GEORGE GALDORISI // WASHINGTON

ENHANCING AUSTRALIA'S PORT AND HARBOUR SECURITY: ADDING TO THE "KIT"

T38E Intracoastal Speed Run. Credit: MARTAC

Europe is a landscape; the Indo-Pacific Region is a seascape.
The 21st Century represents a decided shift from Mackinder to Mahan.
- Robert Kaplan, Foreign Affairs
"Center Stage for the 21st Century"

AUSTRALIA'S PORTS AND HARBOURS: CRITICAL NODES FOR THE NATION'S PROSPERITY

Australia is a maritime nation—perhaps the most maritime of nations—and few would argue that trade represents a critically important part of Australia's economy. Both exports and imports are vital for Australians to maintain their high standard of living. Since Australia is an island nation with no other countries sharing its borders, the overwhelming majority of this trade goes via sea. Australia's neighbors buy iron ore and concentrates, coal, petroleum, natural gas, beef and other commodities, as well as finished goods and professional services.

Australia's ports, from Sydney, to Fremantle, to Brisbane, to Melbourne, to Darwin, to others, are the critical nodes from which these exports and imports are moved across the oceans. The ADF, RAN and the Department of Home Affairs share the responsibility to protect these ports and harbours from attacks by other nations, international or domestic terrorists, or from anyone else wishing to make a statement by conducting a spectacular attack on a harbour's facilities or on ships berthed there.

However, with a coastline of over 59,000 kilometres, an exclusive economic zone of over eight million square kilometres, and other maritime interests to support throughout the region, the authorities have only discrete resources to ensure the safety of Australia's ports and harbours. It may be time to leverage emerging commercial-off-the-shelf technology such as unmanned surface vehicles to take on the lion's share of this vital security role.

PORTS AND HARBOURS ARE VULNERABLE

The deadly explosions that rocked the harbour in Beirut, Lebanon in August 2020 killed over 100 people and injured thousands, rendering that port unusable for an indeterminate period. The full impact of this event is still being assessed. However, lost among the headlines that dominated the international news for days was the importance of ports and harbours to the global commerce that is the lifeblood of the economy of virtually every nation.

While many people focus on the importance of ships in carrying seaborne trade, they often forget that the critical nodes that support this globalisation and burgeoning world trade are the world's ports and harbours. A disaster in one of these ports similar to what happened in the harbour in Beirut—an oil tank explosion, a fire or other catastrophe on a large oil tanker, or any of a host of other events—could close one of these facilities for an indefinite time and also spill an enormous amount of pollution into the oceans.

The magnitude of providing comprehensive security for an average size ports, let alone some of the world's mega-ports, can sometimes lure port authorities into wishing away the challenge. But in an increasingly dangerous world where not just terrorists, but others, may wish to make a statement or lash out at a particular nation, ports present an all too inviting target. The risk-reward curve where a terrorist group or other disaffected person or persons are able to attack a port using something as simple as a RHIB and a small amount of explosives to blow a hole in a ship—is just too great. Ports are an inviting target, and ones that must be protected.

THE CURRENT STATE OF THE ART FOR PORT SECURITY

Current security measures involve monitoring the video provided by cameras throughout the port, as well as patrolling the waters with a fleet of manned vessels. This methodology stresses the ability of port authorities to provide 24/7/365 security and typically leads to serious and potentially fatal gaps in coverage.

Cameras seem to offer a cheap and effective solution, but what people forget is that someone—often several people—must monitor the video for the cameras to have any purpose, let alone effectiveness. With some ports maintaining scores of cameras or more, this entails having a command center and enough watch-standers to monitor all of the cameras in real-time, 24 hours a day. Depending on how

the watch centre is staffed, this often means that multiple crews must be available and paid to provide round-the-clock monitoring. Further, if a camera malfunctions or otherwise goes out of service, this leaves a gap in coverage and a repair crew must be available to fix the device.

or even twelve hours, pounding through an often choppy harbour in a RHIB or small craft means that a watch rotation of somewhere between three and four hours is about all most people can endure.

With such short watch rotations, it is easy to see how the need to provide round-the-clock security can quickly multiply costs, even in the most optimistic scenarios. Add rain, wind, waves, fog and other natural phenomena that often reduce visibility and slow patrol speeds, the need for more craft and more people can multiply significantly, often without warning, thereby further driving the need for standby crews. All-in-all this is an expensive undertaking.

