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Andrew Drwiega

The military helicopter market has had a robust couple of decades, particularly as a result of its use as a counter-insurgency vehicle of choice supporting ground troops in first Iraq, then Afghanistan and more recently in northern Africa. It enabled coalition forces to move unhindered around the asymmetric battlefield, avoiding roadside improvised explosive devices (IEDs) and enabling rapid reaction and resupply to isolated patrols and outposts.

All of the major prime manufacturers made good business developing and selling dedicated attack helicopters, heavy lift, medium lift, utility, as well as numerous naval variants. But designing and selling dedicated military helicopters is an expensive business which is why a couple of current trends have developed: either keep developing new iterations existing helicopters as Boeing has done with its AH-64 Apache and CH-47 Chinook, or develop a modern version of an older aircraft in the way Leonardo has done with the AW159 Wildcat replacing the Lynx/Super Lynx 300 and SikorskyLockheed Martin has done with the CH-53K, taken from the legacy CH-53A/D/G.

A more recent development has been the dual use civil/military helicopters that have been brought to the market by Airbus (H135M, H145M/UH-72A) and Leonardo (AW109LUH, AW139/149/169). Bell did this before with the Bell 407 and of course Russian Helicopters with its dual Mi-8/17.

Tiltrotors entered the market, and after a difficult start have become aircraft that are invaluable to the United States Marine Corps (USMC). Moreover, prime Bell is now taking a newer generational aircraft through the safety and productivity of our helicopters by leveraging autonomy technology. Our Autonomy Pillar is focused on improving the safety and productivity of our helicopters by integrating all of these technology areas in our next generation of products including those focused on US Department of Defense (DoD) Future Vertical Lift (FVL).

Armada International wanted to discover industry’s perspective on the future of manned and unmanned military rotorcraft, and a survey of several questions was sent out to each prime with more that one type of military helicopter. Not all answered, but the four that did represented companies with a long pedigree in helicopter design and development: Bell, Boeing, Leonardo and Sikorsky.

The questionnaire required answers from a senior named figure within the organisation who had a direct connection with the development of their company’s military products and assessment of future ambitions. Respondents did not have to answer all questions.

Andrew Drwiega (AD): What are the main factors driving military helicopter design today?

Steve Mathias (SM): After nearly two decades of conflict, I think US military leaders see a need to re-examine the combat helicopter from ‘soup to nuts’. Future vertical lift aircraft need to be able to accommodate greater payloads and be produced at a lower cost while at the same time shrinking their logistical footprint.

Chris Van Buiten (CVB): At Sikorsky we have selected three technology pillars that we think define the future of rotorcraft. These are: speed, autonomy, and intelligence. Our Speed Pillar is focused on maturing our X2 rigid coaxial helicopter technology which enables us to double the speed of helicopters, improve cruise efficiency, reduce noise and significantly improve manoeuvrability. Our Autonomy Pillar is focused on improving the safety and productivity of our helicopters by leveraging autonomy technology. Our approach will enable our products to be ‘optimally piloted’ with two pilots, one pilot or zero pilots; depending on mission requirements. Our Intelligence Pillar is focused on maturing the monitoring and analytics technology to understand the health of the aircraft fleets we support. This pillar is driving improvements in availability and reducing operating costs. We are integrating all of these technology areas in our next generation of products including those focused on US Department of Defense (DoD) Future Vertical Lift (FVL).

John Schibler (JS): At Boeing, we design military helicopters based upon customer requirements. Typical design requirements
centre upon speed, range, payload, high/hot capabilities, endurance, and survivability of the aircraft and the crew members. This means redundancy for key systems. Design requirements for different military helicopters are based upon the mission set each aircraft is required to perform. For example, design requirements for a light attack/reconnaissance scout, such as the AH-6 Little Bird, is significantly different from those of a multi-role attack helicopter like the AH-64E Apache. The mission of the scout is to perform reconnaissance, gather intelligence, and report it back to operations centres and in this role, the scout helicopter’s direct engagement with the enemy has limitations which lead to design of a smaller, agile aircraft, with limited firepower. For the multirole attack helicopter, which engages directly and decisively with the enemy, the design includes greater protection for the crew; increased durability of the airframe to withstand direct hits; and designed broad spectrum functionality of the aircraft including dual hydraulics, electrical systems, etc. – which leads to considered placement of these systems so that when in contact with enemy firepower, one bullet/RPG will not adversely impact the functionality of the systems. The Chinook tandem rotorcraft fulfils a broad range of missions and is designed and modernised to ensure it meets commanders’ performance requirements for power, speed, stability and lift. The V-22 Osprey continues to redefine multirole flexibility and mission versatility, operating worldwide in combat and humanitarian service. The tiltrotor craft was designed for operational flexibility, shipboard compatibility and technology enhancements planned or in-work ensure future growth for the aircraft. With the versatility of a helicopter and the speed and range of a turbo prop the performance of the Osprey makes it uniquely capable of performing missions that other aircraft cannot.

