New tricks

Examining anti-piracy tactics

*As counter-piracy devices emerge, **Nick Blackmore** assesses how effective they are, and whether the future of maritime security lies with lethal or non-lethal defences.*

KEY POINTS

• Views on the use of lethal and non-lethal counter-piracy measures in the shipping industry are diverse, meaning that approaches to security are different.

• While many counter-piracy devices are being been brought to market, their effectiveness is largely unknown and their use is generally supported with additional planning and training.

• Scaleable security solutions based on individual shipowner resources are likely in the short term.

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Piracy may be an age-old problem for the shipping industry, but brand new solutions are needed to combat it. This is the commercial consensus that emerged in 2009, as demonstrated by a noticeable increase in the marketing of counter-piracy solutions in response to growing incidents of piracy, particularly around Somalia. This promotional surge is not confined to patented shipboard security devices: shipping companies are being offered targeted counter-piracy training and increased operational support for vessel and shore-side personnel, as well as the services of on-vessel armed and unarmed private security personnel. Behind this entrepreneurial push is a perception that the more orthodox efforts of the shipping industry and the international community to protect the sea lanes from piracy have only been a partial success. A ship protection market has developed, which *The Times* (UK) reported in 2009 as being worth USD20 billion.

There are several reasons why the counter-piracy market has opened up. The first is simply that piracy (particularly Somali piracy) is still a public problem that harms the shipping industry at both ownership and operator level. For those owners whose vessels are hijacked there are ransoms to pay; a ship, crew and cargo out of service;

and a prolonged public relations exercise to manage. Even for those that do not suffer a hijacking, there are greater insurance premiums to pay, expensive security arrangements to put in place and increased fuel costs for detours around affected areas.

The human cost of maritime piracy remains comparatively low compared to those fatalities regularly arising from shipping operations. For the period January-September 2009, the International Maritime Bureau (IMB), which reports on piracy, listed six crew members killed and eight missing as a result of piracy, compared to nine killed and seven missing during the same period in 2008. By comparison, nine seafarers were killed in a single tanker fire on 18 August, one of several incidents leading to seafarer fatalities that month. However, piracy's public profile increases the perception that shipping is a particularly dangerous industry, thereby damaging recruitment.

Practical protection for vessels therefore represents a worthwhile investment, but whether that protection should take a lethal or non-lethal form is a point of debate. The issue of firearms being used as shipboard protection remains especially contentious. Historically, some seafarers have taken personal security into their own hands by arming themselves as a precaution when visiting insalubrious ports and transiting high-risk areas, but their status as civilians and the training needed to operate firearms successfully at the ranges required to deter pirates means there is little suggestion that they should be defending vessels as a matter of course. Whether trained private security personnel or military/law enforcement officers should be defending vessels is similarly a topic for discussion.

Up in arms

Shipping involves assets moving between several legal jurisdictions and multiple international stakeholders, creating a great deal of variance in attitudes to firearms and laws on their carriage. In its latest counter-piracy guidance published on 23 June, the International Maritime Organisation (IMO), the UN agency that maintains the regulatory framework of shipping, sums up the quandary, calling the use of firearms by military teams

or law enforcement officers "a matter for [a] flag state to determine in consultation with shipowners, operators and companies". Regarding private security guards, the IMO emphasises that "ships entering the territorial sea and/or ports of a state are subject to that state's legislation" and that "importing firearms is subject to port and coastal state regulations". Similarly, advice on using authorised military personnel comes with caveats concerning boarding conditions and rules of engagement as agreed by flag state governments.

Many industry stakeholders remain wary of putting firearms onboard, seeing it as a temporary measure to cover poor planning and inadequate seamanship. Lars Pälsson, head of group security for shipping company Stena Line, is against firearms being used and subscribes to the view that 95 per cent of protection against piracy should come from intelligence, while five per cent should be provided by physical countermeasures. He told *Jane's* that the lack of a successful hijacking among Stena's many hundreds of vessels is evidence that this is a successful strategy. Other senior figures remain concerned that the use of firearms will lead to increased dangers for crews. "We believe the use of armed guards might serve to escalate the situation," explained Bill Box, communications manager at Intertanko, the international association of independent tanker owners. Box also noted the liability issues involved in accidental deaths during exchanges of fire and the volatility of many cargoes onboard.

