ROVING BAT ROV

THE RIGHT SOLUTION FOR HULL CLEANING AND OTHER UWILD* APPLICATIONS

*UWILD = Underwater inspections in lieu of dry-docking

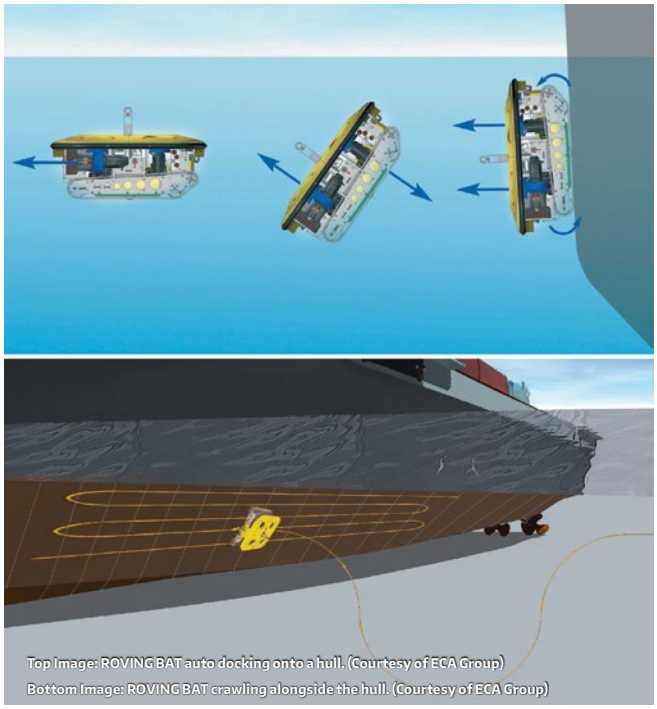
SUMMARY

ECA Group, specializing in robotic unmanned systems for over 60 years, has developed the ROVING BAT, a specific ROV solution to meet 100% of hull examination requirements as specified by international classification societies (IMO or IACS). In context of the Oil & Gas business, this solution is by far more efficient and safe than traditional UWILD methods. Typical interventions are Inspection, NDT measurements and Cleaning. This article will feature a FPSO hull cleaning and inspection operation performed offshore Brazil in early 2018 by Petrus.

The ROVING BAT. (Courtesy of ECA Group)

UWILD – A PREVAILING METHOD

UnderWater Inspections In lieu of Dry-docking are now prevailing around the world, for obvious economic reasons. However, they are strictly controlled by international classification societies, since they are required to ensure the structural and operational integrity of any marine asset throughout its operational life span.



Top Image: ROVING BAT auto docking onto a hull. (Courtesy of ECA Group)
Bottom Image: ROVING BAT crawling alongside the hull. (Courtesy of ECA Group)

PRESENTATION OF THE ROVING BAT

ROVING BAT is a hybrid Remotely Operated Vehicle combining a traditional ROV with a crawler, providing, with its 8 powerful thrusters (4 horizontal, vectored and 4 vertical), a very strong thrust, and equipped with two sets of motorized tracks.

The roving bat swims from the launching point to its target: the ROV embarked sonar system helps this diving-to-docking process in case of harsh environment and/or turbid waters.

When close to the hull, it automatically tilts/rolls onto the hull thanks to its software guided auto-docking, permitting non-skilled operators to achieve this delicate operation ; it thereafter sticks firmly onto the hull, its 4 vertical thrusters securing a much stronger adherence than that offered by magnetic systems.

Then it crawls along it to perform the close inspection and/or cleaning tasks; when necessary, additional thrust from the 4 vectored thrusters helps manoeuvring.

The current ROVING BAT is the result of a long evolution which started in 2006 on Petrobras request for a ROV that could crawl along its FPSO hulls to run close inspections and UltraSonic measurements, hence the successful design for the first ROVING BAT. Then in 2010 came the increasing demand for local cleaning of the hull: ECA Group started a study of several cleaning techniques, going from mechanical brushing to water jetting and finally adopted the cavitation, in close cooperation with the Cavidyne company. In 2017, ECA Group upgrades the ROVING BAT by incorporating two additional horizontal thrusters, which are of great help for cleaning operations in strong currents: the combined push from crawler plus thrusters secure an impressive thrust.

