

ROV Optical Modem

For Fast Retrieval of Subsea Real-Time & Stored Data

SUBSEA EXPO 2019: ROVs / AUVs – Revolutionising Intervention

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Aberdeen, 5 February 2019

Overview

- Why Transfer Data?
- What are the options?
- AQUAmodem Op2: ROV Optical Modem
- AQUAmodem Op2L: Lightweight Version
- Case Studies
 - Hydrotest Monitoring
 - Cathodic Protection Monitoring
- Summary

Aquatec Group Ltd

- Founded in 1990
- Headquartered in Basingstoke UK
- Products sold worldwide
- Design and manufacture:
 - Hydrotest monitoring systems
 - Cathodic protection & monitoring
 - Through-water communication
 - Subsea instrumentation design
 - Oceanographic instruments
- Key Technologies:
 - Acoustics
 - Optics
 - Precision temperature & pressure
 - Cathodic protection



Design, manufacture and supply of subsea instrumentation, communications, and cathodic protection systems

Customers in the offshore market



Why Transfer Data?

- Typical Applications
 - Process control
 - e.g. valves, BOP control
 - Equipment and process monitoring
 - e.g. riser motion, pipeline temperature, hydrotest
 - Asset management
 - e.g. cathodic protection monitoring & control
 - Diagnostics and maintenance
 - e.g. subsea factory condition monitoring
- Data Retrieval from Subsea to...
 - Surface platforms
 - Subsea nodes
 - Surface gateways (buoys, ASVs)
 - ROVs
 - AUVs

What Are The Options?

HOW TO GET YOUR SUBSEA DATA BACK TO WHERE IT'S NEEDED

- Cable/umbilical – high bandwidth but costly, often impractical



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- Acoustic – low bandwidth, but longer range



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- Visual readout *in situ* – very low bandwidth
- Acoustic – low bandwidth, but longer range
- Optical – potential for high bandwidth, though range is more limited



Introducing...

AQUAmodem[®] Op2 OPTICAL MODEM

- Design Drivers
 - Communicate seamlessly with subsea instruments
 - Limited energy resource at subsea instrument end
 - Need to wake subsea modem and connected instrument by optical interrogation
 - Use with all common offshore ROVs
- Interface
 - Compatibility with ROV communications
 - Data rate up to 115,200 baud
 - Externally powered – typically 24 Vdc from ROV

Introducing...

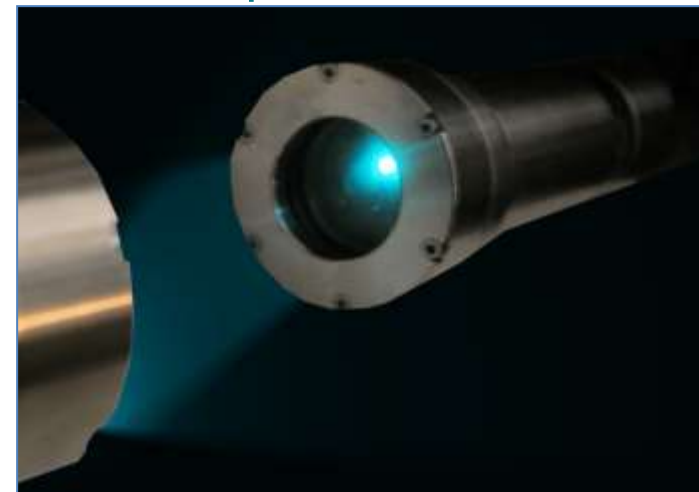
AQUAmodem® Op2 OPTICAL MODEM



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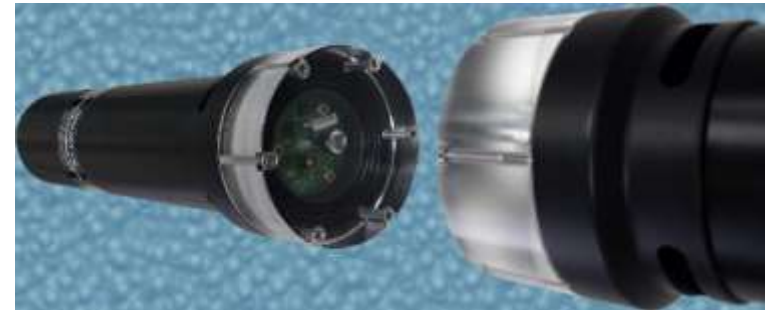
- Based on commercial technology (IrDA)
 - Instead of IR, which is rapidly attenuated in sea water, uses visible light (cyan)
- Isolated RS232 communication for use with ROV multiplexers
 - Interfaces with all multiplexers
 - 115,200 bits per second
- Up to 3500 m operating depth
- Typical 1-2 m maximum separation
- More than $\pm 15^\circ$ misalignment tolerance
- Addressable
 - Individual addresses or broadcast address



And for Mini ROVs...

