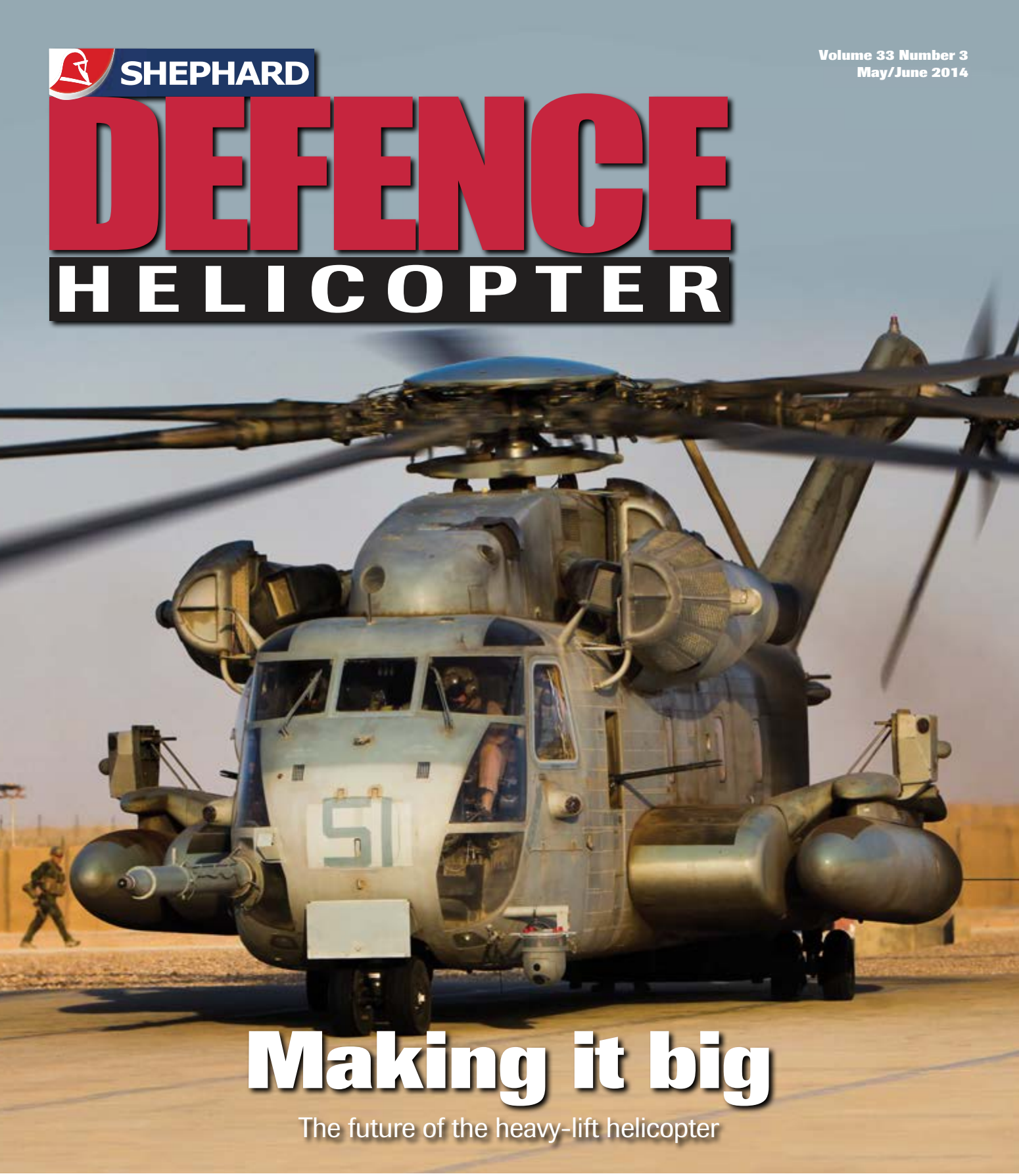
SHEPHARD

DEFENCE HELICOPTER

Volume 33 Number 3
May/June 2014



Making it big

The future of the heavy-lift helicopter

SEASONED PERFORMER
The Bell 214 in Iran

HAZARD PERCEPTION
Self-protection systems

ALL NIGHT LONG
Night vision technology

One mission, one team, one direction.

Airbus Military, Astrium and Cassidian join forces for the success of your critical missions.
www.airbusdefenceandspace.com

AIRBUS
DEFENCE & SPACE

DEFENCE HELICOPTER

Editor
Tony Skinner, *tony.s@shephardmedia.com*
Tel: +44 1753 727020

Staff Reporter
Jonathan Tringham, *jonathan.t@shephardmedia.com*

Business Reporter
Joyce de Thouars, *joyce.t@shephardmedia.com*

Contributors
Patrick Allen, Gordon Arthur, Pieter Bastiaans, Peter Donaldson, Jim Dorschner, Scott R Gourley, Neelam Mathews, Alexander Mladenov, David Oliver, David Saw, Richard Scott, Matthew Smith, Alan Warnes, Jim Winchester, Tom Withington

Production Department Manager
David Hurst, *david.h@shephardmedia.com*

Sub-editor
Adam Wakeling

Commercial Manager
Jane Smith, *jane.s@shephardmedia.com*
Tel: +44 1753 727004

Junior Sales Executive
Sara Sheperia, *sara.s@shephardmedia.com*
Tel: +44 1753 727003

Editor-in-Chief
Tony Skinner

Managing Director
Darren Lake

Chairman
Nick Prest

SUBSCRIPTIONS
CDS Global, Tower House, Lathkill Street, Sovereign Park, Market Harborough, Leics LE16 9EF, UK
Paid subscription contacts:
Tel: +44 1858 438879
Fax: +44 1858 461739
Email: *shephardgroup@subscription.co.uk*

Defence Helicopter (USPS 023-352) is published six times per year – in January/February, March/April, May/June, July/August, September/October and November/December– by The Shephard Press Ltd, 268 Bath Road, Slough, Berkshire, SL1 4DX, UK. Subscription rates start at £65. Subscription records are maintained at CDS Global, Tower House, Lathkill Street, Sovereign Park, Market Harborough, Leicestershire, LE16 9EF, UK. Air Business Ltd is acting as mailing agent.

DTP by Vivid Associates Ltd, Sutton, Surrey, UK

Printed by Williams Press, Maidenhead, UK

ISSN 1741-6043

SHEPHARD

The Shephard Press Ltd
268 Bath Road, Slough, Berks, SL1 4DX, UK
Tel: +44 1753 727001
Fax: +44 1753 727002

www.rotorhub.com

Front cover: The USMC aims to replace its CH-53Es with the new CH-53K from 2019 onwards. (Photo: Crown Copyright)

IN THE NEXT ISSUE
- European focus
- Blades
- Avionics
- Engines

Meeting your operational needs is our mission

IAI - for superior helicopter upgrades and maintenance

- Modular integrated upgrade packages tailored to day/night missions
- Optimized integration of advanced mission equipment and sensors
- Mission-driven displays and controls for enhanced air crew performance
- Comprehensive helicopter support

IAI

WHEN RESULTS MATTER

www.iai.co.il
lahav_marketing@iai.co.il

Tragedy strikes,
but UK capabilities have been proven

ON 26 APRIL, PEOPLE IN THE UK AWOKE to the sad news that a British Army AgustaWestland Lynx AH9A utility helicopter had crashed in southern Afghanistan, killing all five on board.