Nevertheless, the latest statistics indicate that the use of firearms is escalating. In its October 2009 report, the IMB noted that in 2009, compared to the corresponding period in 2008, the total number of incidents in which guns were used by pirates had increased by more than 200 per cent. The number of weapons appearing on merchant vessels may be on the rise too. Companies are naturally unwilling to make sensitive security information public, but one analytical source reported to *Jane's* a slow upward trend in the number of owners deciding to put armed guards onboard vessels transiting the Gulf of Aden, estimating the total number at five to seven per cent, and noted that the majority of these were private security guards or, in some cases, the

Somali coast guards patrol the coast of Mogadishu on 6 December 2009. Somalia experienced an increasing number of piracy attacks in 2009.

Yemen coastguard, which can be legally hired for assistance in such matters.

With lethal measures proving controversial for many reasons, there exists a market for non-lethal counter-piracy measures. The use of such devices is endorsed in both the IMO circular and a supporting set of best management practices focused on dealing with piracy in the Gulf of Aden, which has been assembled and promoted by all major stakeholders in the maritime industry. The IMO notes that "the use of passive and non-lethal measures such as netting, wire, electric fencing and long-range acoustic devices may be appropriate preventative measures to deter attackers and delay boarding" until the authorities arrive.

The industry's best management practices also note the potential usefulness of "commercially available non-lethal defensive measures" but sound a note of caution, stating: "These should be assessed by companies on their merits and on the particular characteristics and vulnerability of the ship concerned."

Hans Tino Hansen, CEO of threat analysis company Risk Intelligence told *Jane's*: "There are good ones and there are a lot of bad ones. Every second week there is a new company bringing something to the market." With industry

guidance on the use of such devices open to interpretation, the task remaining for ship owners and operators is to gauge which devices, if any, will prove effective.

Water, water, everywhere

The frequency with which such devices are appearing may be confusing, but unsurprisingly, one factor unites many of them: water. Water is an obvious and abundant fuel for anti-piracy devices, because all vessels subject to the International Convention for the Safety of Life at Sea (SOLAS) are required to have a shipboard fire-fighting system of some description. The deployment of water hoses has been advised as a piracy deterrent for some time; crews have been advised to aim jets of water at pirate skiffs in an attempt to overload them, halt attempts to board, or damage electrical devices that are aiding the attack.

However, feedback on the usefulness of this tactic has been mixed, and common criticisms include the fact that, as the IMO notes, hoses "may be difficult to train if evasive manoeuvring is also taking place" and that by the time water from the fire hose reaches the pirates it does not have the requisite pressure to provide a sufficient defence.

Some vessels can be re-purposed to use their

water infrastructure in a more aggressive fashion. For example, hopper dredgers can be forced to transit high-risk areas owing to the abundance of dredging work going in the Middle East – travelling at approximately 13 to 14 knots, a dredger is certainly a more vulnerable target than a containership. However, a full hopper can hold as much as 46,000 m³ of water and, with appropriate diversions made in the vessel's pipework, large quantities of water can be pumped from different areas of the ship at extremely high levels of pressure, making it difficult for hijackers to board.

With little recorded evidence on whether such adaptations have worked in practice, attempts to patent devices that use onboard water supplies more aggressively have led to the creation of several new products. Nemesis 5000 is typical of the latest crop of water-based systems, in that it makes water deployment both efficient and remote controlled, removing the need for crews to operate the device and ensuring that water is directed in a way that prohibits boarding attempts.

The product consists of a series of machines stationed around a vessel's perimeter, each with a set of nozzles spinning on a single axis – an arrangement that creates a constantly moving wall of high-pressure water in a downward arc. The high-pressure technology behind the device is

(Above) The long-range acoustic device attempts to deter piratical attacks by broadcasting warnings and deterrent, uncomfortable tones and (right) BAE System's anti-piracy systems involve both early warning detection platforms, such as high-frequency surface radar, and disruption techniques, such as high-powered microwaves to counter pirate attacks.

typically used for washing crude-oil from the inside of tanks, and the device was created by maritime security expert Jim Murray in conjunction with a crude oil tank-washing company. Water is fired from the device's 2.5 mm nozzles at speeds of up to 90 mph. Variations in the build specifications of many vessels mean the solution can be arranged to accommodate varying levels of pressure and sizes of deck.

Tank-cleaning equipment supplier Scanjet Marine has also developed a protection system that appears to work on similar principles to the Nemesis 5000 system, while the US-based International Maritime Security Network is offering an anti-piracy suite that also makes use of a water barrier around the ship's perimeter.