AQUAmodem® Op2L LIGHTWEIGHT OPTICAL MODEM

- Lightweight optical modem
- 1-2m maximum range
- Depth rated to 500m
- Ideal for use with small ROVs or by divers
- Neutrally buoyant – zero payload weight





Case Study 1

HYDROTEST MONITORING

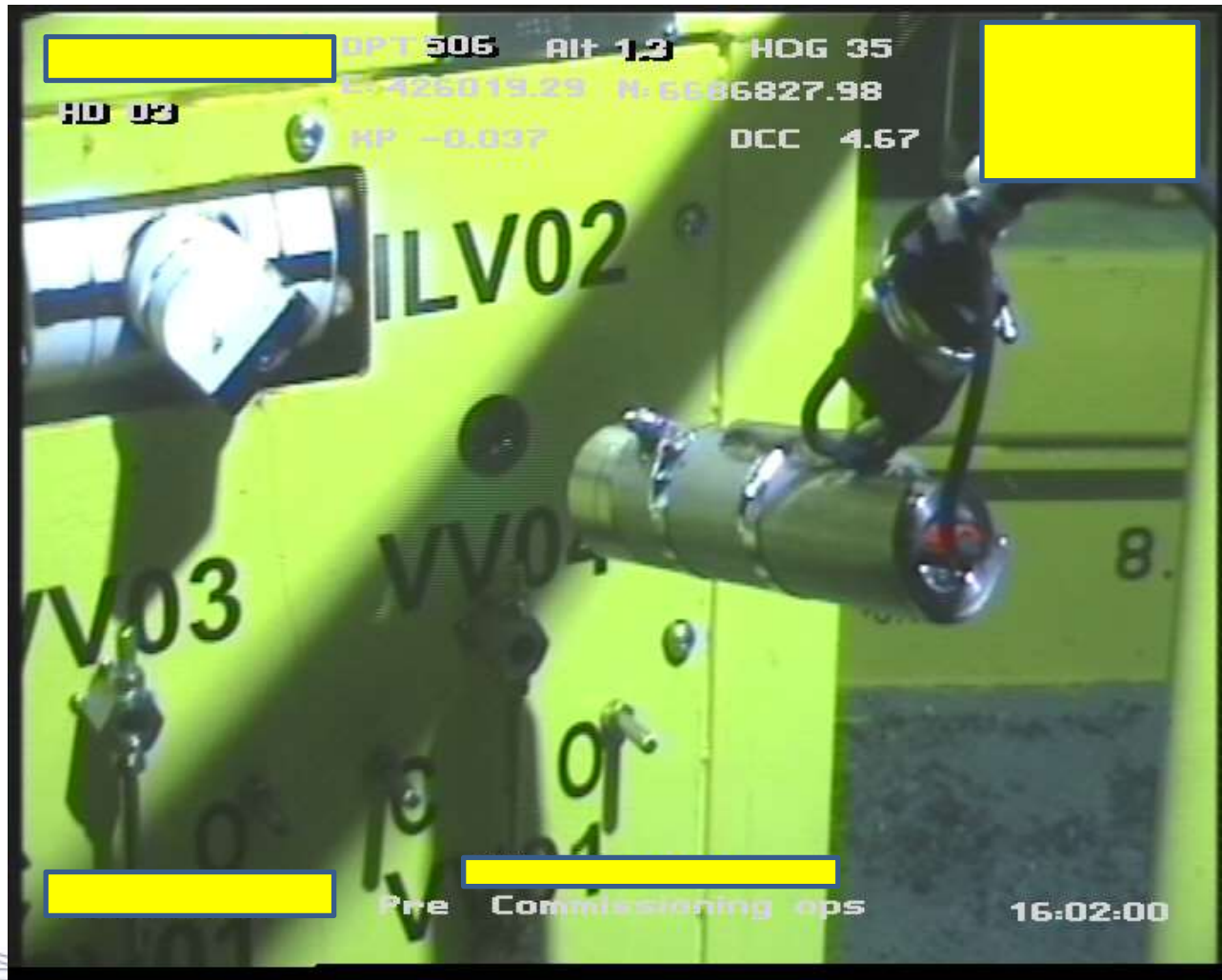
Case Study 1: Hydrotest

OPTIMISING RETRIEVAL OF HYDROTEST DATA

- Hydrotest: the test pressurisation of subsea pipelines and manifolds during pre-commissioning
- Data loggers allow for unattended monitoring of pressure tests (typically 24 hours)
- Physical retrieval of logger in deep water can take several hours.
- Using the *AQUAmodem Op2*:
 - Connect to the logger to view real-time pressure
 - Download the entire pressurise-hold-depressurise cycle
 - Immediate validation of results

Case Study 1: Hydrotest

OPTIMISING RETRIEVAL OF HYDROTEST DATA



HYDROskid 3000

COMPLETE HYDROTEST SKID

Includes:

- HYDROlog 3000 Logger
- AQUAdisp