The rotorcraft came down in the Takht-e Pol district of Kandahar, with the crash site itself at a remote area known locally as Charghai Mountain.

The helicopter was part of the Army Air Corps' 657 Squadron based at RAF Odiham, which flies Lynx platforms for the Joint Special Forces Aviation Wing.

Despite Taliban claims of responsibility, and online speculation that the aircraft was on a special forces mission at the time, the UK MoD quickly issued a statement describing the crash as a 'tragic accident' while the helicopter was on a 'routine sortie'.

It is clearly pointless to speculate on the cause of the crash while the investigation is ongoing, but the likelihood of environmental factors, a technical fault or pilot error will all need to be examined.

TOUGH CONDITIONS

Afghanistan remains an extremely difficult setting to operate in – around 80% of all coalition helicopters lost to accidents have been the result of environmental factors rather than enemy action.

As well as the extremely fine sand – commonly described as being like talcum powder – finding its way into all areas of the helicopter and clogging up parts, the 'hot and high' conditions are constantly placing demands on the aircraft's performance.

Remarkably, this is the UK's first fatal loss of a helicopter in almost 13 years of operations in Afghanistan – a fact that is testament not only to the skill and dedication of crews but the prudence of upgrading the Lynx AH9A specifically to deal with Afghanistan's extremely challenging conditions.

While the MoD has been guilty of some shocking failures in supplying adequate equipment for the Afghan campaign in the past decade, it is hard to argue against the upgraded Lynx Mk 9A being a poster child for the UOR system.

To deal with Afghanistan's hot and high conditions, the helicopters were fitted with more powerful T800 engines, as well as updated instruments and digital displays, a modified gearbox and a strengthened rear fuselage to deal with the extra power.

The new systems were also designed for ease of maintenance, enabling faster servicing and turnaround between missions.

RAPID TURNAROUND

The first upgraded Lynx Mk 9A was delivered to Afghanistan in May 2010, only 18 months after the project was started, while the last of 22 to be upgraded was formally delivered in December 2011, three months ahead of the contracted date.

Despite the upgrades, the current Lynx fleet is due to be withdrawn from service in the coming years, to be replaced by the Wildcat AH1 for the army and the Wildcat HMA1 for the RN.

Over the past three years, Joint Helicopter Command has been carrying out the recommendations as outlined in the government's 2010 defence review.

One key component of this was to ensure that the country's helicopter capability remained up to date, with upgrades and the purchase of new aircraft.

This includes the retirement of the RAF/RN fleet of Sea Kings by March 2016 and the transfer of the RAF's AW101 Merlin HC3/HC3A fleet to the RN's Commando Helicopter Force, as well as the upgrade of the RAF Puma HC1 to HC2 standard.

This also involves upgrading Boeing Chinook HC4/5s, purchasing new HC6s, the introduction of the new AW159 Wildcat AH1/HM1, as well as converting naval Merlin HM1s to HM2s.

The overall aim of this plan was to deliver a 'properly scaled and balanced helicopter force to support [British] troops into the future'.

'It is hard to argue against the upgraded Lynx Mk 9A being a poster child for the UOR system.'

With the UK currently withdrawing its forces from the theatre, helicopter units will soon find themselves facing post-Afghanistan realities.

While a significant shadow lingers over the long-term strategic benefits of the UK's involvement in Afghanistan since 2001, from a purely military capability standpoint the country's helicopter force is nevertheless leaving the conflict a far more effective creature than that which entered it.

Whether the new 'properly scaled' helicopter capability will be correctly tailored for the next conflict of course remains to be seen.

Tony Skinner, Editor

USN gets ready for APKWS


Photo: USN

THE USN IS FURTHERING DEVELOPMENT of its new LAU-61G/A Digital Rocket Launcher (DRL), paving the way for full Advanced Precision Kill Weapon System (APKWS) deployment on its MH-60R/S helicopters.

DRL entered into what the navy describes as 'early operational capability' (EOC) in March and the service is working towards IOC in 2015.

While a variety of weapons can be launched from the DRL, the APKWS laser-guided rocket has been identified as a primary candidate for use on board the MH-60S, and potentially the MH-60R further down the line.

The navy is considering the weapon as a means of countering the threat of swarming fast inshore attack craft (FIAC). 'The [DRL] attaches to the aeroplane and allows us to launch APKWS. We EOC'ed that last month,' Capt James Glass, USN H-60 programme manager, explained during Sea-Air-Space 2014 in early April.

Cdr Alex Dutko, deputy programme manager for Direct and Time Sensitive Strike Weapons, added in a statement that DRL uses standard military interfaces, and incorporates an electronic assembly to control launch functions.

'The new launcher will enhance existing 2.75in rocket system capabilities on the MH-60S by allowing mixed rocket load-outs, permitting the conduct of on-command inventory, providing a tube-usage count feature, and performing a built-in system check test,' Dutko said.

The APKWS is currently used by the USMC on the AH-1W and UH-1Y. Manufacturer BAE Systems has just signed the third full-rate production contract for the weapon with the navy, and the facility to build more is there.

'We've just built our 3,000th APKWS and that will be shipped to the navy soon,' David Harrold, director of precision guidance solutions at BAE Systems Electronic Systems, told *Defence Helicopter* during the exhibition.

'We're doing a lot to leverage that production line and keep it going. The Digital Rocket Launcher would serve as an enabler to put APKWS on another platform. Putting it in MH-60s to engage these fast attack craft enables another level of targeting… We're ready to ramp up production.'

Some 1,300 APKWS are currently being produced per year, but Harrold said that this could be ramped up to 7,000 annually without any changes to the production line, should the requirement from the navy increase or FMS sales be agreed.

BAE Systems also recently completed airworthiness testing with the US Army for potential APKWS integration on its Apache fleet, although the service has not committed to purchasing the weapon yet.

By Beth Stevenson, National Harbor

Aerotec targets Moroccan Gazelle upgrade

FRENCH COMPANY AEROTEC GROUP unveiled an upgraded SA 341F Gazelle with a new suite of modern weapons at the 2014 Marrakech Airshow.

With the Royal Moroccan Air Force (RMAF) operating around 20 Gazelles, the Valence-based business, which specialises in upgrading the type, was keen to promote its capabilities during the event, which took place in late April.

Its latest Gazelle upgrade, which has been developed under the Naja programme, catapults the firepower capabilities of the 40-year-old veteran into a new era.