Roberto Garavaglia (RG): It’s all about capability and affordability. Leonardo has both specialised military helicopters and dual use platforms in its product range. The specialised platforms, such as the AW101 and AW159, have been developed to meet very demanding and specific military requirements that require sophisticated fully integrated mission systems such as radars, weapon systems, defensive aids etc, which of course drive up the cost. Other specific military requirements, such as ballistic tolerance and electromagnetic protection, also have an impact on cost. For a variety of utility and tactical roles Leonardo’s dual use products, such as the AW139M, offer customers a platform that can provide virtually all the capability of a competing specialised platform but with lower acquisition and through life costs.

SM: Bell has always been on the leading edge of technology and innovation. Examples include P59 which was the first US jet fighter, and X-1, which was the first supersonic aircraft, as well as the V-22, which is the first and only production tiltrotor. Additionally, Bell aircraft have been continually upgraded to remain relevant in the commercial space as well as the military battlespace. The AH-1Z and UH-1Y aircraft, while 85 percent common, are the latest generation in attack aircraft responding to a requirement from the United States Marine Corps for combat aircraft.

Bell continues to lead the vertical lift industry with the revolutionary V-280 Valor. The V-280 is a next-generation tiltrotor that is designed to provide unmatched agility, speed, range and payload capabilities at an affordable cost. The Bell V-280 Valor achieved first flight in December 2017. This milestone represents exceptional progress on the V-280 development programme and brings Bell one step closer to creating the next generation of vertical lift aircraft for the US military.

AD: Where does your company direct its main investment: new helicopter design; design modifications and upgrades; new systems technology? Can you provide details about your developments to date?

CVB: Sikorsky has a wide portfolio of helicopter development underway that is funded both internally and by customers. This includes the CH-53K King Stallion heavy lift helicopter development program, Presidential Helicopter, USAF Combat Rescue helicopter, as well as several international programmes including the Canadian Maritime Helicopter, and the Turkish Utility Helicopter program. We are also developing products using our Collier Award Winning X2 Technology: the S-97 RAIDER and the SB>1 Defiant. Our current portfolio is a nice mix of new developments as well as product upgrades. Some of the specific technologies we are leveraging include advanced composite structures, fly-by-wire controls, active vibration control and advanced diagnostics.

JS: At Boeing we work cooperatively and closely with our customers and industry partners to develop active and detailed modernisation plans for each of our contemporary, runway-independent, vertical lift platforms. The customer ultimately decides the priorities based upon the ever-changing threat and emerging requirements. As stated previously, being able to increase speed, range and endurance allow for expanded mission capability while requiring
Interview

a smaller logistics footprint on the battlefield. Other connectivity/situational awareness on the ever-crowded battlefield drives upgraded technologies. In addition to continuously modernising vertical lift platforms, Boeing is actively engaged in the Joint Multi Role Technology Demonstrator (JMRTD) project and other advanced programmes and technologies. Twenty seven new technologies went into the latest model of the Apache, the AH-64E with key developments including a new split-torque face gear transmission to increase power throughput; composite rotor blades; Cognitive Decision Aiding, and interoperability with unmanned aerial systems. The Chinook and Osprey programmes are likewise engaged in modernisation development to ensure continued operational relevance.

RG: Leonardo Helicopters invests more than 10 percent of its revenues into research and development, the challenge is how best to spend that significant sum of money. At Leonardo we are investing in new rotorcraft – conventional helicopters, tilt rotors and unmanned – as well as product improvements to existing helicopter product lines. Additionally we are investing in new technologies, such as electric tail rotor drive and active blade technology, which could be introduced on both new and existing platforms.

