



The Daurade is a multipurpose experimental AUV which has been designed to gather hydrographic data. It can dive to 300m and has a maximum speed of 8kt. (Photo: author)

Threat neutralisation

Tom Withington reports how UUV technologies have become essential to the MCM work of the world's navies.

The importance of the AUV and ROV to the mine clearance mission can hardly be overstated. Not only are such vehicles essential for navies around the world, but NATO, in particular, has to deal with a mine menace on its doorstep. This is one of the reasons why a number of European companies are involved in the development and sale of specialised UUVs – the First and Second World Wars have left the seas around the continent littered with naval mines.

In 2009, NATO published a report entitled 'Sea Mine Countermeasures: Exploring Neutralization Options', which stated that around 80,000 mines may still inhabit the North Sea, Baltic and English Channel alone. On top of this is a realisation that the naval mine represents an attractive 'asymmetric' weapon for a potentially hostile nation.

The upgrade of the French Navy's mine countermeasures (MCM) force took an important step forward on 21 February, following news that the service would acquire Alister 100 UUVs from French marine robotics specialists ECA, to be delivered from 2012. The Alister 100 can operate at depths of up to 100m, although the capability to operate at up to 1,000m is available as an option.

This vehicle provides up to 15 hours' endurance when operating at its nominal speed of 3kt, relative to the water speed. In

terms of payload, the UUV comes equipped with side-scan sonar, video cameras, obstacle avoidance sonar, a multi-beam echo sounder and a conductivity, temperature and density probe. Radio, acoustic, wi-fi and Ethernet communications links connect the Alister 100 to its human operator.

STABLE OF PRODUCTS

The UUV is one of several MCM and underwater inspection products in the ECA stable. It is joined by its Alister AUV sibling, which has a maximum operating depth of 300m, and an endurance of up to 20 hours, depending on the vehicle's sensor suite. Naval operators requiring tethered ROVs have a range of ECA products to choose from, including: the H300 Mk II which can operate at a depth of 300m; the H1000 light work class ROV, also operating at depths of 300m (with an optional extension to 1,000m); and the Roving Bat hybrid ROV/crawler.

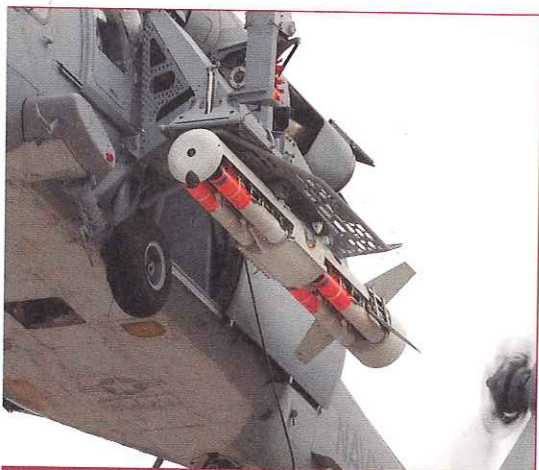
'Around 80,000 mines may still inhabit the North Sea, Baltic and English Channel alone.'

Furthermore, specific ROVs designed to assist the MCM mission are provided by ECA in the form of the K-Ster family, which can operate in deep or shallow water. K-Ster includes a tiltable warhead which can be positioned near a mine in such a way as to achieve the best destructive effect.

Meanwhile, the company's Olister subsea mine hunter is available in two different versions. The FDS (Forward Detection Sonar) can be used for: mine hunting ahead of a fleet; detecting and classifying moored and buried mines; and survey and navigation. The MIDS (Mine Identification and Disposal System) variant can be employed to classify and destroy moored and buried mines, and for general water inspection. Finally, the company's PAP Mk 5 subsea mine identification and destruction system can operate at 300m depth and position a 120kg explosive charge near a mine, or cut the mine's mooring chains to force it to the surface where it can be made safe.

FUTURE SYSTEM

UUVs play a key part in ensuring that the MCM capabilities of NATO's navies remain sharp. To this end, ECA is involved in the French Navy's SLAMF (Système de lutte anti-mine futur/Future Anti-Mine Warfare System), which will perform a major modernisation ➤



The BAE Systems Archerfish has been designed as a one-shot mine neutralisation system. The company is currently under contract to provide this AUV to the US Navy. (Photo: BAE Systems)

of the service's MCM capabilities. Along with fielding a new UUV to perform mine clearance, these craft will be operated from a larger unmanned 'mother ship' which will take the place of the traditional manned mine clearance vessel.

Essentially, this aims to keep the human as far away from the dangers presented by mine-infested waters as possible. The mother ship will be networked to its UUVs via communications and data links, and will locate a minefield using organic sonar before despatching UUVs to take a closer look and destroy individual mine threats.

SLAMF will be deployed from around 2020 as a replacement for the navy's existing

Éridan-class minesweepers. As regards contractors, ECA is joined by French shipbuilder DCNS, which is developing the mother ship, and Thales which is providing the necessary sonar and communications equipment. Along with France, Belgium, Germany, the Netherlands and the UK may yet be invited by the DGA procurement agency to contribute to the SLAMF initiative.