The helicopter was shown fitted with a pod housing two Raytheon Griffin laser-guided missiles on the port weapons pylon, while an FN Herstal .50cal gun was on display alongside.

Another option, shown on the starboard side, is the TDA 68mm laser-guided rocket. A 16-round launcher is already used on the Eurocopter Tiger, but Aerotec is working with TDA to integrate an eight-round pod on a


Photo: author

Gazelle. A pod accommodating seven Raytheon Talon 70mm rockets was also shown. All can interface with the Star Safire 260-HLD FLIR.

'Basically we can customise your Gazelle to fit the customer's requirements. This can include anti-missile protection and a live video data link as well as a glass cockpit,' a company spokesman told *Defence Helicopter*. 'With the French Army looking to operate the Gazelle until 2035, the operators all know that they will get spares support for a long time yet.'

In recent years, Aerotec has worked on upgrading Gazelles for Cyprus, Iraq, Mali and Tunisia, and now has the RMAF's needs firmly in is sights. Having already fitted a handful of RMAF Gazelles with NVG-compatible lighting, the company looks well placed.

By Alan Warnes, Marrakech

France, UK finally commit to FASGW(H) missile production

SOME FIVE YEARS AFTER SIGNING A statement of intent to jointly pursue a next-generation helicopter-launched surface attack missile, the UK and France have finally committed to production of the weapon.

MBDA has now been awarded a £500 million ($830.9 million) development and manufacture (D&M) contract under the Future Anti-Surface Guided Weapon – Heavy/Anti-Navire Léger (FASGW(H)/ANL) programme.

Seen as a test case for bilateral cooperation in defence procurement, the contract – signed on 26 March by the UK MoD on behalf of both governments – marks the first firm collaborative missile venture to result from the 2010 Anglo-French Lancaster House treaties. It is also the first formal production manifestation of the UK's Complex Weapons programme.

FASGW(H)/ANL will to equip the UK RN's AW159 Wildcat helicopter – and, potentially, the French Navy's NH90 NFH – replacing the RN's Sea Skua missile system when it reaches its end of life in 2016 and succeeding the AS.15TT system in French service.

The programme will be managed as part of MBDA's Team Complex Weapons portfolio, and overseen by the MoD's DE&S organisation and France's DGA through a joint project office in Abbey Wood, UK. The British contribution to the D&M contract will be £280 million.

Speaking at MBDA's annual results briefing in London on 19 March, UK managing director Steve Wadey noted that the FASGW(H)/ANL programme will kick-start newly developed missile centres of excellence in both countries.

'The data link will be based around a UK centre of excellence; the actuator will be based around a UK centre of excellence; the weapon controller will be based around a French centre of excellence; and the test equipment will be based around a French centre of excellence. There is a complete breakdown of all the technologies and the subsystems, not only internally, but within the broader supply chain, which is in the UK, France and in wider Europe,' he said.

Defence Helicopter understands the D&M contract provides for a specified quantity of missiles for both services.

'There are a series of different missile types provided for within the contract, from telemetric missiles which are necessary for evaluation trials, training missiles for air carriage and for ground crews to practice with, explosive ordnance demonstration missiles for post-detonation forensics, and operational missiles with integrated warheads,' a defence source said.

However, the exact quantities remain undisclosed, with the source noting that there is likely to be flexibility within the contract for both customers to commit to more missiles and exercise timing options.

The UK MoD declined to provide details of the numbers/variants of FASGW(H) for the RN, stating that the information was classified 'for operational reasons'. This is despite the fact that the planned in-service date (ISD) for FASGW(H) with the navy has moved from the '2015 time frame' to late 2020, according to the MoD.

LIGHTER SIDE

The ministry is now also expected to sign off the anticipated D&M contract for the Thales-developed FASGW – Light missile, along with an integration contract with AgustaWestland to synergise missile trials and mitigate risk and cost, to harmonise with the planned entry into service of Wildcat in 2015.

However, delays on the part of the French government have, in part, impacted the ISD for both weapons – covered by a single business case in the UK MoD – leaving the RN's anti-surface capability potentially exposed.

In response to a request on the status of the two contracts, the UK MoD said 'commercial negotiations are still ongoing and we cannot comment further at this stage on either FASGW(L) or the integration deal'. Defence sources close to the programmes told *DH* that both contracts will likely be signed 'in the early stages of the next quarter'.

By Robin Hughes, London

NEWS ON THE WEB

NORTHROP GRUMMAN TO SUPPLY FLIGHTPRO GEN III FOR H-1 PROGRAMME
28 April 2014

OPTIONALLY PILOTED BLACK HAWK TAKES OFF
23 April 2014

UH-60M SALE TO MEXICO APPROVED BY US STATE DEPARTMENT
22 April 2014

RUSSIA TO DESIGN NEW IFF SYSTEM
16 April 2014

NEW ZEALAND'S FIRST SH-2G(I) TAKES FLIGHT
16 April 2014

SELEX TO SUPPORT MALAYSIAN SUPER LYNX SENSORS
16 April 2014

SIKORSKY BEGINS CH-53K STRUCTURAL INTEGRITY TESTING
14 April 2014

MALTA OPTS FOR SECOND AW139 HELICOPTER
11 April 2014

DOUBTS LINGER OVER USN MH-60 ORDER
10 April 2014

OEMS ANTICIPATE MALAYSIAN ATTACK HELICOPTER RFP
10 April 2014

All these stories can be found at
www.rotorhub.com

Bell Helicopter and Deftech seek Malaysian joint venture

BELL HELICOPTER HAS ANNOUNCED ITS intention to form a strategic alliance with Malaysian defence manufacturer Deftech to seek out industrial joint venture (JV) opportunities in the region.

The companies held a formal signing ceremony of 'a letter of an expression of intent' at the Defence Services Asia (DSA) exhibition in Kuala Lumpur on 16 April.

Speaking to *Defence Helicopter,* Vern Bennett, VP of international military business development at Bell, said the companies wanted to look at the possibility of mutually beneficial projects for industrial collaboration in Malaysia.

Despite the somewhat noncommittal nature of the agreement, Bennett emphasised that Bell was serious about exploring JVs in the region, and that both companies just needed to sit down and work out how best to proceed.

He said: 'We are really at the point where we are trying to figure out if what they want to do in aerospace fits with what we need to be doing in the region – for example, is it supply chain, is it maintenance and repair, is it training, is it helicopter or fixed-wing? We don't know. So we're going to sit down at the table and figure out what each company would like to happen, and see where the fit is.'

Bennett noted that Bell was growing its footprint in Malaysia and, like many companies at DSA, said it was optimistic about the future growth of the market.

'We are looking for partners to work with from an industrial standpoint, as well as support and training,' he continued. 'Deftech is a successful company here, and with this agreement [they are] hoping to further their aerospace capabilities, with Bell advancing our strategic needs in the region.'

The focus of the agreement calls for cooperation to satisfy potential offset obligations of Bell Helicopter, as well as exploration of collaboration opportunities between Deftech owner DRB-Hicom and the global supply chain for Textron, the parent company of Bell.

