SUT Technical Evening

Wednesday 14th February 2018

IMR Vessels and Technology Current & Future Trends - APAC Region

DCF Subsea

IMR Vessels and Technology
Current & Future Trends
APAC Region

Agenda

- DOF Subsea Introduction

Current Trends

Future Trends

IMR Vessels
- IMR Vessel Current Trends
- MPSV Vessel Current Trends

- IMR Vessels of the Future

Current Technology
- FPSO Mooring Repair Trends
- AUV Pipeline Inspection

- FPSO Mooring Repair Trends
- Single Pass AUV with Non-Contact CP
- Hover Mode AUV's
- IMR Data Analysis

IMR Vessels and Technology – What's Trending Today

IMR Vessel Current Trends – Vessel Toolkit

Skandi Hercules – Heavy IMR Vessel

Skandi Singapore - Dive Support Vessel

Geoholm – Light IMR Vessel

Skandi Darwin MPSV
(Shell Australia)

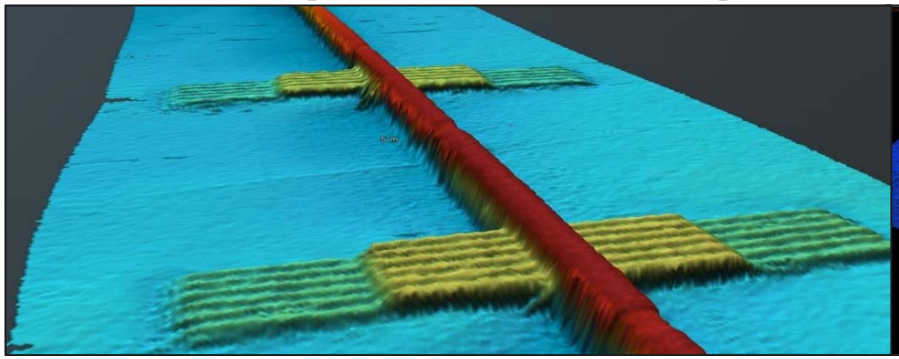
Skandi Hawk MPSV
(Shell Malampaya)

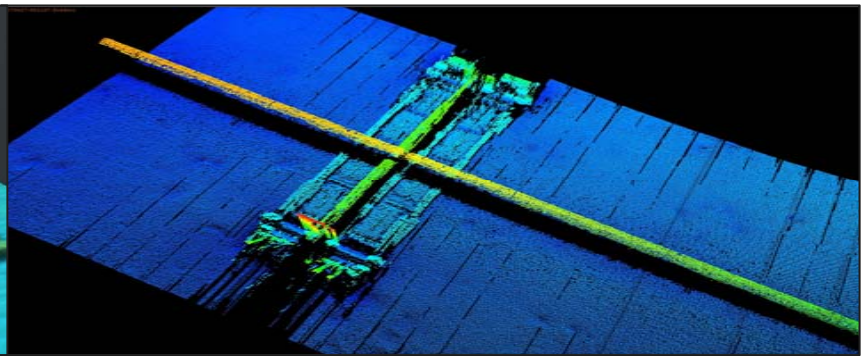
Current Technology

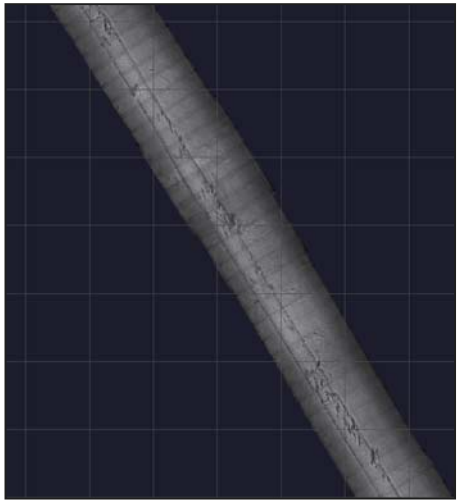
Pipeline Inspection Current Trends

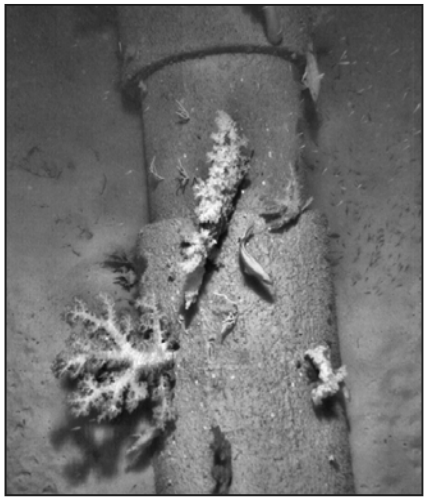
- Single Pass Pipeline Inspection
- Improved Data Quality
- Cost effective without impacting integrity management
- Streamlined Database Deliverables