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Similar issues accompany the use of manned craft to patrol a harbour of any size—let alone mega-ports. Manned vessel operations are increasingly expensive, are often limited by weather and water conditions, and physically stress port professionals. For most ports, multiple manned vessels are needed to guarantee sufficient revisit time to ensure that a threat has not slipped through the security net.

Compounding the issue is the physical toll of riding a small vessel—either a rigid hull inflatable boat (RHIB) or other small craft. Unlike watchstanders on land who might be able to work shifts as long as eight

Additionally, there are many shallow areas throughout ports that are beyond the reach of any manned vessels. Even limited draft craft like RHIBs draw some water when they are loaded with people, communications equipment, weapons and the like. A manned vessel pushing too close to shore also runs the risk of impaling itself against visible or invisible hazards. This risk is compounded at night and during fog and other adverse weather conditions.

Given the manifest challenges of providing adequate let alone comprehensive security for ports with current systems and capabilities, it is little wonder that port officials are searching for technology solutions that will enable them to provide better security, at lower costs, but more importantly, without putting humans at risk.

THE PORT OF LOS ANGELES: A MEGA-PORT WITH A MEGA-CHALLENGE

The Port of Los Angeles (POLA) is one of the world's mega-ports and is the busiest port in the United States. It comprises 42 square miles of water, 43 miles of waterfront and 26 passenger and cargo terminals. POLA handled over 9.3 million twenty-foot equivalent units (TEUs) of cargo in the last year for which statistics are available.

Current capabilities to secure it involve monitoring the video provided by hundreds of cameras, as well as patrolling the port's expanse of water with a fleet

of manned vessels. This methodology stresses the ability of POLA authorities to provide around the clock security.

For these reasons, Port of Los Angeles officials decided to explore the possibility of using unmanned surface vehicles to enhance the security of the port. To that end, port officials invited Maritime Tactical Systems Inc. (MARTAC) to visit and demonstrate the capabilities of their MANTAS USV. MANTAS is a high-performance, commercial off-the-shelf USV built on a catamaran-style hull, and comes in a number of variants ranging in size from six-foot to 50-foot. A demonstration was conducted using a 12-foot MANTAS.

The 12-foot MANTAS (otherwise known as the T12) has a length of twelve feet and a width of three feet. It is fourteen inches high and draws only seven inches of water. The MANTAS can be equipped with a wide variety of above-surface sensors (EO/IR/thermal video) and below-surface sensors (sonars and echo-sounders), as well as other devices such as chem/bio/nuclear sensors, water quality monitors, and above/below surface environmental sensors.

T38E Near San Diego Naval Base. Credit: MARTAC

LEVERAGING PREVIOUS SUCCESSFUL DEMONSTRATIONS

One of the primary reasons that POLA authorities requested the MANTAS system demonstration was the fact that it had performed well in a port security demonstration conducted by the U.S. Army. Earlier, three MANTAS T-series vessels were part of the Mobile Ocean Terminal Concept Demonstration in Concord, CA coordinated by the Army Physical Security Enterprise & Analysis Group. The primary objective of this demonstration was to assess MANTAS' ability to patrol and protect the harbour.

For these missions, three MANTAS vessels, T6, T8 and T12, were used to perform different operations. The MANTAS T6 was utilized as an intercept vessel to quickly address potential threats at high-speeds up to 55 knots. This T6 was equipped with a standard electro/optical camera focused on rapid interdiction and threat identification. The second vessel was a MANTAS T8 equipped with a FLIR M232 thermal camera. Its role was as a forward-looking harbour vessel situational awareness asset. The final vessel was a MANTAS T12 tasked with prosecuting above and below surveillance operations to detect and identify intruder vessels, or other threats to harbour assets. The sensor kit included a SeaFlir 230 for above surface ISR capabilities and a Teledyne M900 for subsurface diver/swimmer detection.

THE PORT OF LOS ANGELES UNIQUE REQUIREMENTS

During the visit to the Port of Los Angeles, MARTAC representatives provided a comprehensive briefing on MANTAS capabilities, took a three-hour boat tour to observe the entirety of POLA authorities' span of operations, and then provided a remote demonstration where port officials controlled and observed a MANTAS T12 operating off the eastern coast of Florida. The demonstration validated the going-in assumption that employing a thoroughly tested and proven USV is a viable solution POLA is keen to pursue.