Bell also used DSA to promote sales of its V-22, AH-1Z and UH-1Y rotorcraft in the region, hoping to capitalise on potential opportunities that may come up as Malaysia considers its options to develop new shore- and ship-based operations.

'In terms of the AH-1Z and UH-1Y, there are a number of countries in this region that are interested in expanding their rapid response, maritime, amphibious and expeditionary operations capability,' said Bob Carrese, director of international military business development. 'They look around and they see the USMC doing that, so there's a trend to start engaging with the marine corps as opposed to the traditional army-to-army, navy-to-navy relationships.

'We're also seeing a lot of regional interest in the V-22 obviously because of what's going on with typhoon relief. The USMC and the V-22 played a huge role in supporting that. The vast area that needs to be covered makes the V-22 the perfect solution for disaster relief and SAR.'

By Jonathan Tringham, Kuala Lumpur

Sikorsky reports sales and profit growth

Photo: Sikorsky

INCREASED INTERNATIONAL AND commercial sales have led to overall growth for Sikorsky. The announcement followed declining revenues for the division in previous quarters which had negatively impacted parent company United Technologies.

Although Sikorsky is affected by cuts in US military spending, it reported a 9% year-on-year growth in sales to $1.4 billion, with 36 military and 12 commercial aircraft deliveries in the first quarter of 2014.

This period also saw the company announce the entry into service of the S-76D helicopter and the signing of a long-delayed contract with Turkey for 109 T-70s.

'On the US government side, prospects for the Combat Rescue Helicopter and V-XX Presidential Helicopter programme remain positive,' said Greg Hayes, senior VP and CFO of United Technologies, in a conference call on 22 April. 'The firm decision is expected around the middle of this year.'

Meanwhile, Sikorsky continues to make progress on the troubled CH-148 Cyclone maritime helicopter programme, for which it recently executed a second set of principles of agreement, defining a final configuration for the aircraft as well as the phase delivery schedule with the Canadian government. 'We expect that the final cost of the aircraft will be significantly higher than previously estimated as a result of additional requirements, retrofit costs and expansion of the programme schedule,' added Hayes.

'We continue to negotiate the financial impact of these programme changes with the Canadian government, but would expect to record a charge this year associated with the acquisition contract upon the completion of definitive agreements.'

For the full year, Sikorsky expects a 'flattish operating profit and high single-digit organic sales growth'.

Total sales at United Technologies were higher than expected, recording growth of 2% to $14.98 billion with adjusted segment operating profit rising 4%.

Hayes said that he expected that the CH-148 charge will be covered by other gains, leaving the 2014 guidance unchanged.

By Joyce de Thouars, London

Designed to **Defend**

www.rubbmilitary.com

2014
EUROSATORY
16 - 20 JUNE 2014 / PARIS

Rubb Buildings Ltd
UK Pavilion Hall 5A
Lane J Stand 512

Strong Durable Rapid Erect Aircraft Hangars

Rubb's Expeditionary Forces Aircraft Shelter System is uniquely suitable for the military services, designed to be rapidly deployed and erected anywhere in the world. With unmatched relocatable buildings in action across the globe, Rubb has the ideal solution to military requirements.

- Relocatable
- Extendable
- Transportable
- Rapid construction
- 11m - 25m spans
- Multiple door options
- Integral crane
- Quality materials
- Client support

RUBB
Military Buildings

Email: info@rubb.co.uk | Tel: +44 191 482 2211

Seasoned performer

Developed in the 1970s to meet a local requirement for a more powerful version of the Model 205, the Bell 214 has served Iran's military for nearly 40 years. **Babak Taghvaee** follows the type's operational history through revolution, war and economic sanctions.

Any observer of Iran's army aviation units is familiar with the Bell 214. A powerful utility helicopter with unique flight characteristics, the 214 was specifically designed for Iran's climate, with the ability to fly in the mountainous areas in the west and north of the country.

Imperial Iranian Army Aviation (IIAA), together with the Imperial Iranian Air Force (IIAF), received a large number of the type in the 1970s, and went on to become the biggest operator of the 214 in the world.

In the early 1970s, the IIAA set out a requirement for 14 assault helicopter squadrons to support the Iranian Army's infantry and armoured divisions in the event of any future conflict with Iraq.

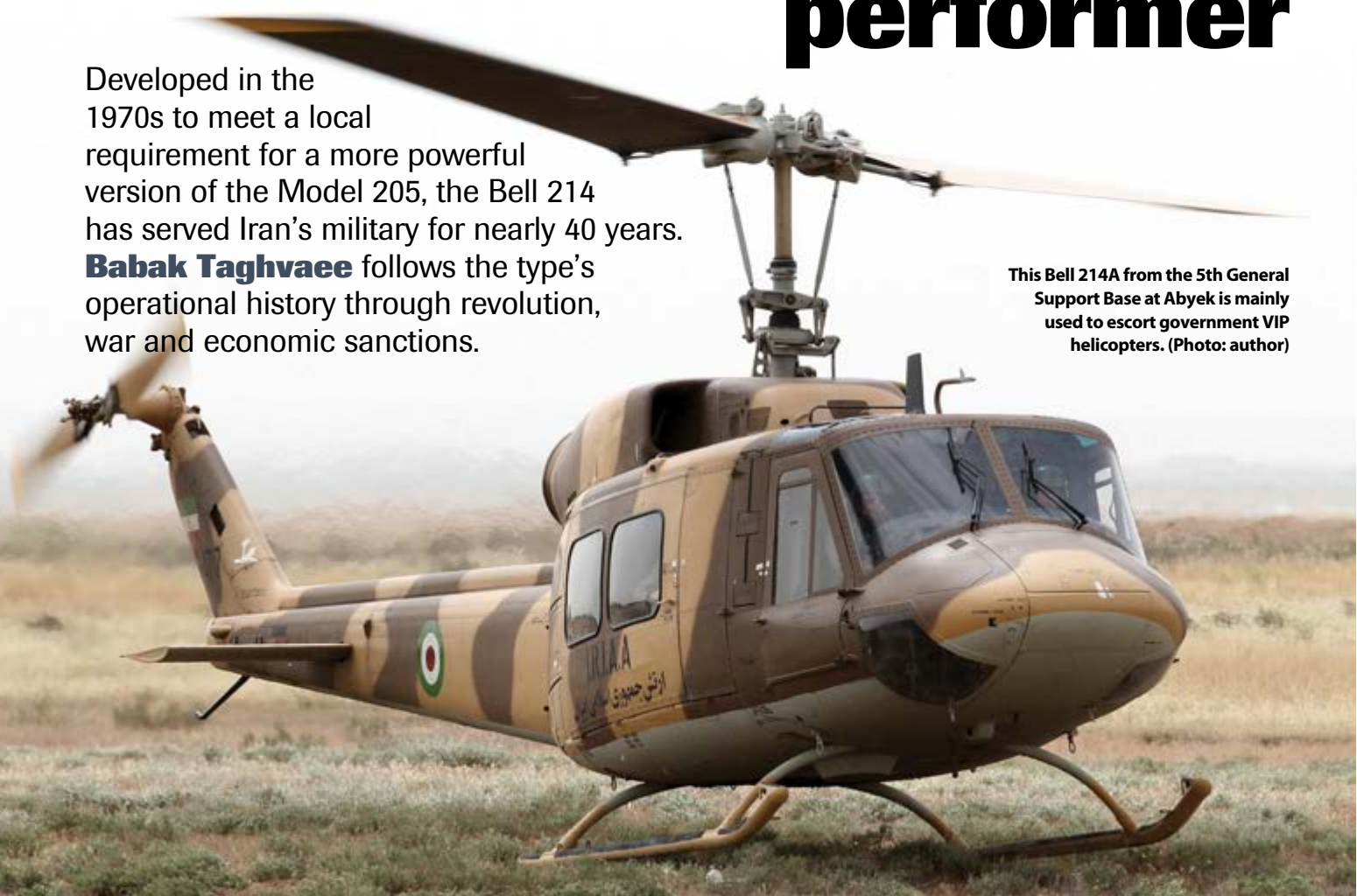
The government had ordered 25 Agusta-built AB 205A-1s (equivalent to the UH-1D) for the IIAA in 1968, which were delivered the following year. However, after some months in service, IIAA pilots remained unsatisfied with the 205's underpowered Lycoming T53-L-13 engine and the type's inability to handle Iran's climate.