- AQUAmodem Op2



HYDROskid 3000

COMPLETE HYDROTEST SKID



Tank Demo – Op2L HYDROlog Download Video

- https://youtu.be/T1fl_hWzv6c

Benefits

- Reduces Hydrotest Support Vessel time by:
 - Real-time monitoring of pressurisation phase
 - Hold period can be monitored autonomously
 - Vessel can work elsewhere
 - No need for data logger to be retrieved to surface
 - Identify problems immediately



Case Study 2

CATHODIC PROTECTION MONITORING

Case Study 2: CP Monitoring

CPguardian DATA LOGGED CURRENT+POTENTIALS

- UK North Sea platform
- 40 years old
- Requirement for 15 year life extension
- Multiple SACP sleds selected as optimum method
- Regular updates of cathodic protection potentials *and* sled anode current
- All data logged subsea for rapid ROV retrieval
- Real-time data available through dunking acoustic receiver



The Solution

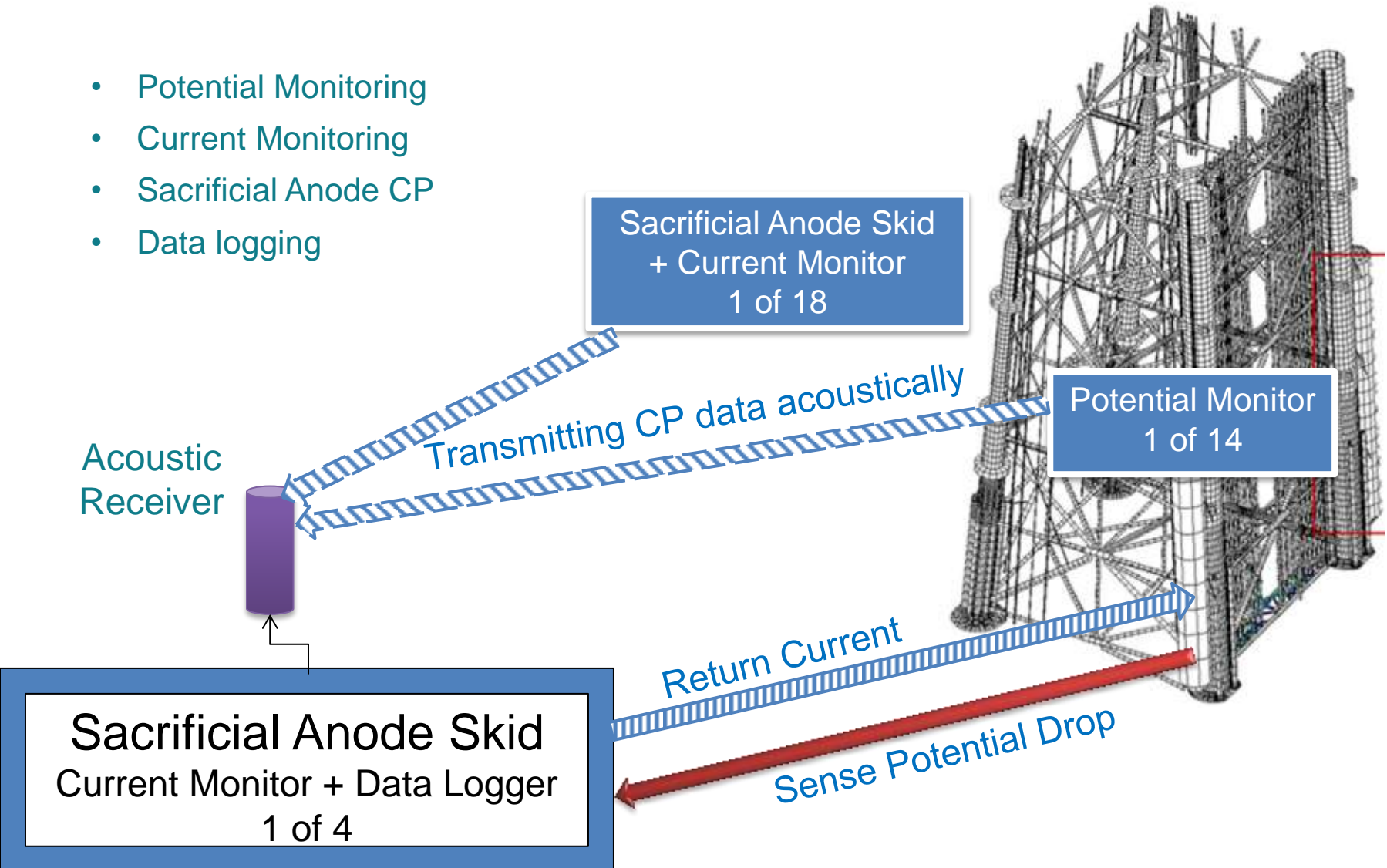
SACRIFICIAL ANODE CATHODIC PROTECTION (SACP)