AUV Pipeline Inspection

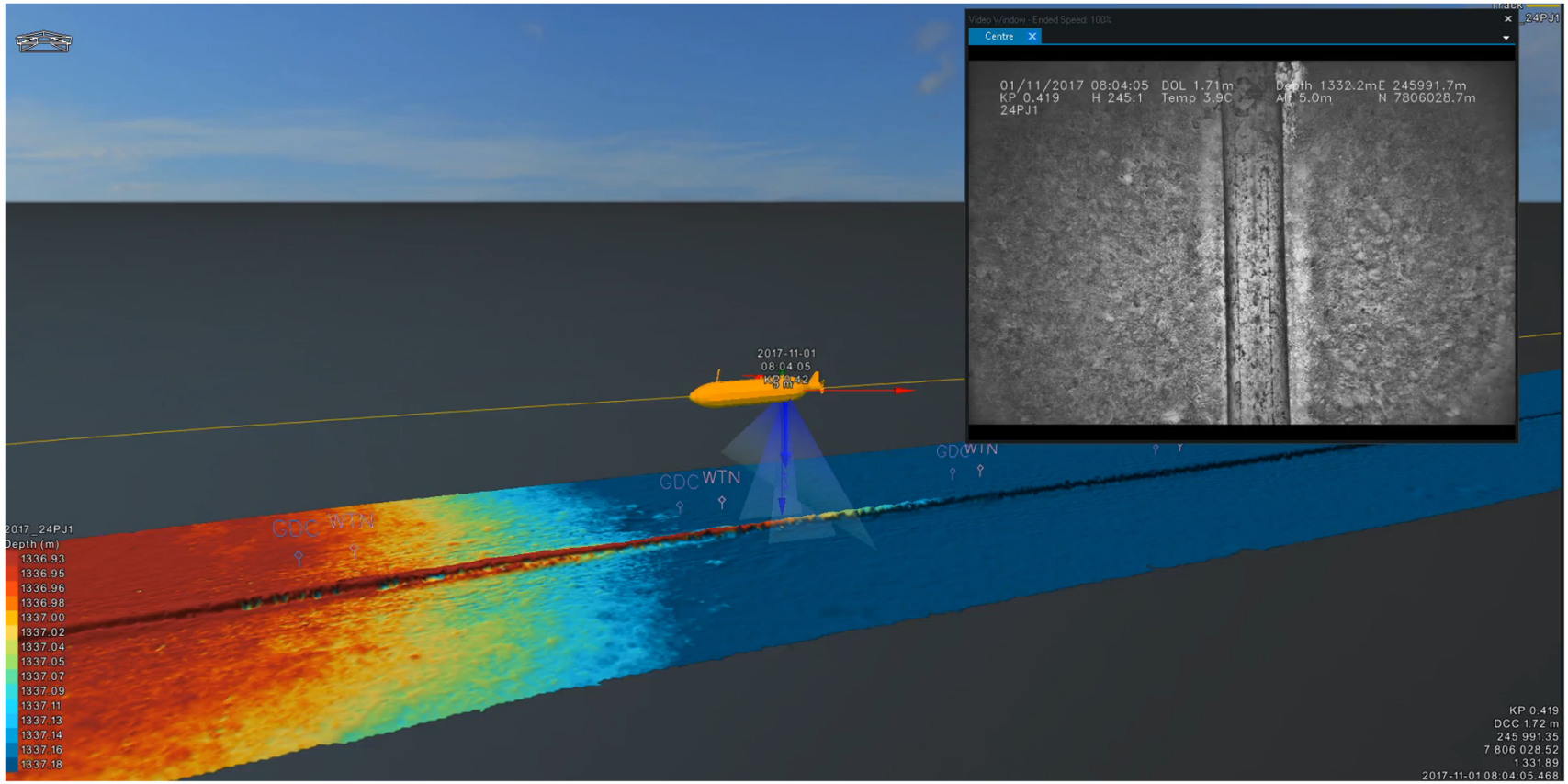








AUV Single Pass Data



AUV vs ROV Pipeline Inspection

ROV

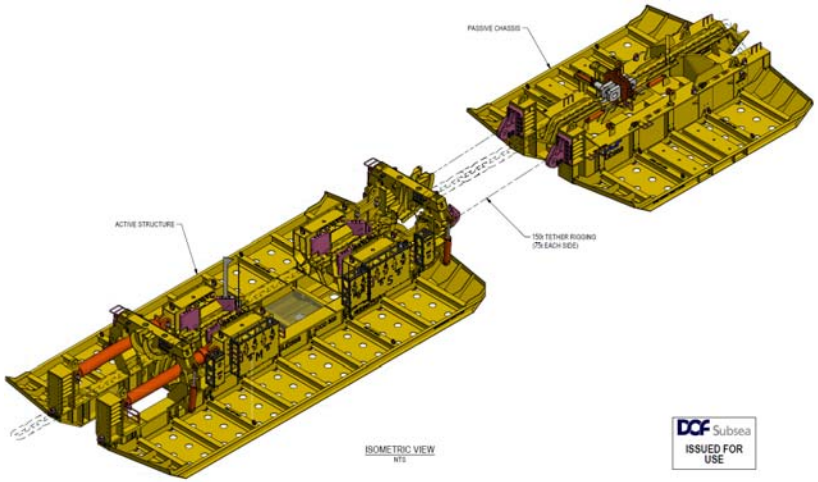
- 0.5 knots or ~22 km/day
- **1 Pass**
- Acquisition = ~109 hrs (4.5 days)

AUV

- 3.7 knots or ~100 km/day
- **1 Pass**
- Acquisition = ~20 hrs (1 day)

KP 0 *Pipeline* *KP 100*

FPSO Mooring Repairs Current Trends



