

RISER MONITORING

IRM Company RotoTech has entered into a collaboration with Resimac to apply a tubular coating facility into its multipurpose pile riser/tubular cleaning and inspection tool.

“Our inspection system is very efficient with no vessel required for the installation, reducing costs and carbon footprint,” said RotoTech Managing Director, Simon Hartog.

“The new venture, however, gives repair and maintenance capabilities. In the Middle East and Asia alone, many platforms are now 30 years old and risers, conductors and caissons need urgent repair and preservation, so the market is very large.”

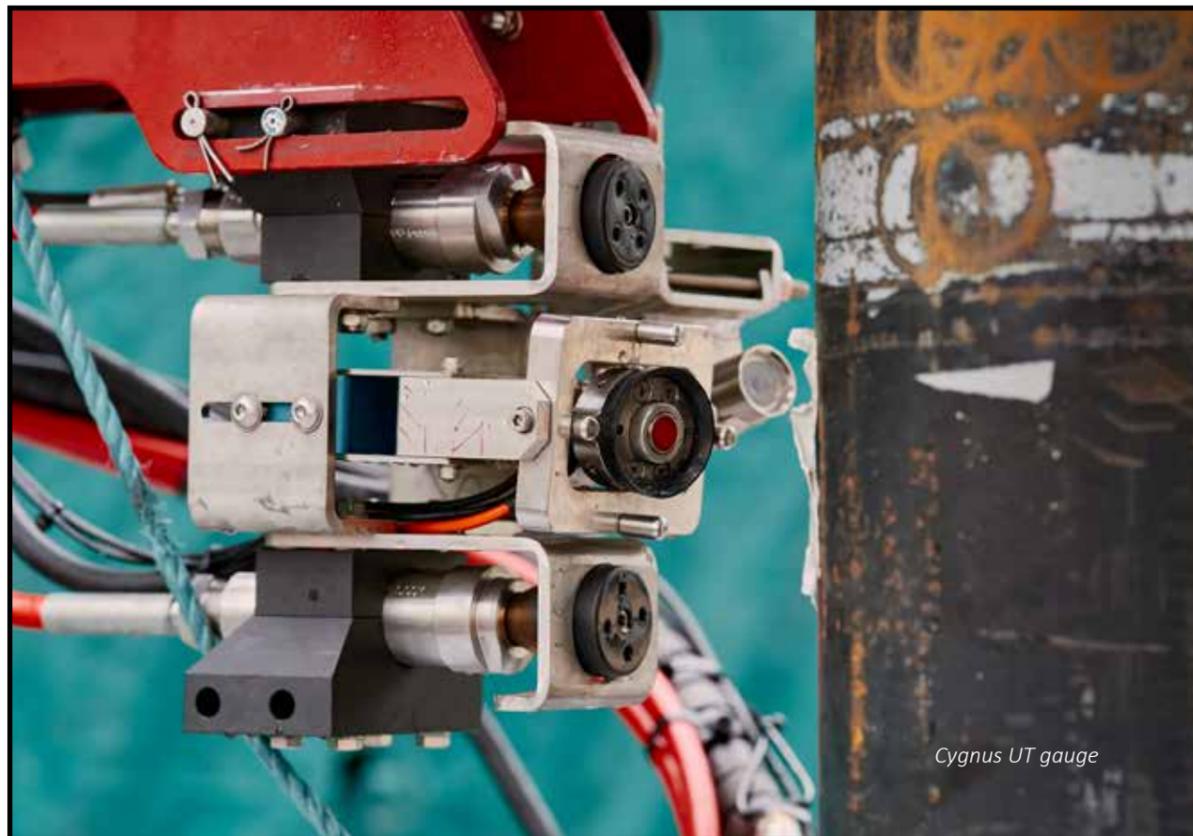
One of the most vital components of an offshore production system, is the conductor or riser that brings the wellstream into the topsides. Passing through the splash zone, these tubes may be subjected to high energy forces which impose stresses on the metal while the presence of seawater and oxygen provides a highly corrosive element. This means that in order to ensure integrity, the lines must be inspected regularly.

One way to inspect such lines is to run intelligent sensors housed in an instrumented pig, inside the pipe. The pig, however, passes very quickly which limits its sensitivity.