HOT AND HIGH

For this reason, in 1970 Bell Helicopter initiated a research project to improve the flight performance of the Model 205 through installation of a more powerful engine. The first stage of this effort saw the installation of a T53-L-702 with 1,900shp (an increase on the T53-L-13's 1,400shp). This new member of the Huey family was named the Model 214 the same year.

Nicknamed 'Huey Plus', the first prototype made its maiden flight in October 1970 from Arlington, Virginia.

After demonstrations to government officials and IIAA commanders in Iran in 1972, a $316 million contract was signed for 287 Model 214As between Bell Helicopter and local agent Air Taxi Co.



This Bell 214A from the 5th General Support Base at Abyek is mainly used to escort government VIP helicopters. (Photo: author)

The first production 214A was officially handed over to the IIAA in Tehran on 26 April 1975. Three days later, this aircraft, piloted by IIAA commander-in-chief Brig Gen Manuchehr Khosrodad and Bell test pilot Clem Bailey, broke five FAI Class E-1e world records, including maximum service ceiling and maximum rate of climb, over Ahwaz airport in temperatures between 35 and 38°C.

The final aircraft from this first order was delivered in December 1975, while six more attrition replacements were received in 1978. Some 40 examples of a dedicated SAR variant with an external hoist and greater fuel capacity, the Model 214C, were also ordered for the IIAF and all had been delivered by 1978.

Before the 1979 Islamic revolution – and the end of US-Iranian military cooperation – a civil Bell 214B Big Lifter was acquired by the IIAF to operate governmental flights, and two others were acquired for the Iranian Department of Energy.

A rare photo of a 1st CSB Bell 214A during a mission in Kurdistan in the summer of 1980. The helicopter still carries pre-revolutionary IIAA (Imperial Iranian Army Aviation) titles and insignia. (Photo: author's archive)

INTO BATTLE

After the revolution, the new regime cancelled most military contracts held with the US and started purges at all of levels of the armed forces. However, the value of aviation assets was soon realised, with the army's fleet of 850 helicopters and fixed-wing aircraft called into service after the invasion of the country by Iraq in September 1980.

During eight years of war, the Islamic Republic of Iran Army Aviation's (IRIAA) Bell 214As had two main roles – CSAR/recovery of AH-1J crews and assault missions in support of infantry divisions. The 214A participated in hundreds of missions during the war, and its pilots were always satisfied with its performance, especially in mountainous regions.

As well as having the ability to carry 2,700kg of external cargo or 16 passengers in the cabin, the helicopter was far easier to maintain than the AB 205s and many other types.

By the time of the ceasefire in August 1988, around 100 Model 214As had been lost, and several more were withdrawn from service after suffering battle damage. Iran Aircraft Manufacturing Industries (IAMI) manufactured around 40 new tail booms for damaged AB 205s, AH-1Js and Bell 214As, and at least 14 of the latter were repaired and re-delivered to the IRIAA between 1989 and 1991.

In 1991, the Iran Helicopter Support and Renewal Co (IHSRC) gathered together battle-damaged Bell 214s and started a further repair programme. At least 12 examples with minor structural or major skin damage were returned to flying condition and handed back to the army. Throughout the 1990s, several other projects for the restoration of battle-damaged machines at the 1st, 2nd and 4th Combat Support Bases (CSBs) were carried out.

By 2001, the IRIAA had around 160 Model 214As in service, although only 85 were operationally ready at any one time. Due to non-standard maintenance practices over the previous 22 years, a lack of spare parts and structural fatigue issues, even the operationally ready aircraft were not fully mission-capable.

LIMITED AVAILABILITY

In the early 2000s, due to the overall poor state of the fleet, the IRIAA's deputy chief of operations notified seven squadrons (five assault, one utility and one training) equipped with the type to avoid carrying more than eight passengers or 1,360kg of cargo on board the aircraft.

'By the time of the ceasefire in August 1988, around 100 Model 214As had been lost.'

In addition, every operationally ready IRIAA Bell 214A was only able to fly for a maximum of 50 hours before inspection was required of its engine's turbine section.

The engines were sent to Iran Aircraft Industries (IACI) for periodic inspection and maintenance, but both IACI and IHSRC reportedly failed to meet their work obligations. The main problem with these companies was the inadequate level of support provided, both in terms of spare parts and maintenance of the fleet.

Every two years, the number of operational Bell 214As would usually drop by half from the summer until March the following year, due to awaiting re-delivery of overhauled airframes and engines by IHSRC and IACI. Most engines also suffered from major internal leaks.

Under Project Ghodrat ('Power'), running from 2001 to 2005, IACI refurbished dozens of IRIAA helicopter engines with the help of army engineers.

The IRIAA carried out an annual exercise at the Darengun gunnery range in Shiraz, which included the participation of several Bell 214As from the 4th CSB and the Vatan Pour training centre.

In the early 2000s, the 214A fleet received several minor avionics upgrades, including a

A close-up of Bell 214C 4-9422 from the SAR flight of the IRIAF's 1st TFB at Isfahan. This machine no longer has its rescue hoist installed under the fuselage. (Photo: author)

GPS receiver on the instrument panel, which were then replaced with new units in 2007. All U/VHF radios were replaced with Motorola models built under licence by Iran Electronics Industries (IEI).

IEI also launched a project to mount a Sagem FLIR turret under the port fuselage of two Bell 214As, but this development stalled due to a lack of funds and US economic sanctions.

