Maximum utility: the future of support helicopters

As land forces are reshaped for expeditionary missions and budgets continue to shrink, the role of support helicopters is evolving to meet a broader range of demands. Andrew Drwiega reports

As budgets are squeezed and personnel numbers fall, military forces around the world are faced with the challenge of extracting more capability out of fewer assets. Support helicopters, usually the most numerous type in any fleet, are now edging towards the centre of this drive. Having a helicopter fleet that simply transports troops or cargo from point 'A' to point 'B' is no longer delivering enough capability as many forces have had to slim down the number of types in their inventories.

Speaking at the IQPC International Military Helicopter conference in London on 21 January, Heidi Shyu, assistant secretary of the army (acquisition, logistics, and technology) and acquisition executive, said that as a result of sequestration the US Army did not have the budget to buy any new helicopter platforms, such as the Armed Aerial Scout. The main path to modernisation, she said, lies in divesting ageing systems to reduce operational cost and sustainment in addition to re-setting existing equipment.

"We will go into the next conflict with the systems we have today; we will modernise with incremental upgrades of existing platforms. These will help us to buy back weight and power," added Shyu.

Military original equipment manufacturers (OEMs) have already achieved this. Sikorsky has progressed its Black Hawk from the UH-60A model through to the newest UH-60M and UH-60L digital (which incorporates a Northrop Grumman digital glass cockpit that allows the army to have a digital aircraft without the cost of a UH-60M). Boeing, too, has evolved the CH-47 Chinook to the latest version CH-47F. For the US Marine Corps (USMC), Bell Helicopter has turned out new versions of its UH-1H Huey (now the UH-1Y Yankee), which fights alongside the AH-1Z Zulu Cobra. Most importantly, the designs have 85% compatibility in parts.
The latest versions of Bell Helicopter’s AH-1Z and UH-1Y have been redesigned to help the USMC reduce support costs while increasing capability. They have 85% commonality across maintenance-significant replaceable components. (Bell Helicopter)

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The US Army is divesting its older-model CH-47D Chinooks (pictured) in favour of an all-CH-47F fleet. (IHS/Gareth Jennings)

Platforms for the long term

The US Army has taken a long-term view on retaining its CH-47 Chinook with heavy-lift capabilities. Beginning operations during the Vietnam War, where it supported the legendary Bell UH-1H Huey at the start of the large-scale air assault concept, the Chinook will continue to support the army up to around 2060 under current planning. This means the helicopter will ultimately see close to a century of service. By that date the army's FVL (heavy) platform should be a reality, but the formation of that programme is still years away, with no rush expected due to the pressure of sequestration on S&T budgets.

The CH-47F, the sixth iteration of the Chinook, has been transformed from an analogue to a digital platform. Even as it rolls into service, Boeing has already announced a Block 2 upgrade that should begin development around 2017. The CH-47F is expected to stay in service with the army until the late 2030s, with Boeing executives already stating that they foresee at least one more version after that to take the design through to the 2060 finishing line.

The plans laid out in the published fiscal year (FY) 2015 budget by the Office of the Under Secretary of Defense (Comptroller) call for the procurement of 513 Chinooks through to 2022. Of these, 452 will be CH-47Fs and the remainder will be MH-47Gs (used by the 160th Special Operations Aviation Regiment). The acquisition comprises a mix of new-build and remanufactured airframes (the latter still has a new airframe, but uses reset components). Over 300 CH-47Fs have already been delivered, with 29 being completed in FY 2014, 32 scheduled for delivery in FY 2015, and a rise to 39 in FY 2016, although this figure comes from the recently announced expectation of the FY 2016 budget request.
The new monolithic airframe has given strength to the platform and cut out weaknesses usually associated with metal plates being joined together that results in water seepage and corrosion. It has a gross weight of 22,680 kg and can carry a 7,257 kg load over a 50-n mile combat radius.

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**Old but new**

Some forces requiring new aircraft but finding themselves without the necessary funding are instead upgrading their existing capabilities. The RAF has just been through this process, upgrading 24 of its Puma support helicopters to the Mk 2 standard. The out-of-service date for the Puma Mk 1 was December 2013; the new upgrade will mean that the two operational units, 33rd Squadron and 230th Squadron, based at RAF Benson in South Oxfordshire, will continue operating the type until 2022.

The RAF’s life-extension programme for 24 Puma Mk 2 helicopters was undertaken by Airbus Helicopters. The Puma now has new Turbomeca Makila 1A-1A1 free turbine engines, a digital glass cockpit (pictured), and other upgraded features that will extend its service life until the early 2020s. (Andrew Drwiega)

The modernisation was carried out by Airbus Helicopters in Braov, Romania. Performance was increased through the introduction of Makila 1A1 turboshaft engines, a digital glass cockpit, a digital automatic-flight-control system, and an improved and secure communications system.
Sometimes, however, upgrading a legacy platform can be very expensive and an ambitious option for the rewards gained. A case in point might be the proposed upgrade of Sikorsky S-61A-4 Nuri helicopters currently operated by the Royal Malaysian Air Force (RMAF), but destined for a role change when they are transferred to the army.