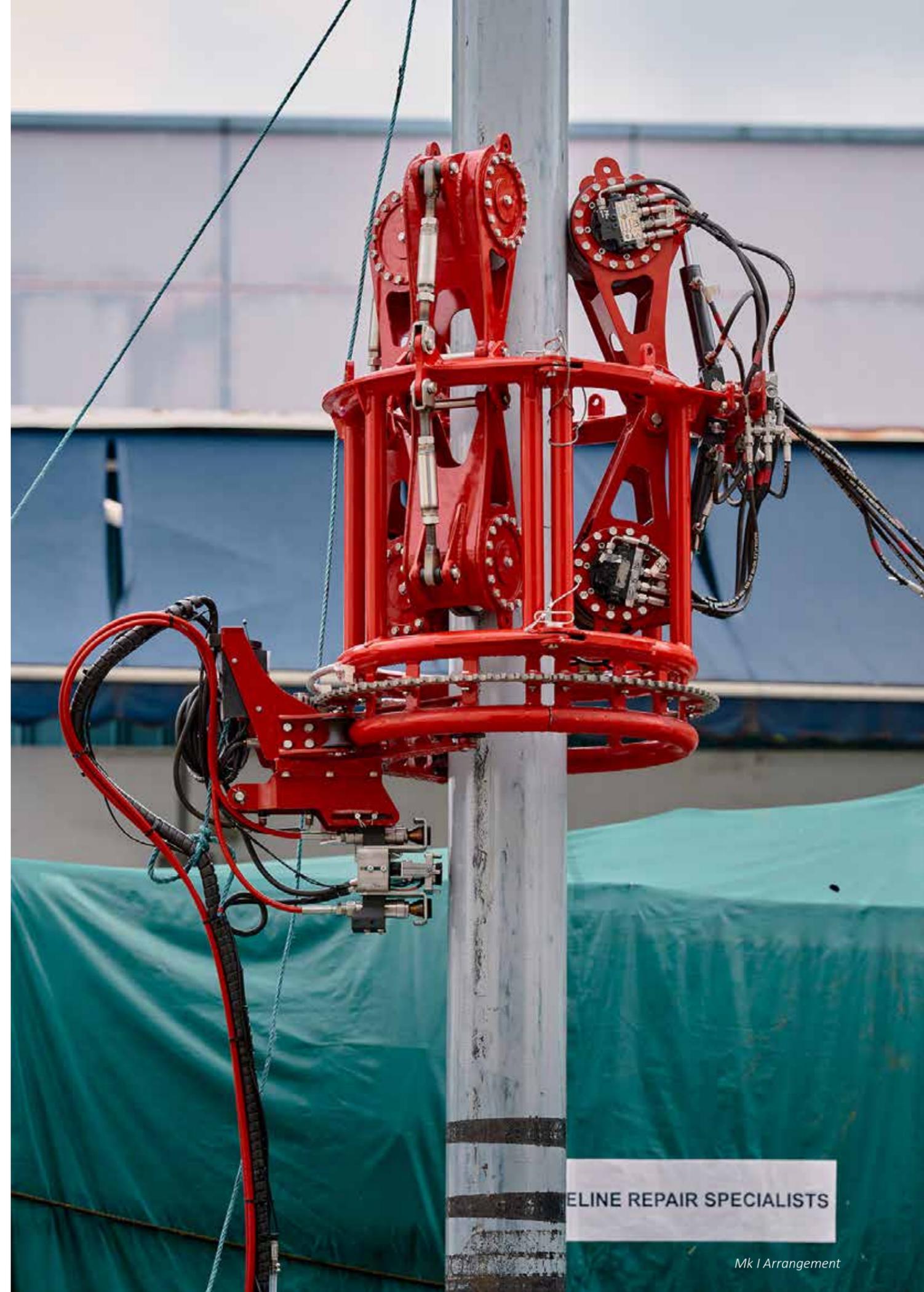
A preferred alternative may be to run a sensor mounted on some sort of tractor system, up and down the outside of the tubular. These devices are equally useful for scanning the tubulars that make up the jacket legs themselves.

The historical problem with this, however, is that in order to resist external dynamic waveforces, the risers are often physically secured to the jacket by some sort of hang-off.

Similarly, the jacket itself has nodes and bracings as part of its design. When a crawler passing along the outside of pipes reaches such an abutment or blockage, the crawler has to stop. It was for this reason that



Cygnus UT gauge



OFFSHORE PIPELINE REPAIR SPECIALISTS

Mk I Arrangement



RotoTech expanded its Roto Climber capabilities.

