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SWIMMER: Innovative IMR AUV

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Abstract

If deepwater field developments are to continue to integrate complex subsea equipment for seafloor processing, sometimes in harsh environments and remote locations, the offshore industry has to find new means for Inspection, Maintenance and Repair (IMR) interventions that ensure and improve both integrity management and the flexibility and reactivity of the interventions.

“SWIMMER” is a new AUV incorporating a light work-class ROV with tooling designed for long-term subsea deployment - 3 months minimum - and able to perform light IMR operations such as:

- valve operation: manual or hydraulic failing valves
- equipment survey: subsea production systems, pipelines and risers, umbilicals
- process monitoring: hydrate localization, thermal leak identification,...
- light equipment replacement: hydraulic or electric flying leads, ...
- trouble shooting assistance,

using an ROV commanded from the surface facilities through the production control umbilical, rather than a dedicated service vessel.

In early 2007, CYBERNETIX, TOTAL and STATOILHYDRO joined their engineering forces to work on a SWIMMER prototype, and set themselves the target of deploying it offshore by the end of 2011.

This paper presents the project’s industrial objectives, highlights key component specifications along with challenges such as AUV system, ROV/TMS, AUV payload, docking station, control and power umbilical, topside interface, and puts forward conclusions on feasibility, technological gaps, associated qualification programs and views on industrial integration on subsea oil and gas fields.

Reliability, flexibility and autonomy are the key words in support of the integration of this concept in future field development architectures which could be fine-tuned with a SWIMMER-based operating intervention philosophy.

Introduction

The offshore industry is facing new challenges with new field discoveries. Reservoirs are often deeper, smaller and in remote locations. The fluids are more complex, often heavy, acid and with low energy. To improve oil recovery, operators are seeking to install complex subsea equipment for boosting, or more generally processing production. Consequently, the capital expenditure figures for future developments are soaring and in the meantime, the costs of IMR operations, mainly driven by ROV support vessels and associated resources, have risen significantly. More than ever, innovative solutions have to be found, not only to decrease the operational expenditure but also to improve flexibility and reactivity.

Over the past years, the use of AUV has increased extensively in various industrial sectors such as oil and gas, military and research. AUV are currently employed in seabed mapping where they have proved to be a choice answer. A couple of programs have attempted to demonstrate that AUVs can perform pipeline surveys but so far, no autonomous vehicle has been really used in inspection, maintenance or repair applications. No intervention AUV are currently available on the market.