The Nuri is at the end of its service life and the accident rate has been a factor in the drive to replace it. Speaking at the Sea King Symposium in Halifax, Canada, on 18 September 2014, Major Roslimizal bin Kamarozaman, a test and evaluation officer for the RMAF, revealed that the average accumulated flying hour rate for the Nuri was 10,833 over 27 airframes (nearly half of which have been taken out of operations). These aircraft date from around 1967-78.

The RMAF initially intended to replace its Sikorsky S-61 Nuri helicopters with Airbus Helicopters EC725s, but with only 12 out of the originally forecast 28 EC725s on order, a life-extension programme for around 26 Nuris is being discussed. (Airbus Helicopter)

Malaysia had previously planned to remove its Nuri fleet from use by 2012. Mohamed Yazin Ahmad, director of the Malaysian Ministry of Defence's Mechanical and Aerospace Technology Division, told an audience at January's IQPC Military Helicopter conference that 89 personnel have been killed in 15 crashes involving the type since it was introduced. However, with the nation having ordered only 12 of a planned 28 Airbus Helicopters EC725s as replacements, "this has forced the service to prolong the life of its Sikorskys", he said.

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Optionally piloted vehicles

The prospect of turning support helicopters into optionally piloted vehicles (OPVs) is something that has caught the attention of military aviation specialists and industry has been quick to respond with developments and proving flights.

The theory is that adapting a support helicopter for unmanned flights allows for more flying hours and, therefore, better use of the platform. Support helicopter operations are limited only by the number of aircrew available. If those same helicopters can be used unmanned for a period of the day (or night) for simple or monotonous missions, then mission rates can be increased while aircrew get sufficient rest to conduct more intensive operations, where their capabilities can still be a game changer during an engagement. Additionally, aircrew are less exposed to any potential for hostile fire in less permissive theatres of operation.

The concept has already been proven with the Lockheed Martin/Kaman Aerospace K-MAX unmanned helicopter deployment to Afghanistan in support of the USMC. In July 2014, when the K-MAX had returned to the United States, Captain Patrick Smith, the US Navy’s Cargo Unmanned Aerial System (UAS) programme manager, said the unmanned experiment had "excelled beyond anything I thought possible". During the deployment from December 2011 to 30 May 2014 a single K-MAX UAS flew nearly 2,000 sorties, logging more than 2,150 flight hours, and transporting over 2.04 million kg of cargo.

One of the most advanced optionally piloted systems is Sikorsky’s current development focused on a UH-60 Optionally Piloted Black Hawk (OPBH) helicopter. Developed through Sikorsky Innovations using its Matrix autonomous technology and working with the US Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC), the OPBH can fly a completely autonomous cargo mission.
The first flight of Sikorsky’s OPBH demonstrator took place on 11 March 2014. The flight, carried out as part of the Manned/Unmanned Resupply Aerial Lifter programme, demonstrated autonomous hover and flight control through the use of a man-portable ground control station. (Sikorsky)

The demonstrator conducted its first flight at Sikorsky’s Development Flight Center in West Palm Beach, Florida, on 11 March 2014. During the flight the OPBH conducted autonomous hover and flight operations while under the control of a man-portable ground control station (GCS).
This demonstration was an important milestone in the Manned/Unmanned Resupply Aerial Lifter (MURAL) programme: a collaborative effort between the US Army Aviation Development Directorate, the US Army's Utility Helicopters Project Office (UHPO), and Sikorsky. For MURAL, the UHPO is providing access to two UH-60MU platforms to which Sikorsky is applying the optionally piloted technology it has been developing since 2007. In 2013 Sikorsky signed a co-operative research and development agreement with the army to advance MURAL to a formal effort and to demonstrate the flexibility and value of a full authority flight control system. The effort includes a demonstration of expeditionary GCSs and precision control.

Sikorsky's Matrix technology, a major component of the OPBH, was launched in July 2013 to significantly improve the capability, reliability, and safety of autonomous, optionally piloted, and piloted vertical take-off and landing aircraft by affording them a high level of system intelligence.

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OUTLOOK In the short term military support helicopters are likely to be reliant on life-extension programmes and upgrades to existing platforms. With government budgets still declining, there are scarce funds available for extensive research and development programmes for new types of helicopters. Commercial off the shelf is an approach that has been followed by the traditional helicopter OEMs, while they prove their capability to take such rotorcraft down the OPV route should the demand suddenly increase. With limited expeditionary campaigns now widely predicted among many forces, there is a growing focus on how life extensions/upgrades can reduce weight and increase speed, although adding more multi-mission capability will soon nullify the gains made.

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