RECYCLING CENTRE

Since 1998, IHSRC has rebuilt eight Bell 214As and Cs from the fuselages of crashed or damaged aircraft.

The first such rebuild involved a former IRIAA 214A with the serial number 6-4817, which formerly belonged to the 4th CSB and suffered major structural damage after a hard landing in the Faw peninsula during the Iran-Iraq War.

The helicopter was transported by road to the capital, where IHSRC initially refused to rebuild it – it was then put in the Tehran Aerospace Exhibition Centre at Mehrabad airport and cannibalised for spares.

However, in the early 1990s IHSRC took back the helicopter and a comprehensive repair project was started. After three years, the aircraft was totally rebuilt and ready to deliver to a new operator. As no prospective customer emerged, the helicopter was leased out on cargo work for civil and private users.

Undeterred, in the early 2000s IHSRC rebuilt several other 214As, 214Cs and one 214B. One aircraft was regularly used as an air ambulance and wet-leased to Tehran's emergency medical service agency.

Iranian Army 214s today

CURRENTLY, THE IRIAA STILL OPERATES 151 BELL 214AS, with 60% of them operationally ready at any one time. They are in service with six assault squadrons, one utility squadron and one training squadron.

The 1st CSB at Kermanshah has one assault squadron with 22 Bell 214As. Their primary role is in support of Iranian infantry forces protecting the western borders with Turkey and Iraq, with a secondary medevac tasking.

The 2nd CSB at Kerman has one assault squadron with 35 Bell 214As with the primary role of supporting ground forces on counter-narcotics missions, and also has a secondary medevac tasking.

In addition, there are usually five forward-deployed Bell 214As from the squadron at Zahedan airport for use on anti-terrorist missions against al-Qaeda-linked groups and Taliban drug smugglers in Sistan and Baluchestan Province.

The 3rd CSB at Masjed Soleyman has one assault squadron with ten Bell 214As to support the 92nd Armoured Division at Ahwaz, while the 4th CSB at Isfahan – the IRIAA's largest air base – has two assault squadrons with a total of 50 Bell 214As plus several attack, observation and transport squadrons. The 214As based here are used on assault missions, for medevac and also as civil air ambulances in cooperation with Iran's Red Crescent Society.

The 5th General Support Base at Abyek near Qazvin, which was formerly located at Ghale Morghi, has 18 Bell 214As in a single utility squadron. They are primarily used to escort government VIP flights, with the secondary role of supporting the Qazvin-based 16th Armoured Division.

The 6th CSB operates from Hashemi Nejad International Airport in Mashhad, and was formed in the late 1990s to protect Iran's border with Afghanistan. Its primary role is to support the Iranian Border Guard, anti-narcotics police and the 77th Infantry Division of the Iranian Army. This air base has a single assault squadron with eight Bell 214As.

The 1st CSB usually detaches two Bell 214As to Tabriz city for use in the SAR role to support the IRIAF's 2nd TFB. Vatan Pour Training Base has a total 18 Bell 214As on its inventory, although only ten are usually operationally ready.

In 2003 and 2005, two Bell 214As were sold to the Iran Revolutionary Guard Corps (IRGC), while another was sold to the Iran Aerospace Organisation a year later. IHSRC also wet-leased a rebuilt Bell 214A to Tehran's fire department for a three-month period in 2006.

In addition, thanks to close cooperation between IHSRC and Islamic Republic of Iran Police Aviation (IRIPA), and the force's large budget, four remaining rebuilt 214s were acquired by this operator in 2006. All were based at IRIPA's main base at Ghale Morghi in Tehran, with one usually kept ready for EMS missions 24 hours a day.

After a law was passed in 2008 prohibiting single-engine helicopter flights, IRIPA bought six rebuilt or refurbished Bell 212s from IHSRC. All four Model 214As were then sent to the northwest of the country and used for traffic and border control missions. One aircraft crashed immediately after redeployment, and in 2013 the remaining three examples were sold back to IHSRC.

During the past 25 years, the IRIAA has lost 28 Bell 214As, half of them due to mechanical failure. Three were shot down by PKK militia with SA-7 missiles in 2006 and 2007.

The most recent crash occurred on 14 November 2012, when a Bell 214A of 6th CSB carrying five people injured in a car accident collided with a power line in low-visibility conditions. All five patients, together with the two pilots, the flight engineer, the crew chief and a doctor, were killed.

IHSRC and army pilots have frequently asked for the installation of cable cutters on the 214, but the IRIAA operations division refuses to grant this request. Due to a lack of cable cutters, the IRIAA has lost ten helicopters in collisions with power lines in the past 20 years.

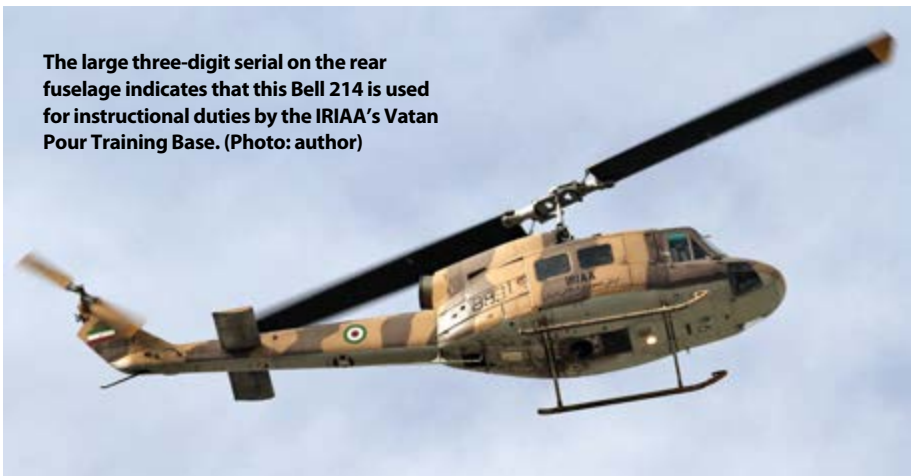
RESCUE FLYERS

The IRIAF is Iran's second-largest operator of the Bell 214, with a fleet of 20 C-models from the original batch of 40 aircraft – ten are usually operational at any one time, and are in service with SAR units at the 1st Tactical Fighter Base (TFB) at Mehrabad and 7th TFB at Shiraz.

The remaining aircraft are usually under unit- or depot-level maintenance at their bases or with IHSRC in Tehran. However, the IRIAF operates the type extensively on daily training flights and its Bell 214 pilots have more readiness and experience than their army counterparts.

As with the IRIAA's Bell 214s, the IRIAF fleet has received no significant upgrades in recent

This former IRIAA Model 214A suffered major battle damage in the 1980s but had been completely rebuilt by IHSRC when this photo was taken in 2003. (Photo: author's archive)



The large three-digit serial on the rear fuselage indicates that this Bell 214 is used for instructional duties by the IRIAA's Vatan Pour Training Base. (Photo: author)

years, with the only change being installation of new Motorola U/VHF radios. Due to the less active operational history of the remaining Bell 214Cs, they do not have the same mission and manoeuvrability restrictions as imposed on the IRIAA's aircraft.