AD: Unmanned military rotorcraft are increasing in numbers and capability among today’s armed forces. Does your company see a future in progressing alongside, but apart from, unmanned rotorcraft; is it developing manned and unmanned rotorcraft together; or are you planning a significant increase in unmanned rotorcraft design and development?

CVB: Autonomy is going to have a significant impact on our industry. Our Autonomy Pillar is focused on leveraging autonomy technology across all of our commercial and military products. Our vision is to enable ‘optimally piloted’ capability (2 Crew, 1 Crew, 0 Crew) in our products to make them safer, more productive and less expensive to operate. Autonomy has the potential to eliminate the leading cause of helicopter accidents: controlled flight into terrain (CFIT). CFIT is currently responsible for about 75 percent of helicopter accidents. This is because helicopters operate close to the ground, in unprepared, obstacle rich environments. Our autonomy approach is more focused on leveraging autonomy in products that are also capable of carrying people and less focused on making small UAVs. This drives our focus on high integrity, highly reliable systems that can be trusted. We also recognise that our products will interoperate with smaller UAVs. This capability set will improve how we operate militarily and support a global community when the bubble goes up.

JS: Leadership within The Boeing Company see significant benefits in the complimentary nature between manned and unmanned rotorcraft/systems and the tremendous benefits associated with the combined increase in capabilities. Today’s Apache helicopter is capable of receiving video from an UAS of the mission area prior to even taking off – and that’s a tremendous increase why Bell is developing the V-247 Vigilant. The V-247 Vigilant unmanned tiltrotor system is another example of Bell’s ability to apply an adaptive systems technology construct through years of lessons learned on V-22 and recently with the V-280 into an unmanned platform. The V-247 is runway independent and will operate from naval vessels to provide long range 24 hour persistent ISR with a flexible payload capacity. This will facilitate meeting known capability gaps and future fleet growth requirements with a capability to change configurations rapidly.

The Bell V-247 Vigilant is a low-risk, achievable approach to satisfying the USMC MUX (MAGTF Unmanned Expeditionary Capabilities) requirement for a Group 4/5 Unmanned Aerial System (UAS). Expeditionary capability with a small logistical footprint.

Additionally, Bell has demonstrated a scalable unmanned autonomous pod transport system, otherwise known as APT, to meet the growing on-demand mobility needs for both commercial and military applications. The APT will autonomously deliver much needed aide or supplies to areas affected by natural disasters, impassable road systems due to flooding or mass migrant movements, or a unit located in an austere forward operating base. This capability set will improve how we operate militarily and support a global community when the bubble goes up.
INTERVIEW

in situational awareness and survivability. There is clearly so much capability in unmanned technologies that the company has and industry leading Autonomous Systems Division within the Boeing Defense, Space & Security business. Both the Boeing Vertical Lift (current platforms) and Phantom Works (new development) organisations are actively engaged with many projects which intersect with this technology.

RG: To get the maximum mission capability benefit you have to design a platform from the outset for unmanned operations. Optionally piloted air vehicles converted from manned platforms give you mission and operational flexibility, but don’t give you the same combination of payload fraction and range that can be achieved with a dedicated unmanned platform.

The amount of investment and work we are doing on unmanned rotorcraft has increased significantly over the last three to four years and we expect it to continue to grow to become an important part of our business over the next decade. One key unmanned project is RUAS Phase II, jointly funded by Leonardo Helicopters and the UK MoD, which is studying the role of a unmanned rotorcraft primarily for maritime missions. We are also continuing to develop the Hero UAS product and the SW-4 Solo OPH/UAS demonstrator.

AD: Does your company regard UAVs as a threat to future business - or an opportunity?

CVB: Autonomy presents an important opportunity by enabling significant advancement of helicopters. Sikorsky makes large helicopters such as the UH-60 Black Hawk, CH-53E/K, S-76 and S-92. These aircraft move passengers and tons of material over large distances in difficult environments. Small UAVs are not going to displace this transportation capability, but I believe the autonomy that enables UAVs will flow into all future helicopters to make them safer, more productive and cost effective both with and without pilots. In this way, the autonomy technology is completely scalable from our 12,000lb helicopters to our 80,000lb helicopters. We do not see an autonomous 19 passenger helicopter on the horizon yet but we are working on using that autonomy technology to make our 19 passenger helicopter safer, more productive and more affordable to operate.

Will manned attack helicopters still have a central role in deliberate attack in 2030 onwards? Does your company regard UAVs as a threat to future business - or an opportunity?

