The future battlespace continues to be reshaped with the role of unmanned systems becoming an increasingly key component in conflicts. This holds true not only in ground battle scenarios where Unmanned Aerial Vehicles or UAVs have already demonstrated their effectiveness but also within a maritime context. Various types of UAVs customised for maritime applications offer naval forces an added dimension in determining the outcome of battle scenarios amidst changing technologies with new generation weapons, aircraft and surface vessels.

**Multi Mission Capabilities with a Range of Options**

The Eagle Eye is a tilt-rotor UAV developed by Bell for ship-based Intelligence, Surveillance and Reconnaissance (ISR) missions. It is able to operate in a maritime or land environment and has a highly reliable design with the ability to carry a variety of payloads that range from electro-optical surveillance sensors to weapons. With vertical take-off capabilities, it has been chosen as the US Coast Guard’s Integrated Deepwater VUAVs, (Vertical UAVs).

The MQ-8B Fire Scout is another UAV platform developed for use with the US Navy’s Littoral combat ships (LCS). It forms the flying component of a total system known as the Vertical takeoff and landing Tactical Unmanned Aerial Vehicle (VTUAV) system.

Operating at a range of 150 nautical miles from its ground station it can carry a wide range of payloads depending on the mission profile. The MQ-8B Fire Scout has multi-mission capabilities that include engagement with weapons as well as Intelligence, Surveillance and Reconnaissance (ISR) roles. The Fire Scout provides commanders with real-time video imagery and communications-relay capability with an endurance of more than eight hours as well as battle damage assessment and precision targeting. The MQ-8B has already entered service with the LCS this year.

The development of the J-UCAS (Joint Unmanned Combat Air System) or J-UCAV stemmed from an initial requirement by the US Navy and Air Force for an unmanned combat aircraft capable of performing strike missions and suppression of enemy air defences (SEAD) without risking the loss a pilot. The J-UCAS is a result of a merging of the UCAV (USAF) and the UCAV-N (US Navy) programmes. J-UCAS aims to provide a single combat system for both services with land and carrier based UAVs.

Development work on the X-45C and the X-47B (X-45CN and X-47BN aircraft carrier enabled navy designations) prototypes are being undertaken by Boeing and Northrop Grumman. The navy prototype designated the X-47BN will have a combat radius of 1,300-1,500 nautical miles carrying a maximum payload of 4,500lb inside a large weapons bay. It will be able to remain “on-station” for 2 hours over a target area 1,000nm away from the operating base performing SEAD, deep strike, electronic attack, and Intelligence, Surveillance and Reconnaissance (ISR) missions.

Air refuelling capability is also being considered for extended endurance. It is envisaged that up to four UAVs operated by a single J-UCAS pilot-operator using stealth airframes, advanced electronic warfare capability and beyond line-of-sight communications using joint mission execution capability will allow J-UCAS connectivity to successfully operate in high threat environments deep inside enemy battlespace.

The US Air Force and Navy will use the X-45C prototypes to demonstrate the key capabilities of the J-UCAS air systems programme such as network-centric operations, global strike, aircraft carrier operations, SEAD, ISR and operational assessment.

The AAI Corporation Shadow 400 UAV performs airborne intelligence, surveillance, target acquisition and reconnaissance as well as observation and battle damage assessment missions in support of naval forces. The Shadow 400 system comprises a control station, multiple air vehicles, a hydraulic launcher, logistics support, payloads, a net recovery system with automatic landing, ground support equipment, shipboard integration, stabilisation equipment, and a radome antenna set. Incorporating multiple launch and recovery methods, a largely composite material airframe, multiple sensor capability, video recorder, dual redundant data links and long-life emergency battery, the system can be deployed onboard ships or on land.

The Shadow 600 features a 12 to 14 flight endurance capability, 91lb payload, a more powerful high-performance 52hp engine, digital avionics and autopilot, wheel brakes, stronger nosewheel assemblies, and lithium long-life batteries. It is also equipped with an airborne videotape recorder and can accommodate multiple payloads.

