

# AUTONOMOUS UNDERWATER TECHNOLOGY (AUT) CONFERENCE

Report on Seminar & Exhibition

Thursday, 31 October 2013

By Karl Bernet, AUT Conference Committee Member (Sub-Committee of the SUT Perth Branch)



To begin the proceedings, the welcoming address was given by Ray Farrier (SUT Perth Branch Chairman), who commented on the success of the networking 'Ice Breaker' event, sponsored by UTEC Survey Australia Pty. Ltd. on the previous evening.

Ray acknowledged and thanked all sponsors, particularly Platinum Sponsors: Fugro Survey Pty. Ltd. and Woodside Energy Ltd., and the AUT Conference Committee, without whom the conference would not have been possible.

## Session One

The morning session was chaired by Kevin Mullen (Intecsea).

### Keynote - Subsea Inspections Technology

The Keynote presenter Pete Wademan (Woodside Energy Ltd.), provided a comparison between conventional technologies and AUV pipeline techniques. Although acknowledging the diverse payload and intervention capabilities of an ROV, he suggested that the optimisation of ROV time should be less "I" more "RM" and AUV's be an alternative technical solution for pipeline inspections.

### First Presentation - Using Wave Gliders for Marine Environmental Monitoring

Iain Parnum (Curtin University) presented a preliminary evaluation of the ability of Liquid Robotics (LR) wave-gliders to monitor the marine environment. Two LR wave gliders (Wuruwuru and SO2004) were deployed off northwest Australia. Iain also gave an appraisal of sensors used and the data collected. The wave gliders proved to be a viable alternate platform to carry out environmental monitoring with the benefit of increased safety through a reduction of personnel in the field.

### Second Presentation - Ocean Gliders, A New Paradigm in Marine Data Acquisition and Environmental Management

Operational experiences, to prove the use of Slocum gliders for environmental management and regulation was discussed by Ray Steedman (AUV Pty. Ltd.). The technology was demonstrated through examples from Cape Riche WA, North Head Fremantle (7 Feb 2010 & 16 Feb 2010) and Deep Water Horizon, turbidity tracking, eddy diffusivity and oil spill plumes. Other findings were that in shallow water a slow moving plume are patchy and does not spread at a uniform rate whereas in deeper water, rapidly varying plumes may be controlled by breaking internal tidal waves.

## Morning Tea Break

Handmade scones with jam and cream were sponsored by DOF Subsea in the busy exhibition area. The seven exhibitors included DOF Subsea; Fastwave Communications; Fugro Survey Pty. Ltd.; Gardline Marine Services Pty. Ltd.; Kongsberg Marine Services Pty. Ltd.; Liquid Robotics Oil & Gas; and UTEC Survey Australia Pty. Ltd.

### **Third Presentation - Autonomous Inspection Vehicle**

Ray Smith described a new service offered by Subsea 7 using the Autonomous Inspection Vehicle (AIV). The build and design of the AIV is a collaborative effort between Subsea and Seabyte using the technology gains from PAIV, SPINAV and Auto-tracker. The current capabilities of the AIV are limited to visual inspection; however future builds are to include contact and non-contact sensors. Ray also provided an overview of the testing regime that included tank tests, open water and operational scenarios.

### **Forth Presentation – SeeTrack AutoTracker: Enabling Low-Logistic Pipeline Inspections**

Joel Cartwright (SeeByte) began his presentation explaining that with AUVs being increasingly being tasked for routine pipeline inspection tasks, it becomes necessary that the AUV navigation function accurately maintains position relative to the pipeline for high quality data to be gathered. However, even with AUVs equipped with high-quality INS, keeping position, is a struggle to achieve. The SeeTrack AutoTracker; a software package is a way to resolve the problems of buried pipelines, data errors and slow, manual operations to provide reliable, accurate and efficient data. payload sensors to detect and adjust its own trajectory to accurately track the pipeline. Using real-time data taken from the AUV's sensors, such as side-scan sonar, SeeTrack AutoTracker will detect, track and control the trajectory of the vehicle, all the while maintaining optimum sensor coverage and a constant offset to the pipeline. Unfortunately, the 'secret sauce' of how this is done was left undisclosed.