- ACCD Subsea Connection Tool
- Live Field (Uninterrupted Production)
- ‘Like for Like’ Replacement
- Adaptable to suit project specific requirements

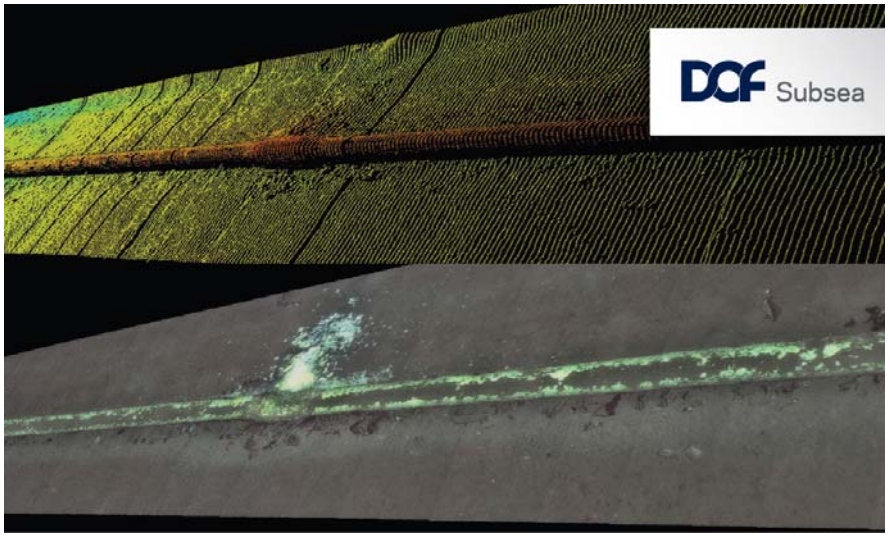
Future Technology

FPSO Mooring Repair Future Trends

- Increased Mooring Capacity > 300-400Te
- Subsea Handshakes (connecting moorings for anchor/pile replacement)
- Cross Tensioning
- Pipeline Walking Anchors