With its vertical take-off and landing capabilities, the Schiebel’s Camcopter S-100 VTOL UAV is very suitable for maritime operations, landing on helicopter deck-equipped ships without requiring launch and recovery equipment. It can either be programmed to fly an autonomous mission profile via a simple point-and-click graphical user interface or controlled manually. The vehicle is equipped with stabilised Inertial Navigation Systems (INS) and Global Positioning System (GPS) while a variety of payloads may be carried to suit the mission. These include day and night thermal sensors, multi-spectral sensors, a synthetic aperture radar (SAR), a laser imaging radar (LIDAR) and a ground penetrating radar (GPR).
The VTOL UAV has two payload bays with the primary one housed beneath the main rotor shaft capable of mounting loads of up to 50kg. In addition there are also side hard points and an internal auxiliary avionics bay. A light and strong carbon fibre body offers a superior strength to weight ratio maximising a wide range of payload and endurance combinations. It can remain airborne for up to 6 hours with a powerful Diamond engine carrying a standard 25kg payload.

The ScanEagle is a mini UAV originally developed by Boeing and InSitu (acquired by Boeing in July 2008). It is used widely by the US Navy on its amphibious assault vessels, dock landing ships and more recently on the Aegis-class destroyers. A special version known as the Sea Scan for ship launch and recovery was developed specially for maritime roles.

The aerial vehicle which weighs a mere 12kg can operate for up to 28 hours with a 1,500km range performing various roles that include surveillance, force protection, maritime interdiction and naval gunfire support. It can be fitted with a stabilised video camera for quick tracking of stationary and moving targets. Payload options include electro-optical, infrared, biological and chemical sensors, laser designators and a magnetometer for identifying and locating magnetic anomalies.

The engine of the later versions have been converted to operate on heavy fuel i.e. jet aircraft fuel thereby satisfying naval operations safety requirements and also allowing for extended endurance. Launched from a pneumatic wedge catapult launcher the Scan Eagle flies pre-programmed missions using its built-in GPS while retrieval of the vehicle involves the Sky Hook system where the air vehicle snags a line suspended from a boom via a hook located on the wing tip.

Developed by the AS Yakovlev design bureau, the Albatross UAV is designed to provide all day aerial reconnaissance as well as environmental monitoring. The low-altitude, tilt-rotor aircraft is powered by two 160-hp turboprops mounted on the wing tips while data collected by its infrared imaging payload is transmitted in real-time to the UAV’s ground control station. The Albatross surveillance system comprises the air vehicle, a ground control station and ancillary equipment that can be ship based in support of naval forces. The Albatross is able to take off and land vertically and can remain on station for about seven hours at distances of between over 50km and 100km.

EADS Scorpio UAV is a lightweight unmanned rotorcraft designed for maximum flexibility performing day and night surveillance missions which can be used in a maritime environment. Its features include autonomous flight control and navigation, various payloads depending on mission requirements, secure real-time data-links and easy maintenance and operation.

The maritime version of the Husky, Autonomous Helicopter (UAV) can land on vessels with helicopter decks without the use of landing equipment. The fully autonomous system can complete its mission from takeoff to landing relying on computer algorithms with a ground control station looking after the vehicle’s flight and mission accomplishment via a secure, two-way, real-time data-link. Redundant inertial and GPS systems provide precise navigation and flight stability while its modular design can accommodate a variety of payloads to suit specific mission requirements. With two payload bays, side hard points and an internal auxiliary electronics/avionics bay, it can be fitted with infrared, low-light cameras and CCD-TV sensors for intelligence, surveillance and reconnaissance missions. The carbon-fibre fuselage allows a payload of up to 42kg.

Advancing Technology

In line with evolving UAV technology, manufacturers continue to design and develop more advanced UAVs with increased payload and performance capabilities while agencies like the DGA (French Defence Procurement Agency) have awarded DCNS and Thales the second phase of the D2AD study to design and demonstrate an automatic takeoff, landing and deck landing system for rotary-wing UAVs. Phase 2 demonstration trials will be conducted in Mesa, Arizona using the AH-6U Little Bird unmanned helicopter from Boeing. Landing tests on fixed and moving platforms will pave the way for deck landing trials on a French Navy vessel at sea, planned for mid-2011.

The DGA awarded the D2AD study contract in late 2008 as part of a broader risk reduction effort to support future tactical UAV programmes for the French Navy and Army. The DCNS/Thales system demonstrator will incorporate the full spectrum of operational constraints related to takeoff, landing and deck landing operations, including the required levels of discretion in a range of environmental, weather and sea state conditions. Naval UAVs offer a wide range of mission options which will undoubtedly see their role being further expanded as naval forces seek to maximise battlespace awareness in meeting the combat needs of operational and tactical commanders.■