The company has designed two models – the Mk 1 and the Mk 2 which are chosen depending on levels of intervention. Two sizes allow it to be used on tubular diameters 8in-22in and again, between 22-36in. The Mk1 is the budget model – lightweight and relatively inexpensive. Self-sufficient, it can be launched, operated and recovered with a small crew size.

It can carry out close visual inspection using a pair of Subsea Tech's high resolution colour (700TVL) UVAS100RL 1080P HD video cameras. With a depth rating of 100m and a 0.01 lux, (night mode) sensitivity, the ultra-compact high resolution colour camera can work off battery power or mains power.

To increase its capability, the camera can be removed from the body and subsequently deployed from a telescopic pole from the surface, with a diver (wrist or hat mounted) or from any fixed or moving support. It is supported by integrated variable density LED lighting (500 lumens) system.

The image produced from the cameras, is output from a waterproof console which has a 12in LCD screen and a digital recorder/reader (SD card) in a Pelicase IP65 housing weighing only 11.5 kg.

The console and the camera are connected through an umbilical for power supply and video signal. Audio communication, text edition and depth meter functions are available on demand.

Mk II Clamp bypass sequence

“As part of the inspection process, an important requirement may be to clean the target,” said Hartog. “The Mk 1 tool is, therefore, equipped with a pair of Stoneage Barracuda (BC-H9-C) nozzles that deliver seawater up to a pressure of 3000 Bar with a flow of up to 28 lit/min. Both parameters are adjustable.

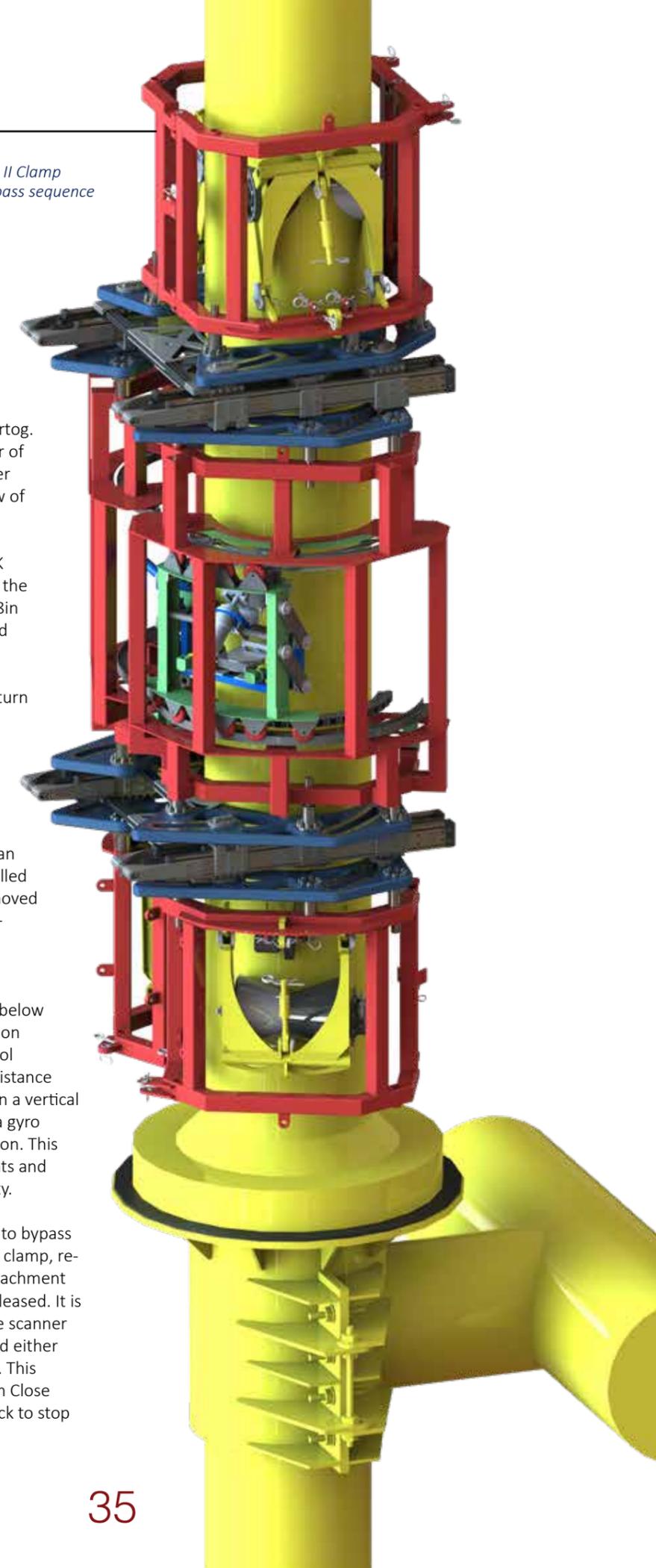
The Mk1 also carries a Cygnus ROV mountable 2K ultrasonic gauge. It can measure the thickness of the metal wall through coatings of up to 20mm or 0.8in thickness and works on both corroded and coated structures.