SM: At Bell we are focused on how to best serve the war fighter. The complexity of the battlefield will always demand a mixture of manned, optionally manned, and unmanned aircraft. We at Bell Helicopter embrace vertical lift across all platforms manned and unmanned. The multiple roles of vertical lift platforms will create unique missions sets where a small, short range aircraft will be needed in the light attack / utility role as well as a slightly larger, faster attack platform. At Bell Helicopter, we have innovation teams continuously working to bring new ideas to life in order to solve the hard challenges that limit the capabilities of rotorcraft. If an aircraft manufacturer fails to innovate, they will fall prey to the wake of disruption caused by new ideas.

RG: Leonardo definitely sees UAVs as an opportunity rather than a threat to its current helicopter business. Leonardo Helicopters is investing in military unmanned rotorcraft and going forward sees them as one of its three product lines – which comprises of conventional helicopters, tilt rotors and unmanned rotorcraft.

We have the technology for the platform, the mission systems and the unmanned mission management. The technology that allows you to fly and operate a unmanned rotorcraft is scalable, for example the technology behind the Hero and SW-4 Solo unmanned air systems is almost identical and applicable to larger unmanned rotorcraft.

What is the long-term impact of performance-based logistic contracts on your company’s overall business? Does this shift the key OEM role from prime
**Manufacturer to sustainment provider?**

**CVB:** Sikorsky has thousands of aircraft operating with customers around the world. The safe and cost effective operation of these fleets is a constant focus for us. We make extensive use of Performance Based Logistics and Total Assured Performance with our military and commercial customers. We continue to invest to improve our capability. Our fleet management centre monitors aircraft around the world with state of the art, customised analytics to reduce maintenance, downtime and costs with the highest levels of safety. These services are a big part of our business but we maintain a balance of new aircraft production and fleet support.

**RG:** There is an increasing trend amongst military customers to evaluate not just the procurement cost but the through life cost of helicopter platforms and to contract for some form of performance-based logistics. Leonardo Helicopters has a lot of experience of providing integrated operational support services for the UK MoD Merlin, Apache and Wildcat fleets. Most recently is has contracted with Norway for a comprehensive aircraft availability based support service and training service covering the first 15 years of operation of a fleet of 16 AW101s. This contract guarantees aircraft availability rates at six SAR bases. These types of contract are likely to increase in the future and are an opportunity for the Company to expand its customer support and training business whilst ensuring customers get the most out of their helicopter fleet.

**Will manned attack helicopters still have a central role in deliberate attack in 2030 onwards or will their role be made redundant through the use of either UAVs, fast jets, or perhaps other platforms that may be able to deliver kinetic weapons?**

**CVB:** Future attack and reconnaissance helicopters will have the flexibility to operate with or without onboard crew depending on mission requirements. They will interoperate with smaller UAVs and fixed wing attack assets. Our S-97 Raider prototype which is aimed at Future Vertical Lift Light requirements will be able to execute missions with two crew, one crew or no crew and will be capable of operating in packs of collaborating aircraft while leveraging off board assets including UAVs. We believe that it will be important to retain the ability to have humans in the system. The role of humans will change from piloting the aircraft to coordinating increasingly complex mission strategies.

**RG:** We see manned armed helicopters still playing a key role in fulfilling the armed role in 2030. However, certainly by then some battlefield commanders are likely to have unmanned armed rotocraft available and, as is the case today, armed unmanned fixed wing aircraft. Looking beyond 2030 it is likely the role will be carried out increasingly by unmanned platforms controlled from remote ground stations or teamed with manned aircraft. However, we do not anticipate complete replacement of manned platforms with unmanned ones, especially in scenarios where a specific situational awareness is needed.

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**NOTE:** The following manufacturers were contacted to contribute to this survey and either did not wish to participate or did not reply: Airbus Helicopter; Korean Aerospace Industries; Hindustan Aeronautics; MD Helicopters; Russian Helicopters.
MAKING MILITARY ROTORCRAFT - AN INSIDER’S EXPERIENCE

Armada International gets the inside line on the military rotorcraft industry from an industry professional who has spend decades selling and promoting military rotorcraft.

