortex induced vibration
- **Solution**
  - Seatooth<sup>®</sup> 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



VIV on Risers



VIV on Free-Span



# Seatooth<sup>®</sup> PipeLogger

## Benefits



Asset Integrity	Benefits
Upheaval buckling	<ul style="list-style-type: none"> <li>• Low cost, flexible solution to for extended monitoring of pipelines</li> <li>• Verify integrity for assets subject to process change</li> </ul>
Over-temperature of flexibles	<ul style="list-style-type: none"> <li>• Low cost, flexible solution for long term monitoring of flexibles</li> <li>• Early identification of elevated temperatures</li> <li>• Improved data to support process EOR and process optimisation</li> </ul>
Internal corrosion / erosion	<ul style="list-style-type: none"> <li>• Flexible method of monitoring assets at risk of accelerated corrosion/erosion</li> <li>• Optimise interventions intervals: reduce OPEX, increase availability</li> <li>• Extend asset life - increase profitability.</li> <li>• Improved safety through fewer diver/ROV deployments</li> </ul>
VIV and FIV monitoring	<ul style="list-style-type: none"> <li>• Low cost, flexible retrofit solution to riser, span and pump vibration monitoring</li> <li>• Extend asset life - increase profitability</li> </ul>
Location / movement	<ul style="list-style-type: none"> <li>• Reduced cost of monitoring</li> <li>• Identification of asset problems avoids leaks / shut downs</li> <li>• Extend asset life - increase profitability</li> </ul>
Flow Assurance	Benefits
Enhanced Oil Recovery	<ul style="list-style-type: none"> <li>• Better management of assets which leads to life extension</li> <li>• Extend asset life - increase profitability</li> </ul>
Hydrate Build-up	<ul style="list-style-type: none"> <li>• More data leads to better decision making.</li> <li>• Extend asset life - increase profitability</li> </ul>