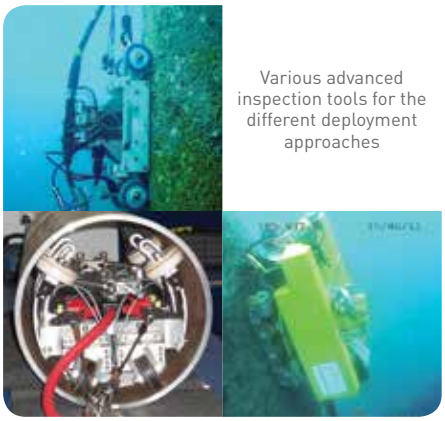
Caisson Integrity – Inspection Approaches & Experiences from Innospection

Corrosion is a constant challenge and a substantial threat to the structural integrity of the ageing subsea assets. Eight years after Innospection's foray into subsea inspection at the request of North Sea Operators to develop solutions for caisson inspection, the company has accumulated substantial field experience which results in the development of various deployment capabilities to meet the challenges in caisson inspection.



Various advanced inspection tools for the different deployment approaches

A typical defect type in pump caissons is internal corrosion in the vicinity of the pumps and centralisers. In some cases, the detected corrosion in the circumferential location resembles perforation as well as partial cracking occurring from the corrosion loci.

The considerations for caisson inspection include accessibility, defect detection requirements, marine growth cleaning, geometry changes and mapping of inspection results in a clear image of localised corrosion and remaining wall thickness. To meet the requirements, Innospection has developed advanced inspection tools capable of performing internal scanning, external scanning from the topside and external scanning with ROV deployment.

For internal scanning, there is less limitation in assessing the entire caisson and the inspection can be performed above and below the sea level which translates to more inspection data. The inspection is not weather dependent and is performed by a minimum two men team. However, an internal scanning means an interruption to the caisson operation during inspection and when the pump is removed from the pump caissons.

Examples of external and internal corrosion in caissons

For external scanning from topside, the inspection is usually performed from above the Lowest Astronomical Tide (LAT) down to the first subsea clamp with limited inspection data at the supports. A two men team together with rope access personnel is required. Removal of marine growth at the splash zone is required to achieve proper inspection data. To ease the external deployment from topside, Innospection has developed a guidance ring to support the circumferential and axial run of the inspection tool as well as a marine growth cleaning head to be combined with tool for a parallel cleaning and inspection operation. There is no disruption to the caisson operation.

External scanning with deployment of the self-crawling inspection tools by ROV is the third option. Although the inspection is typically focused on above and below the LAT, the tools can be deployed to all areas reachable by the ROV. A minimum two men team is required. This advanced deployment method could be a part of the ROV campaign and would therefore not require any direct involvement from the installation.

Online Software Unlocks Subsea Ejector Solutions

Ejector solutions provider, Transvac, has announced the launch of a suite of online software for ejector sizing and screening. In a bid to make the technology more accessible to engineers across the oil & gas industry, separate programs for gas and liquid driven ejectors have been released, including a new 'super-high compression' range of liquid-jet ejectors, capable of gas compression ratios of up to 150:1.

"It has been fascinating to see how our clients are beginning to use the online tools," says Peter Ainge, Transvac's Marketing Manager. "We often see clients logging in and playing with process conditions to see how an ejector will work for them - and it provides instant results, which is what everyone wants. It allows engineers to try out unlimited process scenarios without the need to engage our technical sales team until they are ready to do so."

Also known as jet-pumps or eductors, ejectors have no moving parts and no maintenance requirements, making them ideal for use subsea, offshore and in unmanned locations. Transvac ejectors are fully qualified and field proven for use subsea, successfully achieving 'Technology Readiness Level 7', the highest assessment level to attain.

Transvac supplied the world's first subsea processing ejector on the TORDIS project for Statoil, and also two ejectors to Petrobras' Marlim field, which is located in Campos Basin, Brazil, at a water depth of 870m.

Transvac designs ejector solutions for many applications, including boosting multiphase wells and lowering backpressure on subsea tiebacks. Designs are supported by their dedicated team of mechanical and R&D engineers, who have completed a number of development projects to further the design technology using in-house CFD (computational fluid dynamics) backed up with full scale R&D testing. All subsea ejectors are designed, manufactured and tested in-house, ensuring trouble-free operation when installed.

"Our clients are able to access the very latest in ejector technology at the click of a mouse," adds Gary Short, Research & Development Director. "We can move very quickly from concept, through to CFD modelling then on to full scale performance testing on our flow loops. Our new ejector performance curves can then be incorporated into our online software."

Login details to access the online software can be provided upon request to Transvac.