Andrew Drwiega

A US Army CH-47F delivering cargo during a training flight. Modern Chinook heavy-lift helicopters feature digital 'glass cockpit' avionics, a digital automatic flight control system (DAFCS) and are made to be easier to maintain.
In looking to get an insider’s view point on the military rotorcraft industry today, delving into where it has come from and where it is headed, I quickly decided upon a guy that I have known for many years, known to many simply as ‘Torgy’.

I have known Robert (Bob) Torgerson ever since I started writing about military helicopters nearly 20 years ago. We were introduced by a mutual good friend and journalist, David Harvey, who told me I ought to get to know Bob as he knew a great many people and either had been, was currently, or would be involved in every major military rotorcraft programme that Boeing had brought to the mass market. This turned out to be true.

Bob retired at the end of 2017 after a career of 38 years with Boeing Vertical Lift in a variety of roles, including leading international sales of Boeing’s CH-47 Chinook in Europe and Asia. He also served in communications and public affairs positions for Boeing, with his skills founded in newspaper journalism. He is currently involved as a trustee with the Philadelphia Foreign Policy Research Institute. All comments reflect his personal view points and are not representative of any outside organisation:

Bob, let’s begin with your view on how the military rotorcraft industry has changed over the decades that you have been involved in it?

The biggest changes are in technology, particularly the advent of digitisation, as...
well as the use of composites and other advanced materials to lower weight and improve survivability. The processes used by manufacturers to improve quality and reduce or level out costs is also significant.

Because of digitisation, rotorcraft are now a key element of the informational node. This has heightened the importance of rotorcraft in the battlefield priority list as exemplified by their invaluable contribution to the Afghan and Iraq Wars. One result of this is the rise of rotorcraft officers up the chain of command exemplified by Air Chief Marshal Sir Andrew Pulford, the first rotorcraft pilot to rise to the rank of Chief of the Air Staff (July 2013–July 2016).

The emergence of Unmanned Aerial Vehicles (UAVs) has been rapid and is already affecting how rotorcraft are used and operated. From a business standpoint, the entrance of large corporations into the rotorcraft business, e.g., Boeing, Lockheed, Leonardo, Airbus, etc., as opposed to smaller rotorcraft-focused firms such as Vertol, Sikorsky, Augusta and heritage Eurocopter companies, has changed business priorities. Corporations now leverage the capabilities and market interest rotorcraft bring to increase their overall defense businesses.

More recently, the establishment of support businesses by the traditional primes has resulted in a stronger link between production and support in campaigns. This has changed traditional ways of involving in-country suppliers. If a prime is selling overseas it is essential to build local partnership arrangements in order to succeed. Due to the cost of product development, defence will still lead new commercial developments. There would not be the Leonardo AW609 without a proven and in production Bell-Boeing V-22. However, give Leonardo credit as it is starting to fulfill the AW609s promise and it will be a boon to the commercial market. I also believe Airbus deserves significant credit for funding new and innovative commercial developments; a case-in-point being its X-6 series technology, which is part of a larger compound approach.

Can I ask you to select and expand on up to three landmark moments in rotorcraft development during your career?

The development of the tiltrotor (specifically the V-22 Osprey and more recently the AW609) and bringing them into production has to be the highlight. This is epitomised by the first flight of the V-22 in March 1989. This showed how difficult change can be within an industry, both politically and from a business standpoint. You had to be a visionary to believe this would succeed in light of the developmental difficulties that took place early on. I think tiltrotor advocates have to be supremely confident going forward as follow-on military and commercial products, including UAVs, are now taking shape.

Second, the extension by way of programme design and modernisation of heritage fleets beginning in the early 1980s and carrying on into the present day, to long-term platforms, such as Chinooks, Black Hawks and Apaches. This has proven to be a cost and operationally-effective approach to maintaining and modernising rotorcraft.
fleets. This has certainly brought affordability into the forefront in any rotorcraft platform conversation.

Finally, I’d say emerging globalisation trends. Any large US-based OEM can’t expect confidently to be able to sell its products without adequate industry involvement from a potential customer nation and I think if you ask European manufacturers they’d tell you the same is true going the opposite direction. So I’d point to potential transnational programme efforts, some of which did not succeed.

What are the most common misconceptions between international government buyers of military rotorcraft and the industry OEMs/systems integrators during the buying process?