These measurements are checked using three return echoes to give repeatable and reliable results. There is also an eco strength indicator to aid measurement. The actual ultrasonic gauge itself is depth rated to 2000m.

For subsequent, more in-depth investigation, RotoTech offers a larger Mark II version in which an increasing number of work packages can be installed into a much larger discrete sensor body. This is moved by a separate traction unit. There are two types – a smaller climber that works on 8-22in diameter tubulars, and a larger model for 22-36in.

“The sensor module can be mounted above and below the hydraulic tractor unit depending on what action is required to be performed,” said Hartog. “Control equipment within the body allow it to measure distance moved by the carriage, both from starting point in a vertical direction, and also in a horizontal direction with a gyro being used to determine a North/South Orientation. This enables the unit to exactly replicate its movements and return to a defect location with very little difficulty.

“An important feature of the system is the ability to bypass a clamp by releasing one part, moving it over the clamp, re-engaging it and then using that to provide the attachment to the pipe when the first part is subsequently released. It is even possible to check the clamp and bolts as the scanner passes over it. The work packages can be attached either above, or below, or both, to the Traction Module. This means that it would be possible to clean, perform Close Visual Inspection, make an NDT survey, drill a crack to stop



A Mk II Arrangement

it propagating and then recoat the surface all in one operation.”

The Mk II Incorporates multiple cameras and the Cygnus UT system of the Mk 1 but includes other work packages. One such is the Olympus FOCUS PX Phased Array system for corrosion mapping as well as crack detection. The FOCUS PX instrument together with the HydroFORM scanner enable corrosion mapping to be performed up to 64 times faster than conventional methods. The results can be observed remotely in several different ways depending on available internet offshore and bandwidth. It is possible to upload data to a cloud for real time or later analysis onshore as raw data.

Amongst the other packages RotoTech have developed is a novel drilling device with the aim of accurately placing a hole in the path of a crack to stop it propagating. Elsewhere, a cutting module that can cut shapes into a pipe. It is the latest work with Resimac, however, that gives the Mark II a novel repair facility.

“If no significant structural damage is found and the customer would just like to have a very tough anti-corrosion coating replaced, the system can apply a paint-on coating from say 6m below the high tide level to the bottom of the spider deck,” said Hartog. “This coating has a 10 year life span and it is tolerant of less than perfect surfaces.”

Boasting a high build capacity, the



Olympus Focus PX Phased Array testing, showing the HydroForm Buggy, which is mounted inside the Mk II Cleaning /CVI/ PAUT Module.”

Resimac 305 InterFlex is a flexible high build solvent-free abrasion resistant epoxy coating specifically designed for the external coating of pipework, bearing piles, oil rig conductor pipes and risers, and steel structures in sea water environments. The surface to be coated must be free of any marine life such as algae or barnacles, and any degraded coating or surface corrosion must be cleaned from the surface.

This could require the surface be hydro-blasted at a minimum pressure of 3000psi to ensure the majority of contaminants will be cleaned from the surface. This spray can be applied in a moving habitat from say up to 10 meters below seawater level up through the splash zone to just below the level of the spider deck.

If wall loss is found and structural integrity restoration is needed, however, then a composite wrapping system with a wrap that can be applied and cured underwater may be a favoured solution. Rototech and Resimac are developing such a system which involves the use of a unique underwater curing resin composition pre-applied onto high tensile strength woven tape which when applied under tension consolidates into a high strength homogeneous repair. This can be applied robotically and without habitat.

“The only other robotic system in the world so far is the Kongsberg Ferrotech solution which costs millions of dollars and can only wrap pipelines in a dry environment,” concluded Hartog.

AI and Robotics Ventures Company Limited (ARV) has officially partnered with RotoTech Private Company Limited to introduce and further develop the ‘Roto Climber’ technology. ARV is a subsidiary of PTT Exploration and Production (PTTEP),



Movement sequence bypassing attachment