- 22x SACP Anode Skids (by others)
- All fitted with acoustic CP Current Monitors
- 14x acoustic CP Potential Monitors
- 4x Data Loggers with acoustic receivers & AQUAmodem Op2 Optical Comms



Complete System

- Potential Monitoring
- Current Monitoring
- Sacrificial Anode CP
- Data logging



Complete System

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- Current Monitoring
- Sacrificial Anode CP
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Acoustic Receiver



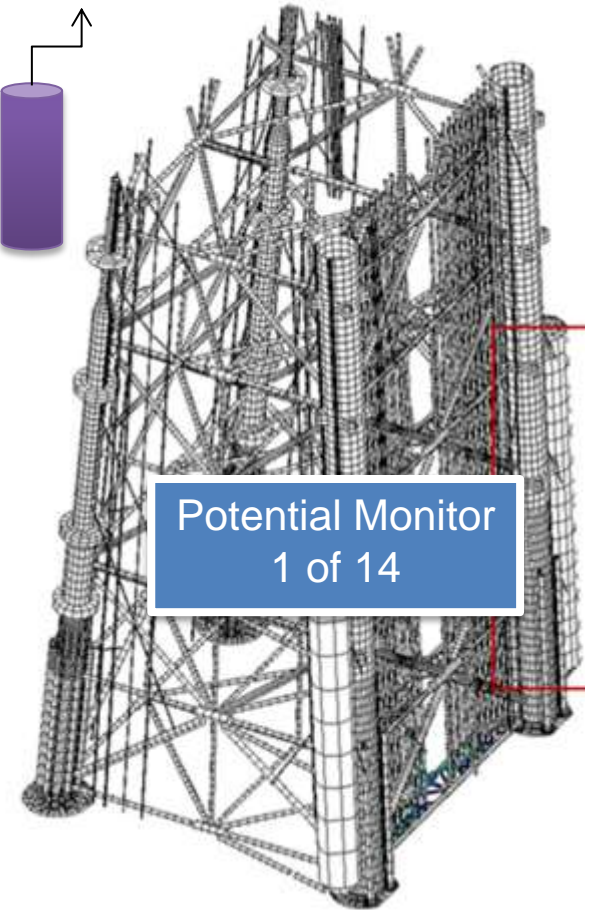
Sacrificial Anode Skid
Current Monitor + Data Logger
1 of 4