To me this is straightforward. An OEM needs to go to great lengths to understand the most important customer requirement and who is the buying customer decision-maker. Is the major need operational (lift, speed, range, time on station, etc.,); affordability, (to be able to fit within a budget?); and/or, the industrial needs of the buyer nation. Generally speaking, decisions usually involve some combination of the three. The trick is to appropriately prioritise them so each bid meets what is needed by the customer.

What do government’s need to appreciate more and manage better when it comes to through-life-maintenance of a particular fleet of military rotorcraft?

Rotorcraft need a constant influx of parts and sustainment support. A customer can’t just buy the aircraft and not plan to maintain and update their fleet. I believe that is why the various approaches to long-term customer support that are starting to be featured by OEMs will continue to grow in popularity.

Do you foresee a day in the next 20 years when all military rotorcraft will be unmanned? What effect is the proliferation in design of unmanned rotorcraft having on the manned rotorcraft industry?

I suspect there will always be a place for some piloted aircraft in fleets worldwide, although UAVs will become more and more predominant globally, particularly in missions where the manned need may not be essential (straight forward cargo delivery) and in most likely in attack roles as warfare becomes more lethal for rotorcraft platforms.

Will the Future Vertical Lift (FVL) programme potentially be the last military specific rotorcraft to leave the drawing board? Probably not. I would say that current
Sand and dust gets thrown up as a British unit deploy out of an RAF Chinook helicopter in Helmand Province during the war in Afghanistan

Both the Sikorsky-Boeing compound SB.1 Defiant and Bell tiltrotor V-280 Valor are arguably modern representations of ideas and designs that surfaced in the last century (thinking of Lockheed's compound AH-56 Cheyenne Piasecki helicopter and Bell's XV-15 tiltrotor, first flown in 1967 and 1977 respectively). How will rotorcraft design go forward from those we are seeing today?

There will be more emphasis on variations of compound designs in my view. It is the perennial quest for better speed and payload yet having the ability to retain the capacity for vertical take-off and landing.

The rotorcraft industry was developed by pioneers including Juan de la Cierva, Igor Sikorsky, Frank Piasecki, Nikolai Kamov, Charles Kaman, Arthur Young - with several companies founded in their name or as a result of their designs. Is there any 'pioneering spirit' left in the military rotorcraft industry, and if so, where does it reside?

There remains a lot of pioneering spirit in the rotorcraft industry, both within major OEMs and within smaller companies, including technology development firms. Regarding your previous point about the SB.1 and V-280 designs is that one of the aspects of the helicopter that is often overlooked is that a series of incremental improvements to existing designs can bring about a large in-crease in capability. Obviously this takes time and incremental improvements are not as sexy as a space shot, however, over time they can bring about significant improvements. Look at the nearly 60-year design that is Boeing's CH-47 Chinook: a nearly perfect design when you factor in the combination of affordability and capability. It went originally from 33,000lb gross weight to what will soon be a 56,000lb aircraft with nearly triple the lift capability. Same general comment can be made for the Sikorsky CH-53 and the Aérospatiale (now Airbus) SA 330 Puma series.

It needs to be understood that just because a silhouette remains the same, it doesn't mean there is not pioneering spirit within a modernised design of a familiar rotorcraft.

Note: Robert Torgerson is now an independent rotorcraft business consultant in the Philadelphia area.
The utility and cost of acquiring and deploying unmanned aerial systems (UAS) is witnessing a steady increase across the military, but particularly in the military maritime market. However, it is the need for many navies to know more about what is over the horizon that is a driving factor in USA development and employment, particularly when their loiter time is substantially more than a manned aircraft or helicopter.

Andrew Drwiega

“The maritime environment is dominated by the horizon. Without high ground to occupy all ships have the same horizon therefore all ships have the same range limitations at which to detect and understand,” noted Ewen Stockbridge Sime, UMS Skeldar’s head of training, in a positioning document issued by the company in February.

“Improved lift capacity on this class of UAS has meant that, for the first time, maritime surface search radars can be carried and employed with effect,” he explained. He noted that the increased capability and smaller size of high sensor systems meant that a range of missions, not just military, can be prosecuted “from coast guard boarding parties to search and rescue to littoral survey. Hyper spectral sensors can be used to detect pollution and the emergence of ViDAR (Visual Detection and Ranging) gives real opportunity for low weight, high resolution surface picture compilation at range.”

RUAS PROGRESS INCREASES MARITIME RELEVANCE

As Rotary Unmanned Aerial Systems (RUAS) have improved in terms of range and load capability, they have moved into the tactical sphere encompassed by naval needs for Maritime Domain Awareness (MDA).

