Integrity Monitoring using AUVs

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Subsea Europe, 27-28 October, in Paris
Content

- Introduction to NCS Survey
- Low logistics, man-portable AUVs
- What is Gavia?
- Case Studies
- Conclusions/Summary
Background

• Formed in 2005
• Experienced Management Team
• 30 years + Experience in Survey Operations
• Experienced Field Staff
• Graduate & Ex Forces Training Program
• Recently acquired SRD Survey Division
Services

• High Quality Survey Services to Positioning & Construction markets worldwide
  – Rig, Barge and Vessel Positioning
  – Metrology & Well Setting
  – Dredging & Backfill Control
  – Pipe & Cable Lay Support
  – Precision Subsea Positioning
  – Wind Farm Installations
  – Hydrographic Surveys
  – Route Surveys

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Track Record

- Over 500 Projects
- 32 Countries
  - Australia, Singapore, New Zealand, Indonesia
  - Angola, Cameroon, Congo, Equatorial Guinea, Ivory Coast, Mauritania, Tunisia
  - Brazil, Trinidad & Tobago, USA, Canada
  - UK, Norway, Denmark, Eire, Germany, Greece, Gibraltar, Italy, Netherlands, Faroes, Sweden, Russia, Azerbaijan
  - Qatar, India, Israel
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Low logistics, man-portable AUVs

• Why low logistics, man-portable?
  o Fits with type of company NCS Survey is (i.e. not a marine/ROV contractor operating/chartering vessels)

• Availability in market place
  o Gavia from Hafmynd
  o Remus 100 from Hydroid
  o Bluefin-9 from Bluefin Robotics
  o Inver2-580 from OceanServer Technology
Benefits of such vehicles

• Reduced requirement for vessel – can be deployed from:
  o Ridged inflatable boat (RIB)
  o Standby vessel or supply boat
  o Any vessel of opportunity
  o No vessel! Directly from shore/beach.

• No restrictions on vessel, especially if operated autonomously as opposed to untethered
  o No requirement for USBL

• Reduced requirement for LARS
• Speed and ease of deployment from base
• Low cost compared to vessel based solutions
Limitations of such vehicles

- **Limited battery life**
  - 4-7 hours compared with 20-60 hour on larger vehicles
  - NCS Survey vehicles have ability to fit two battery packs thus increasing endurance to 8-14 hours
  - But often this period of time is sufficient, especially if truly autonomous
  - More sensors uses up battery quicker

- **Payload**
  - Limitation with some vehicles regarding payload, for example:
    - INS, camera/video, DVL, etc
  - Standard industry payloads may need modifying for integration into such sized vehicles
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What is Gavia?

- Man-portable
- Fully modular
- User-changeable modules that can be replaced in minutes, allowing rapid sensor reconfiguration and battery replacement.
Gavia for offshore market

- DGPS with Veripos Ultra
- Kearfott T24 INS
- Teledyne RDI 1200 kHz DVL
- HD Stills Camera
- Obstacle Avoidance Sonar
- Acoustic modem
- Marine Sonics 900/1800 kHz SSS
- Geoswathe 500 kHz MBES
- SeeByte AutoTracker
- Iridium satellite phone
- WLAN communications on surface
Low logistics, man-portable

- **Size**: 2.9m and 92kg with full payload
- **Endurance**:
  - 4 hours (with full payload)
  - 7 hours (no MBES, just SSS)
  - 8-14 hours (with two batteries installed)
- **Speed**: 3-4 knots
- **Depth**: 0m to 500m/1,000m

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Post-mission analysis

Operation report

Operation start: Wed, 18 Feb 2009 08:04:35
Weather: Good
Present: Andy White, Mark Ogden, Phil Hert
Duration: 459h54m:37s:41m
Time in water: 02:33:54 hours
Time on mission: 02:08:20 hours
Distance travelled: 14.2km

Mission name | Start | End | Status | Distance travelled | Distance estimated |
--- | --- | --- | --- | --- | --- |
AmelondReRun | Wed, 02 Jun 2010 11:00:51 | | successful after 02:08:20 hours | 13.6km | 11.4km |

Temperature profile

Bathymetry

Accuracy

Surge
Post-mission analysis
Offshore applications

- Pipeline inspection using AutoTracker
- Scour surveys in restricted areas – O&G & renewable energy
- Various types of bathymetric, SSS and camera surveys
- Pre-lay and post-lay build surveys for pipelines, umbilicals, trenches, etc
- Hydrographic surveys
- Post-hurricane inspections (NTL surveys in US GoM)
- Exploration work
- Environmental surveys

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Reduce vessel specifications
Launch & Recovery
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• BP Caspian Business Unit
• Contract through Saipem Caspian
• 8 x pipelines  – 12” through to 30” – some trenched but exposed – large longitudinal spoil heaps
• 2 x Fibre Optic Cable  – nice to have but observed by SSS
• All from Sangachal Terminal
• Water depths – 0m to 12.5m
• GVI, SSS & MBES
Slant range corrected Marine Sonics side sonar image using 900khz transducers, illustrating finely detailed natural features such as patches of seagrass and sand ripples.

- Buried Oil Export Pipeline
- Patches of Seagrass
- Sandripples
- Range 30m
- Sea surface
Payload – MBES
Trench & spoil heap
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Pipeline Inspection
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Pipeline Inspection in US GoM
Pipeline Inspection in US GoM
Petronius 12" Gas Pipeline

AUV Survey - Phase 1

23 August 2010
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Conclusions

- Put the AUV where you want
  - Ability to survey in shallow water depths
  - Ability to fly in restricted areas
  - Ability to track exposed pipelines
- Opportunity for vessel to perform other tasks simultaneously
- Speed of data acquisition, especially compared with traditional ROV/vessel based systems
- Quality of data is significantly better than vessel based and towed systems – no interference from surface/vessel or cable ‘tugging’
Summarise

• Fast response anywhere in the world
• Small teams
• Lower cost equipment
• Minimal equipment required for L&R
  – simple davit
  – from beach
  – vessel of opportunity
• Better quality data
Acknowledgements

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Thank You.
Questions?

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