ECA Group assess that the ROVING BAT solution is by far more efficient than other traditional UWILD methods, such as divers, conventional ROVs or magnetic crawlers. Indeed, ECA Group recalls the traditional method drawbacks:

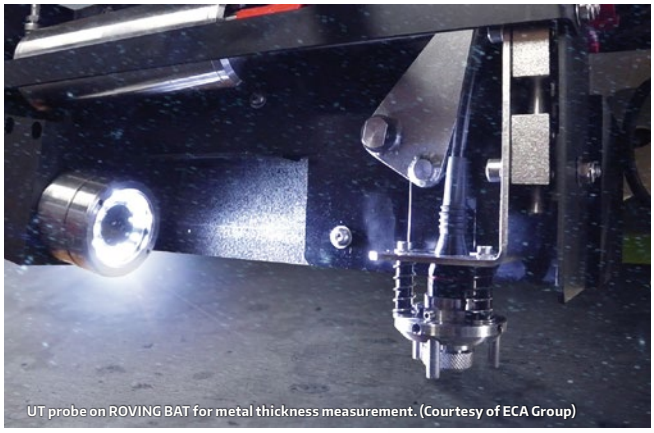
- The divers can't approach the hull in case of rough or turbid seas, present safety hazards and have poor efficiency, hence they generate high costs.
- The traditional inspection or work class ROVs can't remain at close contact with the hull and are inoperable in case of rough seas.
- The magnetic crawlers need manual handling for docking on hull and face possible loss of magnetic adherence in case of significant marine growths and/or hull irregular shape.

INSPECTION

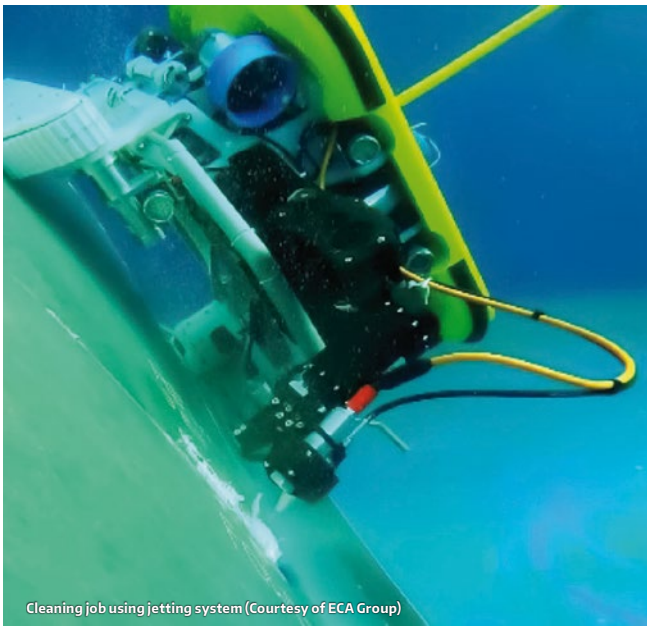
ROVING BAT is particularly well equipped in terms of: Viewing system with a colour zoom TV camera with panoramic viewing through a dome, a wide angle B/W- TV camera with built-in LED ring, and two powerful LED headlights. Sensors indicating heading (with auto heading function), pitch & roll, depth gauge (with auto depth function) and odometer for crawling mode. Optionally, it incorporates a sonar and a digital still camera. The main inspection applications are related to the underwater hull and the sea chests.

NON-DESTRUCTIVE MEASUREMENT

ROVING BAT embarks a NDT unit installed at the back of the vehicle, which incorporates: a cathodic protection measurement probe, a metal thickness measurement UT probe which controls the hull thickness, so as to validate the conformity of the vessel, verify the structural integrity and assess the level of corrosion and wear.



UT probe on ROVING BAT for metal thickness measurement. (Courtesy of ECA Group)



Cleaning job using jetting system (Courtesy of ECA Group)

CLEANING

There are two cleaning methods proposed as alternatives. One is the traditional jetting system where:

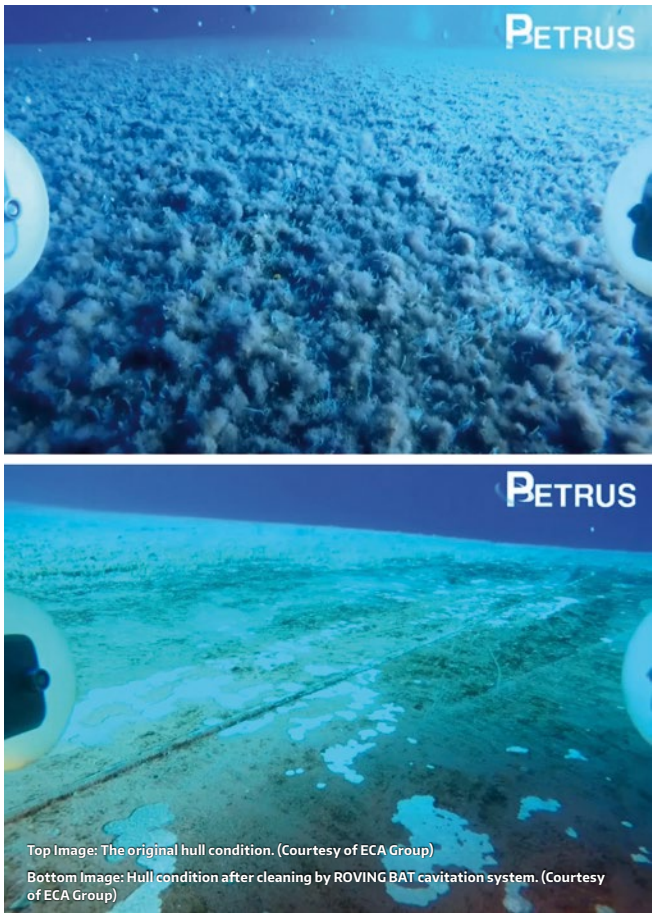
The ROV then incorporates a 5 function electric manipulator arm equipped with a stainless steel cleaning nozzle aside to a micro colour TV camera.