The UMS Skeldar 200 has been selected to participate in the European Defence Agency initiative OCEAN2020.
Sime makes the important point that due to the smaller size or some types of rotary UAS, “small vessels can transport their own organic air capability. Picket ships can extend understanding further, small survey ships can understand better and coastguards can find and help more effectively.”

UMS Skeldar’s contribution to this field is the Vertical Take-Off and Landing (VTOL) Skeldar 200, a Hirth heavy fuel engine that can use Jet A-1, JP5 and JP8, a kerosene-based fuel (NATO code F-34). UMS Skeldar states that the 200 has a includes a 518lb (235kg) take-off weight, with a payload up to 88lb (40kg).

UMS Skeldar is one of the companies that have been selected to participate in the European Defence Agency initiative OCEAN2020. This is a cross-European military research programme which will employ ‘unmanned platforms of different types (fixed wing, rotary wing, surface and underwater) integrated with naval units’ command and control centres to enable data exchange via satellite with command and control centres on land.’

Around $110 million (€90m) has been allocated for the Preparatory Action on Defence Research (PADR), being spent over three years between 2017-19.

Leonardo was awarded leadership of the OCEAN2020 initiative, which comprises 42 partners from 15 European countries. These include the Ministries of Defence of Italy, Greece, Spain, Portugal and Lithuania, with additional support from the Ministries of Defence of Sweden, France, the United Kingdom, Estonia and the Netherlands. Industrial partners include Indra, Safran, Saab, MBDA,PGZ/CTM, Hensoldt, Intracom-IDE, Fincantieri and QinetiQ.

As stated by Leonardo, the OCEAN2020 project will require ‘two live demonstrations of maritime surveillance and interdiction operations, which will be conducted by European fleets using unmanned aircraft, surface vessels and underwater systems. The first demonstration, scheduled to take place in the Mediterranean Sea in 2019, will be coordinated by the Italian Navy. The second, which will take place in 2020 in the Baltic Sea, will be conducted by the Swedish Navy. The data collected during these two demonstrations will be processed and sent to
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Leonardo’s Hero and Solo unmanned rotorcraft will be used during the first demonstration with the Italian Navy in the Mediterranean. The SD-150 Hero is a heavy fuel engine Short Range Tactical Rotary Unmanned Air Vehicle (RUAV), with an endurance over five hours over a range of 540km. It has a range speed of around 80 knots (144km/h) but for an endurance mission 50kts (90km/h) would be more applicable.

The SW-4 Solo, based on the Polish PZL-Swidnik SW-4 light single engine helicopter, is currently an Optionally Piloted Helicopter (OPH) but can be converted to a rotary UAS within an hour. In early March Leonardo announced that the SW-4 Solo had flown totally unmanned for the first time, for a period of 45 minutes to a height of 1,500 ft (457m) and up to a maximum speed of 60kts (111km/h).

I TRIED AND TESTED

Austrian manufacturer Schiebel continues to demonstrate constant progress with bringing its Camcopter S-100 unmanned air system (UAS) to the international market. It has had particular success within the naval community, as witnessed by the Royal Australian Navy’s (RAN) announcement in February 2017 that it had awarded Schiebel a contract to supply the S-100 and three year of contractor logistics support.

The RAN has been testing the heavy fuel variant of the S-100 during customer acceptance trials undertaken recently. The acquisition of the S-100 has taken place through the Navy Minor Project (NMP) 1942, a programme to procure and develop a Vertical Takeoff and Landing Maritime Tactical Unmanned Aircraft System – Interim Capability (MTUASIC). The intent is to develop a mature UAS fleet for the RAN by the early 2020s.

Most shipborne operations currently come under the short-range tactical capability and the company states that it Camcopter S-100 has flown from over 30 types of ships in a variety of environments. This system maturity was what the RAN was seeking in making its selection.

The flying and verification programme was conducted at the Jervis Bay airfield in New South Wales. The S-100 JP-5 (NATO F-44) heavy fuel powered S-100 had a Wescam MX-10S payload which delivered images from a distance of around 60 nautical miles (NM) and at altitudes exceeding 10,000ft (3,048m).

RAN contract manager Kevin Beare stated that the S-100 had “performed very well during the validation and verification program and the RAN looks forward to utilising this platform to achieve NMP1942 project objectives over the coming years.”