Hot water

Firing water at high pressure is one tactic, but another company is ensuring that the water is unbearable for a second reason. Secure-Marine took six months to develop a system (Secure-Waters) that creates a hot water curtain around a vessel, heating sea water to between 80ºC and 90ºC and ejecting it through a series of nozzles fitted around the edge of the deck. At sea level, the temperature is approximately 60ºC, so the higher a pirate climbs, the less incentive they will find to continue. A main feeder pipe is installed from the vessel engine room to the spray pipes on the ship's deck railing, and the water is heated up via a heat exchanger in the engine room.

Secure-Marine previously developed a 9,000 volt shockwire system (Secure-Ship) that triggered an alarm and delivered a high-voltage shock when anyone attempted to board a vessel. Approximately 30 systems have been sold following the product's launch in 2001, numbers that CEO Raphael Kahn attributed to installation difficulties and the need to fold the device when the vessel was entering port. He was able to cite

one incident of the device being used, in 2006 when an alarm was activated on a vessel carrying Secure-Ship while it was travelling in Vietnam. The crew spotted a boat leaving aft of their vessel, leading them to surmise that a boarding attempt had fallen foul of the electrified barrier.

Light and sound

Another device aiming for sensory overload is the long range acoustic device (LRAD). The LRAD is an acoustic array that allows users to transmit warnings to potential attackers over great distances, and to transmit 'deterrent tones' at volumes uncomfortable enough to encourage attackers to abort. Thanks to its use in the military and its comparative seniority in the market (it has been available since 2003) the LRAD is well known in the industry and is mentioned in IMO counter-piracy guidance. A common criticism of the device is that it needs to be aimed precisely to be effective, introducing the same difficulties of exposure to firearms and accurate operations during evasive manoeuvres that are cited with fire hoses. A further suggestion is that the use of ear defenders by attackers can reduce its potency.

A spokesman for the device's manufacturers American Technology Company, told *Jane's* that the primary purpose of an LRAD was "to absolutely determine intent at distance" and that "if pirates are wearing ear protection and not responding to LRAD broadcasts, then their intent has been confirmed". He also pointed out that the device's 30º to 60º beam allowed for variability in targeting skiffs, and argued that deploying an LRAD was a deterrent as it demonstrated that the element of surprise was lost and that the crew were preparing to repel any attack. The company

declined to say how many of the devices had been sold and what proportion of those to commercial shipping, although it is evident that other companies are marketing larger counter-piracy solutions that use LRADs as a component.

Even light is being used for counter-piracy purposes; industry guidance notes that appropriate lighting can serve to alert suspected pirates to the fact that they have been detected. It can also provide enough discomfort to be a deterrent, according to Norwegian company Norselight, which sells searchlights and floodlights that can be programmed to sweep the surface of the waters surrounding a vessel. The process can help detect pirates and to present an uncomfortably bright and disorienting light if pirates continue towards a vessel.

Detection solution

While most of these systems rely on a single theory for success, a more sophisticated solution was recently presented by defence company BAE Systems. The company has developed a new early-warning counter-piracy suite that incorporates high-frequency surface wave radar to detect small craft, a panoramic surveillance system and a passive radar identification system to warn of unidentified radar-carrying vessels. There is also potential for a laser dazzler to be deployed to disorient pirates at ranges of 1 km, as well as a high-powered microwave generator to disrupt pirate electronics.

BAE's suite will be trialled in 2010 and if it lives up to the company's claims, it will be welcomed by the industry as, unlike many other devices, it emphasises detecting and preventing attacks. However, incorporating sophisticated bridge systems aimed at improving operations has not

historically led directly to safety improvements. For example, a technology introduced to make navigation safer will soon be mandatory on the bridges of most vessels: Electronic Chart Display Information Systems (ECDIS) replaces paper charts with electronic versions that incorporate global positioning system information and navigation data from radar and vessels' automatic identification systems. A spate of groundings and collisions have been attributed to ECDIS in 2009, with blame attributed to bridge team dependence on the system for immediate graphical reference in some cases and inadequate understanding of the system's capabilities in others. Masters and trainers have reported instances of crews who, when tasked with carrying out position checks, continually refer to ECDIS rather than making first use of the central bridge window. The possibility of a crew relying on sophisticated technology to alert them to a pirate attack, rather than relying on basic seamanship, does not seem out of the question.