■ PLATFORM PROLIFERATION

Away from France, unmanned MCM platforms are also available from Germany's Atlas Elektronik. The company's SeaCat includes 'SwapHead' technology allowing for the rapid exchange of payload sections on the ROV, which can be operated with or without a fibre-optic tether. Other Atlas Elektronik products include the SeaOtter which, according to Sven-Christian Hesse, head of UUV programmes at the company, 'offers the capability to achieve 8kt, and has an endurance of 24 hours at 4kt'. He added that the firm's SeaFox vehicle 'is designed as a one-shot mine disposal system'. Other Atlas Elektronik armed mine disposal products include the SeaWolf UUV for use against buried and semi-buried naval mines.

Meanwhile, the SeaOtter family includes sub-variants such as the Mk II, which has a modular design enabling it to perform mine detection and clearance, plus seabed mapping and hydrographical survey, along

with ISR collection. An AUV version of the SeaOtter Mk II is also available in the form of the Mk IID.

Atlas Elektronik's mine-hunting products are joined by those of Norway's Kongsberg. The company's MineSniper Mk II vehicle has been acquired by the Spanish Navy to destroy naval mines using a 72mm charge, plus an optional larger warhead which can be deployed against insensitive munitions.

'These craft will be operated from a larger unmanned mother ship.'

In addition to the MineSniper Mk II, navies can opt for Kongsberg's HUGIN AUV product line which offers three variants (HUGIN 1000, 3000 and 4500) which have maximum operating depths of 3,000-4,500m, and can support a number of payloads for MCM, ISR, hydrography and anti-submarine warfare. The HUGIN range is supported by Kongsberg's REMUS (Remote Environmental Measuring Unit) AUVs which include the REMUS 100, 600 and 6000 models – the numerical designation reflects their maximum operating depths in metres.

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Saab's Double Eagle SAROV can operate either with or without a tether at depths of 500m and speeds of 8kt. (Photo: author)

Scandinavia is also home to Saab, manufacturer of the AUV-62MR UUV, which can operate at depths of around 500m and travel at speeds of up to 20kt to support the MCM mission. The craft's payload includes a dual flank array and high-resolution gap-filler sonar, although its modular design also enables the AUV-62MR to be used for hydrography work. The Swedish Navy is one operator of the vehicle.

Other Saab MCM products include the Double Eagle SAROV, which can be operated with or without a tether and is in service with the Royal Danish Navy. The Double Eagle SAROV is capable of speeds of 8kt, and can operate at depths of 500m, although an optional extension to 3,000m is available.

■ ONE-SHOT SPECIAL

Finally, BAE Systems is also involved in the AUV sector. The firm has fielded its Archerfish, which is designed as a one-shot mine neutralisation device. Archerfish can be launched from either a boat or a helicopter, and is guided using a fibre-optic link. Like the ECA K-Ster, Archerfish includes a tiltable warhead to ensure the most efficient destruction of a mine.

According to a BAE Systems spokesperson, the company has 'invested private funding in the development of Archerfish', and is 'currently under contract to the US DoD to deliver the low-rate initial production of Archerfish to meet the Common Neutralizer requirement for the Airborne Mine Neutralization System

programme'. This involves procuring a suite of MCM systems to equip the US Navy's 230-odd Sikorsky MH-60S Knighthawk multi-mission helicopters.

In addition to Archerfish, BAE Systems is developing the Talisman UUV product line which includes the Talisman-L and Talisman-M, the latter being optimised for the MCM mission. The Talisman-L accommodates the M's mission system on a craft which can be operated, transported and handled by two people.

As far as forthcoming trends in UUV technology are concerned, Hesse predicted: 'AUVs will increase their level of autonomy to perform in-mission re-planning rather than pure collision avoidance, and navigation accuracy will be further enhanced. Another key element will be the capability of underwater docking to allow AUVs to stay for longer periods in a certain area, and to perform regular inspection surveys.' Moreover, new AUVs are on the horizon. For example, Thales, ECA and French inertial navigation specialists IXSEA are developing the Asemar, which will perform mine clearance work, along with general underwater surveillance. **UV**



Thales is involved with the development of the Asemar AUV, which is equipped with a side-scan synthetic aperture array sonar, and is designed for MCM work and hydrography. (Photo: author)



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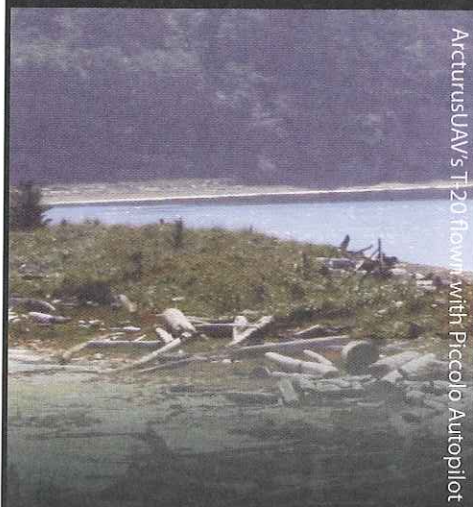
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