Over the past 20 years, the IRIAF has only suffered accidents to four 214Cs – all due to engine or structure failure. One aircraft only received minor damage and was rebuilt by IHSRC in the early 2000s, but the others were written off.

The most recent accident occurred on the morning of 16 August 2009. Bell 214C 4-9435 and its crew from the 1st TFB's SAR group were tasked to fly a training sortie over Mehrshahr near Tehran. Some 30 minutes after take-off, a catastrophic failure occurred when the main rotor separated from the helicopter and it crashed into the ground.

Flight instructor Maj Yussef Ahun-bar, trainee 1st Lt Ahmad Ra'afat-Nia and crew chief Lt Zareiee were killed in the incident. The IRIAF's head of observation and safety subsequently grounded the Bell 214C fleet.

After four months of investigation, the cause was identified as fatigue followed by a fracture in the main rotor hub. IHSRC engineers then inspected all Bell 214Cs in Tehran and Shiraz for cracks in the main rotor and gearbox assemblies. The fleet was finally cleared to fly again in January 2011.

IMPROVEMENT EFFORTS

IAMI has worked extensively on several upgrade and modernisation projects for the Bell 214, including development and manufacture of a composite main rotor. One rebuilt 214A was delivered to IAMI in 2003 and the first composite blades were tested at Shahin Shahr airport the following year. However, the project was suspended due to a lack of support from the IRIAA.

Later, in 2010, one of IRIPA's Bell 214s was sold back to IHSRC and transferred to IAMI for further composite blades development work.

The same year, the IRIAA received its first batch of six upgraded and modernised Bell AH-1J attack helicopters from IAMI. They received new instrument panels consisting of several multi-function displays, a mission computer, new radios, a GPS-integrated moving map and a new digital targeting system for BGM-71A TOW missiles as well as several other changes.

Thereafter, IRIAA interest in the modernisation of its other helicopters increased. As a first step, two Bell 214As were delivered to IAMI in 2011 for a major upgrade of which no details are known. ***DH***

Bell Helicopter vs the Islamic Republic of Iran

IN NOVEMBER 2013, THE US COURT OF APPEALS dismissed efforts by Bell Helicopter to revive a failed lawsuit against Iran, which it attempted to sue for selling 'counterfeit' Model 206s.

The court upheld a prior ruling, absolving Iran of any financial culpability for the manufacture and marketing of a helicopter that resembled Bell's JetRanger.

In her findings, Judge Judith W Rogers said Bell fell short of adequately demonstrating any negative impact on its business caused by Iran's allegedly copied helicopter design, the Shahed 278.

As a result, Bell could not 'exploit the commercial activity exemption' in the Foreign Sovereign Immunity Act (FSIA), because of a lack of evidence that Iran's commercial activity had caused a direct effect in the US.

According to the judge, Bell did not offer any evidence that Iran had actually sold or advertised the Shahed in the US, instead focusing on the physical similarity between the aircraft and the JetRanger, and the potential financial and reputational loss it may have incurred.

The legal saga began in 2006 when Bell filed a complaint under the FSIA in the US District Court of Columbia, seeking an injunction and damages against Iran for the infringement of its Model 206 design.

Bell had discovered that one of its manufacturing plants, abandoned after the Iranian revolution in 1979, was being used by IAMI to build replicas of the 206 Jet Ranger – the Shahad 278 and the military Shahad 285.

Bell declined to comment at the time of the verdict.

By Jonathan Tringham

BAE Systems' CIRCM offering leverages field-proven technology. (Photo: BAE Systems)

Hazard perception

A key consideration in recent theatres of operation, keeping helicopters and their crews safe from enemy fire is becoming an increasingly refined and mature area of technology, finds **Peter Donaldson**.

All weapons that can threaten helicopters present some kind of signature such as a radar signal, a flash of UV or IR light, a muzzle report or a shockwave, along with some kind of tracking or guidance loop that self-protection systems can exploit and disrupt – an art that has been greatly refined over the past decade.

In recent years it is directional IR countermeasures (DIRCM) and hostile fire indication (HFI) technologies that have been most urgently needed.

With the release of its draft RfP for the Common Infrared Countermeasures (CIRCM) system on 6 February, the US Army has taken another step along the road towards providing its helicopters with a new generation of laser-based DIRCM systems to defeat IR-guided missiles.

BAE Systems and Northrop Grumman are competing for the engineering and manufacturing development (EMD) stage of the programme.

Previous efforts have stumbled over weight and reliability issues, so the service is offering incentives for 'A-kits' that weigh less than 35lb (16kg) and show a mean time between failures of longer than 700 hours at an 80% confidence level, while meeting the stated performance requirements. CIRCM is intended to replace the current Advanced Threat Infrared Countermeasures (ATIRCM) equipment in this role on many of the army's rotorcraft.

Seeking better coordination between the services in the development of aircraft survivability equipment, more competition between industry offerings and greater reliability, the US Army restructured the ATIRCM/Common Missile Warning System (CMWS) programme in 2009 and awarded contracts to provide CIRCM prototypes for testing.

These, however, proved unready for system development, leading the army to initiate a new technology development (TD) phase that began with the award of fresh contracts to BAE Systems and Northrop Grumman in January 2012.

DECISION AWAITED

By June 2013, BAE Systems had completed initial deliveries of its CIRCM systems to support contractor-led testing – ahead of schedule – successfully concluding a preliminary design review (PDR) in August.

The TD phase is now complete, Bill Staib, director of threat management solutions at BAE Systems, told *Defence Helicopter*.

'It completed just this past month on March 14th, the end of our period of performance, and we received a draft RfP for the EMD phase. The draft came out on the 6th [of February] and we had about three weeks to provide comments and questions. The final RfP is expected in the June time frame,' he said.

'We have a very low-risk offering, because we are leveraging designs that we have already fielded,' Staib added – a reference to the AN/ALQ-212 ATIRCM, which is credited with saving several aircraft from IR missile attacks, and which the army continues to buy, having most recently awarded the company a $68 million contract in late 2012.

Also working under a January 2012 TD contract, Northrop Grumman and partner Selex ES carried out acceptance testing of their first suite of equipment and delivered a complete hardware set – also ahead of schedule – in January 2013.

The company completed its PDR on 25 July and safety of flight testing on its prototype hardware, which includes a quantum cascade laser (QCL) from Californian company Daylight Solutions, in September.

Final selection of one contractor for the EMD phase is expected in January 2015.