After observing the MANTAS remote demonstration, it was determined that the capabilities of this USV met the requirements for the wide variety of missions for the Port of Los Angeles. That said, port officials asked MARTAC to scale-up the MANTAS to a 24-foot and 38-foot version. It was felt that the 12-foot MANTAS was so stealthy that ships in transit could not see it. Additionally, the larger T24 and T38 could operate for longer periods and carry additional sensors. The T38 MANTAS has now been demonstrated in U.S. Navy exercises, and is scheduled to be demonstrated in the Port of Tampa, Florida later this year.

One need only look to events such as the Fukushima Daiichi nuclear disaster in March 2011 to understand the challenges of dealing with these sorts of catastrophes.

DISASTER RELIEF AND MITIGATION FOR PORTS AND HARBOURS

While this article has focused on using commercial-off-the-shelf unmanned surface vehicles for day-to-day, 24/7/365 port and harbour security, a related mission for which COTS USVs are ideally suited is their use for disaster relief and mitigation. This capability is needed following a catastrophe at one of these ports, at a power plant, after an air crash or ship disaster, following flooding of low lying areas, or any other humanitarian assistance of disaster relief incident where areas are either inaccessible to humans or too dangerous for humans to deal with.

One need only look to events such as the Fukushima Daiichi nuclear disaster in March 2011 to understand the challenges of dealing with these sorts of catastrophes. In the wake of natural disasters such as Fukushima Daiichi, rapid location of injured personnel becomes a critical and time-sensitive mission that is ideally suited to unmanned surface vehicles, especially in shoreline areas not accessible by larger harbour boats or rigid-hulled inflatable boats, or not safely accessible due to potential personnel hazards such as biological, chemical or radiological agents.

In performing these missions, unmanned surface

vehicles can be fitted with a wide array of video, audio, sonar or other sensors to locate personnel and assess damage. In some cases, larger USVs can transport relief supplies to areas not otherwise accessible. While unmanned surface vessels may not completely replace manned assets in disaster relief and mitigation nor are they intended to they can provide an immediate response while authorities are assessing whether or not the scene of the disaster poses an unacceptable risk to human responders.

ADVANCING THE ART OF AUSTRALIAN PORT AND HARBOUR SECURITY

In a 2018 posting on their website, Australia's Department of Home Affairs said this:

"The Australian Government is committed to uplifting the security and resilience of Australia's critical infrastructure to protect the essential services all Australians rely on." This relatively new agency (which was established in December 2017) has an important mandate, and from this observer's perspective, none more important than protecting Australia's ports and harbours.

Australia's ports are critical to the nation's economy. A disaster like a fire, explosion, or a major oil spill could close one of these ports for an indefinite time. As the world comes to grips with the human and economic impact of the Beirut harbour disaster, all nations would be well-served to leverage emerging technology to enhance the security of the ports and harbours that make the global economy hum. To fail to do so would be inviting a disaster that is eminently preventable.

In an article in the January 2020 issue of U.S. Naval Institute Proceedings, Commander Rob Brodie noted:

"When the Navy and Marine Corps consider innovation, they usually focus on technology they do not possess and not on how to make better use of the technology they already have." Extrapolating his assertion to the entities responsible for port and harbour security for Australia, one must ask if we are too slow to leverage an innovative solution that can be grasped immediately.

The enhanced security taxonomy described in this article had not been evaluated prior to the demonstrations described above, and there is a reason. The technology to provide reliable, adaptable and affordable USV support to augment manned capabilities and expand the reach of port police at facilities such as Australia's ports simply did not exist just a few years ago. But that has now changed.

This technology is available today with commercial off-the-shelf unmanned surface vessels, and these can be employed to increase the effectiveness of port protection if we do as Commander Brodie suggests and "make better use of the technology we already have." Given the enormous personnel costs associated with monitoring cameras and patrolling with manned vehicles, this innovative solution designed to supplement current capabilities will drive down acquisition and life cycle costs while resulting in shorter times for a return on investment.

The way that commercial-off-the-shelf unmanned surface vehicles have performed in an increasing number of military and civilian exercises, experiments and demonstrations, shows they have the potential to be leveraged more fully and more quickly for a variety of missions. Innovating with COTS systems we have at hand would appear to provide a near-term, affordable and effective solution to the challenge of providing comprehensive port and harbour security for Australia. Like any new technology, COTS USVs take a while to gain traction. But there is danger in waiting too long to put them to use.