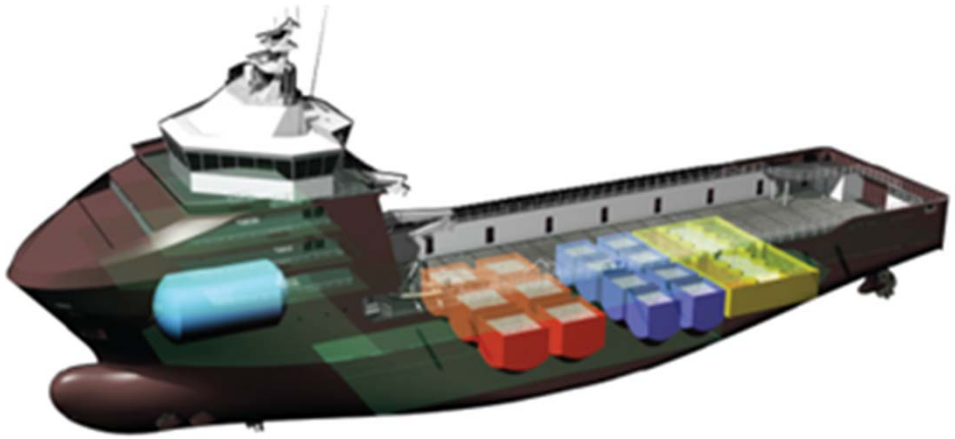
AUV Technology – Future Trends

- Non Contact CP
- CH4 (Methane Sniffer) – leak detection
- Laser Imagery – Micro Bathymetry
- Hover Capability
- Permanent In-field



IMR Vessel of the Future

IMR Vessels – Future Trends



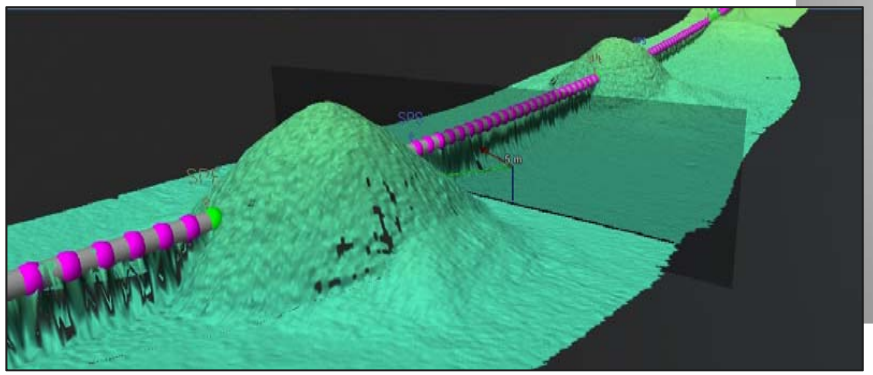
Skandi Gamma

- Dual Fuel / Battery options
- IMR Vessel Toolkit Remains
- Potential for larger Crane Size and Module Handling
- Regulatory Requirements Driving Vessel Design for working in a Hydrocarbon Environment

Data Processing

IMR Data Volumes

- AUV/ROV Data Volumes
  - Increased resolution
  - Larger Datasets
  - Increased Processing
  - Increased Storage
  - Increased Cost?



Tomorrow’s Solution Yesterday

- Going Back a few years
- Increased data and manpower for processing was already and issue
- Solutions
    - Onshore Processing
    - Large Data Centers
    - Reduced Cost
- Limitations
    - Remote from project
    - Bandwidth costs

Tomorrow’s Solution Today

- AI in Your Pocket
  - Processing occurs today at rapid rates
  - AI has developed with software learning operating in vast data centers via the cloud
  - Transmission delays response time
  - Apps are being developed to remove delays
  - FB already uses deep learning to capture, analyse and process pixels / Google developer’s now build AI into apps
- Deep Learning and Machine Learning is already being used to automate subsea data processing.

Summary

- Technology needs to deliver improved safety and reduced cost
- IMR Vessel Toolkit remains and needs to expand
- Vessels will come with alternative power sources
- Autonomy has a major role to play (Surface / Subsea / Processing)
- Technology is changing to meet the needs of huge consumer markets. The O&G industry is not centric to these drivers but we stand to benefit massively as a result.

Thank you!

DCF Subsea