White paper

Industrial filtration

Compact water handling

Getting the water quality and water chemistry right is fundamental to ensuring a decent rate of return on water-based enhanced oil recovery investments

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Compact water handling

Getting the water quality and water chemistry right is fundamental to ensuring a decent rate of return on water-based enhanced oil recovery investments. **Jennifer Pallanich** looks at the evolving role of membrane technology in this endeavour.

A new generation of membrane water treatment technologies is changing the landscape of enhanced oil recovery and raising awareness of the value-added aspects of a well-planned and strategic water quality plan during injection. Membrane technologies can be used to consistently meet an EOR project's water quality objectives. These same technologies are also enabling offshore EOR by reducing project risks and reducing chemical consumption, according to water-handling company Water Standard.

Polymeric membranes for removing sulphate from seawater have been used offshore since the 1980s to reduce the risks of sulphate scaling and reservoir souring. EOR projects now use microfiltration and ultrafiltration membranes to remove suspended solids, reverse osmosis and nanofiltration membranes reduce the salinity and/or hardness of the injection water for low salinity and/or low hardness chemical injection, and gas permeable membranes de-aerate water instead of conventional vacuum towers.

These technologies are more compact and lower in weight than their conventional counterparts, and in many cases result in significantly reduced chemical consumption, making them particularly attractive for offshore applications.

Recent pilot testing of the effectiveness of membrane de-aeration (MDA) to consistently achieve oxygen removal from seawater down to less than 10 ppb has proven successful. As of mid-July, a pilot unit producing 4000 barrels per day of de-aerated seawater had operated without chemical polishing for three months at a marine facility in Florida.

The Water Standard pilot evaluated operating and design parameters such as seawater flow rate, level of filtration, and nitrogen sweep rate. Water Standard says the MDA technology can be an enabling technology for many EOR projects using water injection, and can be used for de-aerating produced water.

Membrane technologies can be applied in EOR to facilitate a higher return on the water treatment facility investment and to expand water to new reaches in the oil industry to increase oil production. The Water Standard C-H2Ocean Spectrum product line includes compact membrane systems for filtration, sulphate and hardness removal, low salinity treatment, and de-aeration.



Image: Kongsberg

Crane training

Kongsberg Maritime will deliver what it describes as the most advanced offshore heavy-lift crane simulator to Heerema Marine Contractors (HMC) for use at the new simulation centre in the HMC Academy in Leiden, Netherlands.

The simulator will be based on Kongsberg's K-Sim Offshore platform, which is in use at a number of offshore training facilities worldwide.

The Kongsberg Maritime scope of supply includes two offshore crane operator domes and a DNV Class A bridge with K-Sim DP simulator, which is based on the same Kongsberg Maritime K-Pos DP systems used on Heerema's vessels. The K-Sim Offshore simulator will feature detailed models of three HMC deepwater construction vessels — *Thialf* , *Balder* and *Aegir* — in addition to several barges and a supply vessel.

Kongsberg is also developing a set of library objects and models of offshore installations and equipment used for simulating specific heavy-lift projects, such as lifting jackets, topsides and subsea templates from barge to vessel or from vessel and overboard. The planned September 2015 delivery includes an extensive instructor system along with two deck operator trainers designed to improve communication and teamwork between the crane operator and deck operators.

20K kit on order

Maersk Drilling has placed an order with GE Oil & Gas for four blowout preventers (BOPs) and two risers that could be deployed on a pair of Maersk 20,000 psi-compliant rigs in 2018. The equipment will form an integral part of BP's Project 20K initiative (Upstream Technology, May 2014). The order includes options for more BOPs but is subject to a final investment decision on a Project 20K rig contract between BP and Maersk Drilling.

In early 2013, BP and Maersk announced their intentions to develop a new breed of drilling rig capable of withstanding reservoir pressures up to 20,000 psi and temperatures as high as 350° Fahrenheit.

"The intention and our expectation is to see a 20K rig contract realised next year," says Maersk Drilling chief executive Claus Hemmingsen.

A jointly staffed engineering team in Houston has been working on engineering studies required to select the design of the 20K rig, riser and BOP systems.

QUOTE, UNQUOTE

"This is not an age of expansion. This is an age of discipline."
Dev Sanyal, BP executive vice president and group chief of staff, speaking at the June release of the BP Statistical Review of World Energy 2014.



Photo: BP

"People were scared to put centrifugal compressors on platforms 30 years ago – for those guys the idea of putting anything underwater would have been bonkers!"
Subsea guru Dr **Bil Loth**, on the advent of subsea gas compression.

"Hurricanes are very democratic. They don't have a preference where they go."
Armando Rebello, senior associate with Stress Engineering Services, discussing diverless subsea pipeline repair at the Marine Technology Society's June lunch meeting in Houston.

Safe release

Sonardyne has shipped a consignment of acoustic release transponders and accompanying heavy-duty release frames to Subsea 7. The Oceanographic Release Transponders (ORTs) will be used, up to 17 at a time, to assist with the installation of 20 structures being lowered to the seabed from a Subsea 7 offshore construction vessel. Once landed, the ORTs are acoustically commanded to "open" and detach the lifting slings from their load.



Image: Sonardyne

The acoustic releases ordered by Subsea 7 are depth rated to 2000 metres.

Sonardyne says that the heavy-duty release frames can increase safe working loads up to 15 tonnes. The ORTs are controlled from the surface using a lightweight command unit — each ORT is ascribed a unique "address" to enable multiple units to be deployed without the risk of interference or accidental release.



Photo: Emerson

Loop tests

Emerson Process Management is opening a flow loop facility for its Roxar technologies unit in Stavanger. The new facility will be designed to increase production capacity and drive research and development in multiphase meters, Emerson says.

The 200-square-metre facility will replicate three-phase flows in oil and gas production and increase Emerson's capacity to run factory acceptance tests without relying on third-party facilities. The flow loop facility mixes diesel, salted tap water and nitrogen to imitate the multiphase flow coming out of oil and gas production wells. Emerson's Micro Motion ELITE Coriolis meters provide reference measurements and its DeltaV distributed control system is used to control and operate the flow loop and log data from the reference instrumentation and the multiphase meters being tested.

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