Retrieve
logged data



Collect real-time
data



Potential Monitor
1 of 14

Subsea CP Monitoring Data Retrieval Video

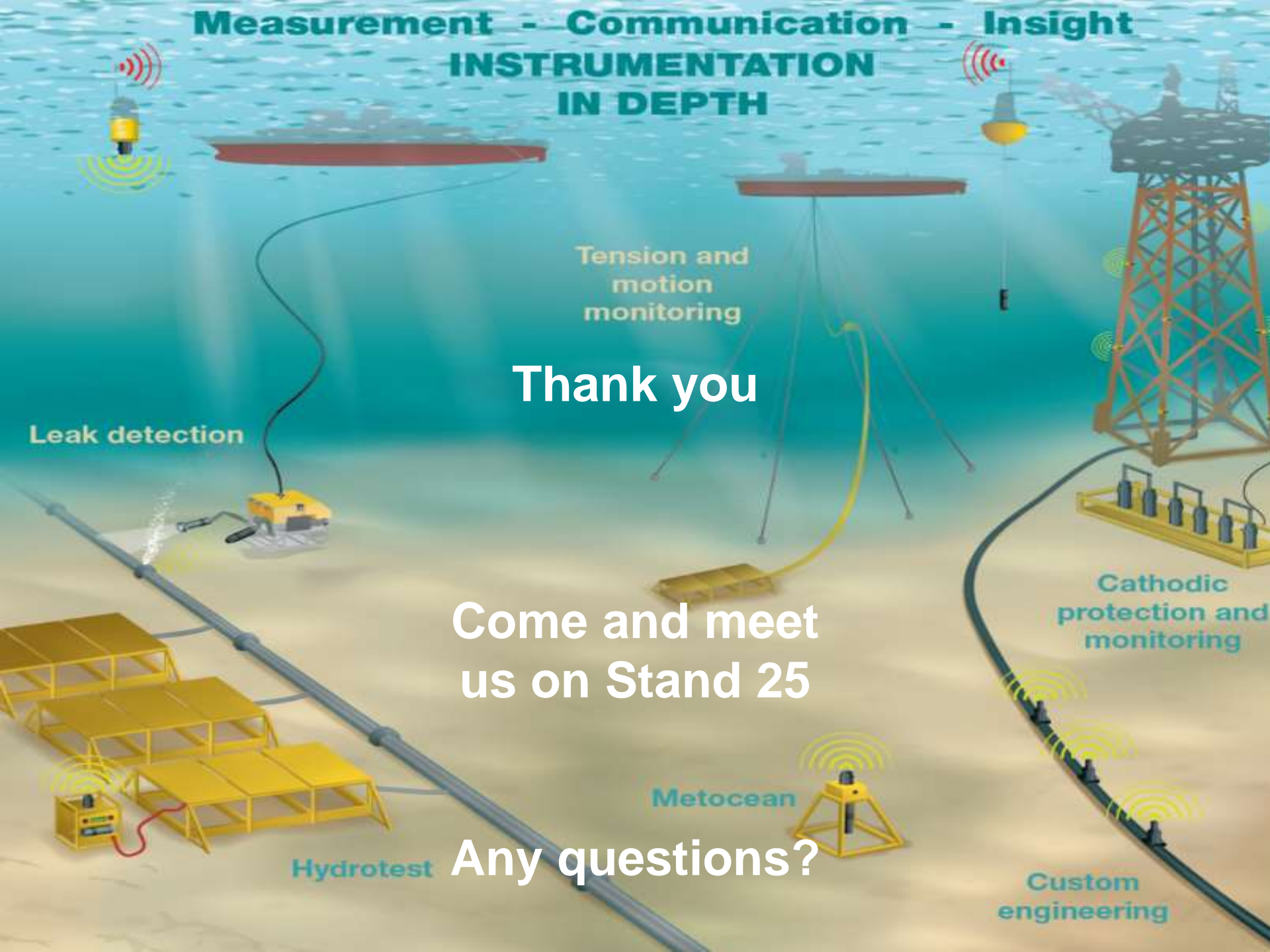
- <https://www.youtube.com/watch?v=A6EKzmgpruw>

Summary

ROBUST AND COST EFFICIENT SUBSEA DATA TRANSFER

- Seamless connection
 - Communicate with subsea equipment from surface PC using standard software
- Easy to install and operate
 - Rapid subsea and topside interfacing to any ROV multiplexer
- Robust solutions for all depths
 - Lightweight model for mini-ROVs
 - Deep water version for 3500 m
- Long term operation
 - Low power, with optical wake up
 - Mechanical window to limit biofouling

Measurement - Communication - Insight INSTRUMENTATION IN DEPTH



Tension and
motion
monitoring

Leak detection

Cathodic
protection and
monitoring

Metocean

Hydrotest

Custom
engineering

Thank you

Come and meet
us on Stand 25

Any questions?