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AESOP SUBSEA MODULE PREPARES FOR FIRST DEMONSTRATION

Production of the first AESOP (All Electric Seabed Oil/gas Processing) module is nearing completion at the Kockums Engineering yard in Malmö and continues on schedule for demonstration to the offshore industry in September. Kockums managing director Sven Åke Nilsson is confident that the new unit will be welcomed by the industry, as its subsea production capability will bring significant cost benefits. Estimates suggest that it could boost well production by up to 75 per cent and development of the system is being supported by a consortium that includes Conoco (UK), British Borneo Oil and Gas, Shell UK Exploration and Production and Statoil (Norway). The European Union is also providing funding for the demonstration project and the approaching September deadline appears likely to signal a new milestone in offshore technology

AESOP is a unitised autonomous module for use in an AlphaPRIME system and incorporates electrically powered flow control and processing units. It was conceived by British based Alpha Thames in response to the trend towards seabed systems being completely electrically powered and controlled. A preliminary study confirmed that an electrically powered and controlled seabed oil separation and boosting system is feasible especially if it is part of an AlphaPRIME modular seabed processing system. The AlphaPRIME concept is the progeny of Alpha Thames that was purchased to create a happy marriage with the Kockums Group when the potential of its new system was recognised. “We realised that subsea processing will be big in the future and we acquired Alpha Thames who had the idea to package machinery on the seabed,” said Sven Åke Nilsson. The AlphaPRIME concept is now being engineered into reality at the Kockums yard where the company has been building submarines since 1914.

AlphaPRIME is a diverless modular system that is completely retrievable for re-use or recycling and allows for the packaging of modules such as AESOP in a variety of configurations to suit specific field requirements. An AlphaPRIME system can be used with floating production facility or fixed platforms that may be 50 km or more away. The benefits of the field would be optimised by the system, which enables manifolding, pumping or seabed separation. The modules

provide a means of readily installing and retrieving seabed equipment without the need to shut-in any of the wells.

The system can be installed in water of any depth and begins with the positioning of the main seabed structure and the connection of a 5 MW power supply. The use of high voltages underwater has been made possible by a technical breakthrough by Alpha Thames that eliminates the problem known as “water treeing”. With power available the installation of the docking manifold follows. This includes a multiple pipework connector known as MATE that allows the simultaneous connection or disconnection of various combinations of pipework sizes to suit the process requirements. Both halves of the connector are internally valved to contain process fluids when separated. MATE can be used to isolate subsea production systems and allow process equipment to be retrieved for surface maintenance without the need for a field shutdown.

Flow line tie-in is achieved with the CUSP connection system that enables pressure connections of rigid or flexible pipelines, electro-hydraulic umbilicals, the remote retrieval of valves and pipeline repairs. The system has been designed to dramatically reduce the complexity of these subsea operations by accurately aligning the pipeline ends, which it then clamps, locks and seals in a single operation. The connection system comprises a compact lightweight installation tool containing the connector that can be flown in on a standard work class ROV and readily deployed from the smallest support vessels.

A minimum of two production modules would normally be installed, each weighing between 25 to 80 tons and lowered from surface ships onto the docking manifold. The modules are self-aligned and cushioned against impact by the MATE connector as it is docked. Once installation of the module to the docking manifold is completed, start-up can commence. Installation and operation is not, however, the end of the story as the modules can be retrieved later with equal ease for maintenance or for the installation of additional production capabilities such as gas and/or water separation as the characteristics of the field change during its life cycle. This is all achieved without the need to shut-in production

When the AlphaPRIME system enters service it has been calculated that it will reduce production costs by \$2 to \$3 per barrel, a figure that includes investment and maintenance. By separating water on the seabed, where it can be re-injected, the operator is not paying to pump it to the surface and could ultimately eliminate the need for FPSOs. Because AlphaPRIME can be

situated a considerable distance from surface facilities the system will re-write the economic rules for satellite fields. The problems associated with hydrates and multiphase flow will also be eliminated and the system could justify the reactivation of abandoned fields.

For further information contact Sven-Åke Nilsson, Kockums Engineering AG, telephone +46 40 34 80 00, fax +46 40 34 83 86 or email svenake.nilsson@kockumseng.se

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Captions for 07 ALPHA

Fig 1. Docking with MATE connector module being lowered into place.

Fig 2. The MATE connector surfaces from a trial in the basin at Kockums' Malmö yard.

Fig 3. The AlphaPRIME system offers versatility for seabed installations