DIY devices

A counterpoint to the increasing proliferation of non-lethal products comes from counter-piracy expert Nick Davis. He runs the Merchant Maritime Warfare Centre (MMWC), a not-for-profit organisation providing counter-piracy support and training, as well as Gulf of Aden Group Transits, which offers armed and unarmed support services. Davis's previous venture, Anti-piracy Maritime Security Solutions (APMSS), supplied unarmed guards to protect the chemical tanker *Biscaglia* during its transit of the Gulf of Aden, but those guards were forced to abandon the ship and its crew after pirates boarded the vessel and fired on the APMSS personnel with automatic weaponry. This 2008 incident heavily influenced Davis's establishment of MMWC in September 2009, which defines crew member roles during counter-piracy operations more aggressively, as well as outfitting vessels with sufficient visible counter-measures to deter an attack. This focus on visual deterrence extends to deploying 5x2 metre banners to display during transit, warning aggressors that the crew is trained in anti-piracy measures.

Davis made a brief foray into non-lethal anti-piracy devices with the launch in January 2009 of the Counter Piracy Net, a device which aimed to snag the propellers of pirate skiffs. It consisted of a floating net extending 6 m on either side of the vessel and a stern net trailing 50 m behind the vessel, which could be deployed within 20 minutes. No ship owners purchased the system, he said, mainly through a lack of interest in modifying ships with deployment booms. Davis told *Jane's*: "BAE's counter-piracy suite is great for huge budget operators, but I cannot see any ship

owners purchasing the system to its price point." He claimed that he can rig a ship for less than USD5,000 using "counter-measures you can get in any port in the world".

By this, Davis means the likes of razor wire (to discourage boarding and access), 45 gallon drums (which can be dropped on intruders as missiles), heavy-duty security grills (to block doors and windows), and different types of netting (to impede movement across deck areas and to snag skiff propellers). Such an approach has already been adopted by some crews who have used available resources, including sandbagged look-out posts, and dummy security guards among other inexpensive 'homemade' counter-measures on board. Interestingly, Davis' strategy focuses on visibly fortifying a vessel's accommodation block, as control of the bridge and custody of the crew is a pirate's strategic goal. It will be interesting to see how this thinking bears out if

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it is tested by an attack, as such a strategy is not reflected in the designs of many devices, most of which reflect a central strategy of repelling boarders at deck level.

Uncertain future

The IMB report into piracy in 2009 noted that while the number of piracy incidents stayed level in the period January-September compared with the previous year, the success rates of pirate attacks in the Gulf of Aden had dropped dramatically, apparently owing to naval patrols in the region and "ship masters adhering to the recommended advice and deploying effective anti-piracy precautionary measures". However, this does not suggest an increased demand for patented non-lethal devices for a number of reasons.

First, there are no statistics available from the IMB concerning their use, and any successes on the level of visual deterrence would naturally be difficult to quantify. Companies may also be unwilling to publicise the successful use of a device for fear of compromising vessel security.

Second, many devices have yet to establish sufficient industry credentials. Jim Murray is in talks to get the Nemesis 5000 certified for use by several different classification societies, but at least one major classification society said that it had no testing or approval processes ongoing for any such equipment, and that it was difficult to comment on the overall effect on risks presented by such device because "it is not known whether such equipment reduces or increases risk; whether

it focuses attention on the user; or whether it is more likely to provoke a violent response".

Finally, while there is agreement on the continuing need for counter-piracy strategies and counter-measures, there is no overriding consensus on what form those measures should take or how robust they should be. Industry guidance emphasises forward planning, good seamanship, liaison with rescue co-ordination centres and international naval forces, and the use of affordable and abundant resources for ship protection and visual deterrence. If cash-poor shipowners choose to follow these guidelines, while the majors enlist the services of security companies focusing on any combination of armed security, risk assessment and crew training, then such patented solutions are unlikely to become commonplace.

If naval support in the region is withdrawn, the market for such devices might increase; however, with numbers of actual and attempted attacks increasing year-on-year since 2006 (the year end total for 2006 was 239, while the figure for 2009 up to 30 September was already at 306), the case for a military deterrent remains convincing. At a shipping conference in London in September 2009, Peter Hinchliffe, marine director of the International Chamber of Shipping, predicted that with regard to Somali piracy at least, "there will be a need for a naval presence for another five or six years".

For these reasons, several manufacturers are marketing their devices as part of holistic solutions taking in security planning and crew training. The industry is united in its opinion that running a tight ship is the best deterrence against piracy; just what constitutes a tight ship may become clearer as counter-piracy solutions are increasingly put to the test by enterprising attackers. ■

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