Mini-Remotely Operated Vehicle as an alternative to a dive team

By LCDR Simon O’Hehir
Introduction

Almost hand-in-hand with the rapid development, proliferation (and subsequent price drop) of some capable drones with image capture ability; underwater ROVs have taken a similar path and now represent an affordable way to capture underwater imagery. For a modest outlay, a mini-ROV with a still image and/or video capture ability can be quite a handy asset to have in a deployment toolkit.

On every deployment, there is usually a requirement to put divers in the water to either check the state of a berth, conduct hull inspection for marine pests, conduct disentanglement or check defects below the waterline. Although a mini-ROV cannot perform all of these tasks, it can provide a set of eyes underwater to assist in the planning of diving tasks and some cases may replace the need to get a team in the water. This can be a particularly attractive option if the harbour contains dangerous marine life, strong currents or has a high concentration of pollutants.
Starting at approximately $2000USD, a Commercial Off The Shelf (COTS) mini-ROV with associated control/recording laptop is available from several suppliers globally. These units can operate at around 100m with a battery life of around 3-4 hours and provide digital imagery via the tether in real-time. They are simple to use, require a minimum of training and can be launched/recovered by hand. Space-wise, the units can fit into a small case that could fit down a submarine hatch. The units generally weigh less than 15KG, meaning no special handling equipment or safety considerations beyond the normal safe-lifting techniques.

A Royal Australian Navy Clearance Diver trainee moves from the waterline to secure a beach during the Basic Clearance Diving Course, at Pittwater Training Facility, NSW. Photographer: ABIS Leo Baumgartner.
Tasking

Some of the dive tasks that could be completed by a mini-ROV include:

- Checks of size and location of potential obstructions before static dives
- Hull inspections in ports not conducive to diving
- Wharf inspections on coming alongside to assess the state of the wharf and as part of unit FP measures
- Hull inspections in the case of suspected damage or defect below the waterline
- Providing hull/fitting imagery before diving operations to assist in briefing

Checks of size and location of potential obstructions before static dives

This activity is a vital component of stability trials once out of FCD. Although the charting is quite accurate, providing detailed imagery of the area that the static dive is to occur in can give Command a greater appreciation of where the dangers are and the potential damage that could be caused if something goes wrong. This could greatly assist in conducting risk assessment before the static dive and will ensure the team has a full appreciation of the Commanding Officer’s intent and priorities.

Hull inspections in ports not conducive to diving

In areas such as Darwin where the combination of strong tidal streams and dangerous marine life make diving operations especially risky; the use of ROV imagery may negate the need to dive. With marine pest inspections, either HD imagery of the hull may provide enough evidence to mitigate against a dive or being able to postpone diving until a more permissive environment is available. Either way, the imagery a mini-ROV could provide will allow a more considered and safer decision.

Wharf inspections on coming alongside to assess the state of the wharf and as part of unit FP measures

Regarding post-visit reporting, units will report on wharf suitability from the waterline up. The wharf fittings, available gangways and access points are a regular part of the reporting. Under the wharf, the condition of pylons, obstructions and any debris in and around the wharf may not be reported on unless there is a specific requirement for diving operations. The ease of deploying a mini-ROV may result in a more complete picture of the port’s suitability.

As part of the unit, Force Protection plan, a mini-ROV available to conduct berth searches at random intervals alongside may provide an additional layer of protection not normally available without a drain on manpower. Two people launching, recovering, and operating a mini-ROV can safely deliver a capability similar to a dive team search with minimal impact to the crew whilst alongside.
Hull inspections in the case of suspected damage or defect below the waterline

Although a mini-ROV cannot affect any repair or conduct further investigation into a suspected defect, it can provide images that can be sent back to Australian support agencies or contractors to assist in diagnosing an issue or developing a defect rectification plan. It can also provide imagery of the damaged / defective fitting to guide the dive team’s actions before them entering the water. This may mean less time with divers at the surface communicating with supervisors and engineers during defect rectification. Whilst this will be a necessary part of the evolution, having the ability to brief against the imagery, and having an “in the event of finding this, take this action” type of brief will speed the operation, by reducing the amount of diver clarification needed.

Providing hull/fitting imagery before diving operations to assist in the briefing

Similar to above, the ability to provide up-to-date, relevant imagery specific to the task will enhance diver understanding and reduce the need for clarification once teams are in the water. It can also allow the MTs onboard to better understand exactly what the divers are looking at in the event of an issue.

The $2000 mini-ROV has a modest capability and depending on what tasking, sensor fit-out, depth and endurance required the price tag goes upwards from there. As an idea and a low-risk option, I have chosen to focus on these simple COTS mini-ROVs. There is certainly scope for these units to do much more than basic hull searches and as the technology rapidly develops, these will become increasingly affordable.

I have utilised submarines in the examples above, however, this technology could be useful to surface units as well particularly if they have a small crew or limited dive capability. The utility of mini-ROVs for a modest price tag could provide many gains for the deployed ship or submarine. The ability to provide up-to-date video or stills at short notice could provide a better understanding of defect issues, guide dive teams, allow divers to be more efficient once in the water and provide better awareness of the berth and surroundings to command teams. The ability to provide imagery to support organisations or contractors may streamline the defect rectification process and get ships or submarines back out to sea sooner.
The embarked remote operated vehicle is loaded back onboard MV Besant during Exercise Black Carillion. Photographer: LSIS Richard Cordell.