### **Fifth Presentation - Recent Improvements in Imaging Performance of the HUGIN 1000**

The presentation by Bill Russell-Cargill (DOF Subsea, Pty. Ltd.) describes the improved imaging capability and enhanced navigational performance of DOF Subsea's HUGIN 1000 AUV. The presentation described the vehicle's new suit of survey sensors (EM2040 Multi-Beam Sonar, HG 9900, HiPAP aiding and Navlab post processing) and the switch to lithium batteries. Case studies were used to illustrate the improvements now being achieved using the increased resolution capability during a detailed bathymetry survey of historical airplane wreckage in the Eastern Mediterranean.

### **Sixth Presentation - AUV Expanding the Dynamic of Geophysical Survey**

Kelvin Chow's (Fugro) presentation began by describing the unique geo-hazards encountered in deep water environment and the challenges faced in geophysical survey methods. He then showed how AUV technology is becoming the perfect solution to the challenges that deep sea production and development projects are facing, by offering a stable and reliable platform that expands the dynamic of geophysical survey. Though sharing of some recent AUV projects, Kelvin shared his experience with ultra-deep pipeline route determination, detailed engineering surveys and a micro-3D survey program. He concluded with saying that traditional shallow water geophysical survey technology is not effective for deep water application.

### **Session Two**

The afternoon session was chaired by Steve Duffield (Fugro).

### **Seventh Presentation - AUVs for Environmental Survey**

Stefan Williams (Australian Centre for Field Robotics, University of Sydney), in his talk examined a novel visual navigation and mapping system based on clustering and classification of the resulting imagery. Under Australia's Integrated Marine Observing System (IMOS) program benthic reference sites were established around the country. These sites are revisited on an annual basis to monitor changes in marine habitats by exploiting developments in high resolution mapping using stereo imagery data collected by the AUV systems. Large volumes of data are collected and the challenge is transforming the resulting data into information of measured change suitable for the study of marine environments. Stefan concluded with his thoughts on the direction of future benthic observing programs and the potential role of AUV systems for cost-effective, safe environmental assessment and impact studies.

### **Eighth Presentation - How the Oceans Have Turned to Gold**

Todd Kleperis (Liquid Robotics International) offered a unique perspective on piracy, illegal fishing and subsea mining in his presentation.

## Ninth Presentation - Automation of Full-coverage Hydrographic Survey Over Variable Topography

Stuart Anstee (Defence Science and Technology Organisation), in his talk presented a set of algorithms to automate the process for survey planning an unfamiliar area with the goal of minimising overlap while maintaining complete coverage. The algorithms are based on probabilistic exploration of random survey paths, allowing generation of acceptable solutions to what is otherwise an intractable problem. This was demonstrated via simulations of a robotic survey system using these algorithms show that this approach almost always produces useful improvements in survey efficiency, with the potential for dramatic improvements over complex terrain and in very shallow water. The talk concluded with noting that even the simplest data-driven strategies are worthwhile, though more aggressive strategies have potential to increase productivity substantially.

## Tenth Presentation - Unmanned Subsea Surveyor – Remote Long-term Monitoring

Peter Mellor, (WorleyParsons Servcies Pty. Ltd.), presented the Unmanned Subsea Surveyor (USS). The USS is a field mounted hydraulic telescopic arm with a fully flexible camera which captures either stills or video for later or live analysis. The USS can monitor an area of 300m<sup>2</sup> using a 10m arm that can rotate 360°. It is deployed at one site and is used to map coral assemblage and monitor bombora. It has been at the site for over a year without servicing. The USS can be operated in two modes; autonomous (transit to a specific location at set times), or manual (the user can inspect a specific location). The USS removes the requirement for divers or long-term field exposure of ROV teams in remote areas, subsea and locations with climatic extremes.

## Closing remarks

The closing remarks were provided by Dr Peter Ramsay (AHS Chairman, West Australia Region) who again thanked sponsors, exhibitors, presenters, session chairs, delegates, the AUT Conference Committee, the Society for Underwater Technology and the Australian Hydrographic Society for all coming together to make the event possible.

Peter closed the proceedings by inviting delegates to the exhibition area for post-conference drinks and canapés thanks to sponsor Kongsberg Martimine Pte. Ltd.



*Pre-Conference Ice Breaker Function at the Belgian Beer Cafe*



*AUT Conference Committee*



*Conference*



*Exhibition*