I NEW PRETENDER

Airbus Helicopters is developing its own rotary UAS for naval maritime deployment called Vertivision Surveillance Rotorcraft (VSR) 700 (for its weight at 700kg). The VSR700 is derived from a Helicoptères Guimbal Cabri G2 helicopter, a light, single-engine, diesel-powered rotorcraft. A flight/loiter time of up to ten hours is expected with a fuel burn of around 15kg per hour. This is with a payload of around 250kg, likely to comprise EO/IR sensors and radar.
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Airbus is talking to the French Navy regarding the VSR700 and its potential use by new medium-sized frigates. It completed OPVs trails in June 2017 proving the integration of Airbus Helicopters’ flight control system with the aerial vehicle.

In January this year the DGA (Direction générale de l’armement) awarded a technology development contract to the Naval Group and Airbus Helicopters consortium. The objective is to create a demonstrator that can be trialed by the French Navy onboard a vessel. It would also trial associated mission systems.

According to an Airbus statement, this capability would contribute towards ‘the preparation of the SDAM (Navy Airborne Drone System), whose entry into service is foreseen for the middle of the next decade on new Intermediate-Size Frigates (FTIs)’ and potentially other French warships.

The aim of the project would be to develop ‘a demonstrator of the complete system in a representative environment’. The Naval Group and Airbus Helicopters will have the responsibility of programme design authority, working with the main subcontractors of Hélicoptères Guimbal, Safran, Thales and ONERA.

On 18 December Bell’s V-280 Valor tiltrotor made its first flight has achieved first flight at Amarillo, Texas. It has been designed for the US Army’s future Vertical Lift requirement: it will have a cruise speed of 280 knots (520 km/h), a range of 2,100 nautical miles (3,900 km), expected maximum takeoff weight is around 30,000lb (13,600kg).

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Sea trials of a manned Cabri G2 have already been conducted onboard a French Navy air defence frigate to order to define the VSR700’s flight envelope for shipborne operations.

The US Navy’s Northrop Grumman MQ-8C Fire Scout, based on a Bell 407 helicopter, is a US Navy programme to provide an unmanned Intelligence, Surveillance and Reconnaissance (ISR) capability.

The USN has selected a platform based on the existing Bell 407 manned helicopter, which has had over four million flight hours logged by owners and users since its first flight in 1996. The Bell 407 frame was also put forward by Bell Helicopter for the US Army reconnaissance helicopter replacement as the ARH-70. However, the programme was cancelled by the Army in 2008. It has a four-bladed rotor with a maximum speed of around 135kts (250km/h), an operational height up to 16,000ft (4,876m) and a maximum internal payload up to 500lbs (226kg).

Latest reports state that the Navy’s MQ-8C Fire Scout UAS will be fitted with Leonardo Osprey 30 Active Electronically Scanned Array (AESA) radar together with a 16 datalink. Leonardo describes the Osprey as a multi-mode surveillance radar which is particularly suited to maritime challenges. Its features include: an AESA-enabled small target mode (STM); high resolution wide swath SAR mapping; small radar cross section (RCS), low minimum detectable velocity (MDV), multi-channel moving target indication (MTI); and air-to-air surveillance, track and intercept.

Such capabilities will allow the USN to use the MQ-8C as a forward sensor which can feed ISR information back to the surface fleet which would be able to use modern weapons to engage targets at this greater range.

The MQ-8C will be integrated with the Johns Hopkins-developed Minotaur Track Management and Mission Management system that collates data from several different sensors to provide a unified target picture to a USN battle group.

According to Jack Thomas, director of Tactical Autonomous Systems Mission Engineering at Northrop Grumman Aerospace Systems, the Fire Scout with Link 16 operating with a fleet of ships “is a key enabler to that capability and requires no additional modification to any of the other platforms.” He continued: “We certainly see Fire Scout as the long-range, high-endurance sensor that does the detecting and identification that will shorten that cycle from initial detection through to managing that track.”

In December 2017, Fire Scout programme director at Northrop Grumman Autonomous Systems Melissa Packwood stated that the USN had acquired 30 MQ-8Cs for its LCS programme. Early in 2018, the US government announced a $33.5m modification to its previous contract with the company for the further delivery of three Fire Scout MQ-8C UAS with a completion date set for March 2020.
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