This arm is also extremely useful for access into restricted areas ; it can also be equipped with a laser pointer for 2D measurement.

The optional CaviBLaster Gun can also be installed on the arm in place of the jetting system in order to increase significantly the power and efficiency of cleaning in confined areas. The CaviBlaster gun is then connected to the (hereunder described) Double Dome Cavitation HPU connection.

The other solution is the double dome cavitation system, where the ROVING BAT is equipped with a high-pressure water power unit generating cavitation at the end of proprietary nozzles. The system cleans the hull using the energy released by the implosion of the bubbles during the cavitation process, causing the marine growths to be removed from the surface. Each dome incorporates rotation nozzles which, besides performing an excellent cleaning job, create a vortex effect, hence increase the ROV adherence to the hull.

Double dome cavitation system. (Courtesy of ECA Group)



Top Image: The original hull condition. (Courtesy of ECA Group)

Bottom Image: Hull condition after cleaning by ROVING BAT cavitation system. (Courtesy of ECA Group)

THE PETRUSTECH EXPERIENCE

The Petrus Group is a major service company devoted to Offshore Oil and Gas. It leads the way in provision of key services to support the International Energy Industry. Petrustech Oil & Gas LTDA won a tender for the overall inspection of a FPSO laying off Brazil coasts. For this operation it successfully used a Roving Bat equipped with the double dome cavitation system.

Further to this job, the Petrus Group offers section services/diverless UWILD solution integrating the ROVING BAT Hybrid ROV.

''Our Multi-Purpose Hybrid ROV allows unparalleled flexibility and efficiency in UWILD operations. Able to perform standard ROV observation, fly-by inspection of the hull, hull cleaning, hull thickness gauging and ICCP testing, this is a game changer in diverless solutions, far beyond what the current market has to offer'' says Daniel Schmidt, Chairman of Petrus Group.''

''We successfully experienced Roving Bat end 2017 on a comprehensive class related inspection task (i.e. cleaning, inspection and hull gauging, as per IMO requirements) on an FPSO off the coasts of Brazil.''

''The ROV was deployed directly from the FPSO, hence we didn't need any support vessel.''

We particularly appreciated the vehicle efficiency in terms of hull cleaning : we can quote that, including the ROV positioning on the selected spot, the cleaning of marine growths and the thickness measurement: the performance of this hybrid ROV is far above what you can achieve with divers.

"A crew of 4 persons were mobilized for the job, three on the Roving Bat, and one specifically attending the Caviblaster equipment.

"Although I didn't have the chance of comparing, within the same environmental conditions, the Roving Bat with magnetic vehicles, I feel Roving Bat is better, in terms of adherence on the hull and efficiency.

I also want to report that we did beneficiate of a very good technical support from ECA Group.

In conclusion, I assess that Roving Bat is technically the best equipment currently available on the market for hull inspection"

ABS REQUIREMENTS REGARDING UWILD OPERATIONS

All international classification societies have specified stringent requirements regarding the UWILD operations in terms of hull examination and cleaning.

Specifically, the ABS requirements are:

1 FOR HULL IN WATER INSPECTION

- A general examination of 100% of underwater hull including rudders, propellers, propeller shaft clearances
- Close visual examination of critical areas
- Corrosion protection potentials check and anode survey
- Splash zone examination

2 FOR HULL IN WATER MEASUREMENT

- the cathodic protection
- the hull thickness measurements

3 FOR HULL IN WATER CLEANING

- spot cleaning
- or extensive cleaning

CONCLUSION

As feedback from recent operations conducted on FPSO hulls by our clients with this ROV, ECA Group assesses that Roving Bat meets 100% of ABS requirements for UWILD hull inspection.