COMPETITOR ANALYSIS

Elsewhere, Elbit Systems Elop's Mini-MUSIC, launched in June 2013, uses the same fibre laser as the company's larger MUSIC (Multi Spectral Infrared Countermeasure) system plus a thermal camera for target acquisition and tracking. The system is packaged in a single line-replaceable unit measuring 271mm wide by 316mm long by 449mm high that weighs 19kg and consumes less than 1kW, according to Elbit's

The ISSYS POD system for helicopters packages Saab's Compact Integrated DAS into a pair of RUAG-developed pod enclosures. (Photo: RUAG)

figures. The system also features a hyper-hemispherical dome – technically one with a boundary curve of greater than 180° to maximise its field of view. Mini-MUSIC is optimised to protect small/medium helicopters and fixed-wing aircraft.

Also new, the Miysis DIRCM from Selex ES is designed to protect platforms ranging from small helicopters, light aircraft and UAVs right up to the largest transport aircraft. This, says the company, requires advanced laser technology, 'superior' threat tracking accuracy and 'ultra-efficient' direct laser coupling instead of fibre-optic links. A sealed 5½in (140mm) dome contains all the moving parts of a system intended to add less than 50kg to the aircraft and draw less than 500W while providing spherical coverage. Miysis is also designed with a sufficient speed of response to meet the most difficult attacks to defend against, when SAMs are fired from very close range.

Tony Innes, head of DIRCM campaigns at Selex ES, said that Miysis uses a multi-Watt, multi-band fibre laser instead of the QCL that partner Northrop Grumman is using in its CIRCM offering.

Several key areas of comparison between QCL and fibre lasers are classified, he told *DH*, adding that, in general, high-powered QCL devices are only available from US suppliers, limiting their exportability.

'However, while the Miysis laser is of a fibre-pumped/OPO [optical parametric oscillator] configuration, our DIRCM equipment has been

successfully integrated with both fibre and [QCL] technologies.'

Asked to compare Miysis against Elbit's Mini-MUSIC, Innes said that the published weight of 19kg for the Israeli product excludes the missile approach warners and the system controller.

'As a direct comparison, the weight of a single Miysis DIRCM integrated laser pointer/tracker, the equivalent element to that of Mini-MUSIC, weighs less than 16kg. Furthermore, Miysis is smaller and uses considerably less power.'

LISTENING OUT

Timely warning is the key to avoiding fire from unguided weapons, and to achieve this developers of both EO and acoustic systems now appear able to overcome the challenges of adapting them to the helicopter environment, a view reinforced by recent announcements of sales to the US military.

On 14 January, BAE Systems revealed that the US Army is buying more than 300 third-generation CMWS units worth around $39 million. The order coincides with the army's fielding of this Gen 3 variant on the Apaches, Black Hawks and Kiowa Warriors still in service in Afghanistan.

The manufacturer says that the order is the first under a contract potentially worth $496 million for up to 1,300 units, and that more than 1,000 aircraft will be fitted with them over the next two years.

The Gen 3 CMWS includes an HFI function that detects ballistic threats and provides the pilot with manoeuvre advice, along with data recording for post-mission analysis.

Retaining the UV sensors of the previously fielded CMWS, the Gen 3 iteration features additional software for HFI and a more powerful processor to enable that functionality, Staib told *DH*.

Using a mix of company and army funds, BAE Systems is also working on a next-generation UV sensor. 'It gives us a significant improvement in sensitivity and dynamic range, enabling improved missile warning and HFI performance', he said.

While Staib would not be drawn on precisely what the sensors look like and measure, he did point to an interesting possibility: 'Although it is not currently a requirement, the enhancements in the sensor technology make geo-location of the threat a potential upgrade.'

Additionally, the company is working on its own acoustic sensor technology that could help determine hostile intent by warning the pilot when enemy fire comes close.

DANGER ZONES

With the stark reality that it is not only military helicopters that are likely targets for MANPADS, defensive aids suites (DAS) are now available to civil operators, particularly those that fly in support of the UN and non-governmental organisations in the world's trouble spots.

Pitching to this market, Rotorcraft Services Group (RSG) has teamed with Switzerland's RUAG to install and qualify the latter's

Elbit Elop's Mini-MUSIC system features a small form factor and weighs less then 19kg. (Photo: Elbit Systems)

Integrated Self-Protection System Plug-on-Device (ISSYS POD). ISSYS POD itself is the result of a cooperative effort that packages Saab's Compact Integrated DAS (CIDAS) into a pair of RUAG's pod enclosures.

Sensors that can go into the pod include the RWS-300 radar warning receiver, the LWS-310 laser warning receiver and the MAW-300 missile approach warning system plus a BOP-L series chaff/flare dispenser, all from Saab.

Following initial contracts placed in 2008, India's HAL has signed up for two more serial production orders for Saab's Integrated DAS (IDAS) to equip the Advanced Light Helicopter (ALH). Saab reported the orders in September, valuing them at around SEK216 million ($33 million). IDAS includes radar, laser and missile approach warning sensors and automatic dispensing of countermeasures. Deliveries are due to begin this year.

The latest fully featured variant is known as IDAS-3. Radar threats are detected and identified by the aforementioned RWS-300, which can handle pulsed and continuous wave (CW) emitters simultaneously over ranges of 0.7-40GHz (pulsed) and 0.7-18GHz (CW) with a near 100% probability of intercept.

The installed LWS-310 covers wavelengths from 0.5-1.7µm, performing direction finding and classification of rangefinders, designators, dazzlers and lasers used by beam-riding missiles.

The final alerting sensor in IDAS-3 is the MAW-300. Operating in the solar-blind UV spectrum to eliminate false alarms caused by the sun glinting off water, for example, this passive sensor also employs neural net classifiers that use temporal and spatial information and compensation for the aircraft's movement to further minimise the overall false alarm rate. Saab says that the MAW-300 is accurate enough to cue a DIRCM turret.

With just the optical sensors and a smaller controller, IDAS-3 becomes the lightweight CIDAS that goes into RUAG's ISSYS POD.

TACTICAL TRIALS

The Royal Danish Air Force (RDAF) has moved closer to final certification of the upgraded EW suite acquired for its AW101 TTT tactical transport helicopter fleet following successful flight testing of the system carried out by Denmark's Defence Acquisition and Logistics Organization (DALO) and manufacturer Terma, the latter announced on 20 December.

Conducted from the RDAF base at Karup, the programme involved many flights and flare ejections, said the company. DALO and RDAF test teams are evaluating the data in preparation for approval of the system and its certification on the AW101. Final delivery is due later this year.

Terma is perhaps best known for its podded self-protection systems, namely Modular Aircraft Survivability Equipment (MASE) for medium and large platforms and the lightweight LASE variant for 'non-complex' integration into smaller helicopters, and for its AN/ALQ-213 controller. MASE and LASE are based on interchangeable modules that enable upgrade through replacement of individual elements with others housing, say, DIRCM or HFI systems.

SIMULATE TO INNOVATE

In this vein, the UK MoD has appealed to industry through the Defence Science and Technology Laboratory (DSTL) for innovative ways to develop simulation and field trial capabilities to assess how aircraft manoeuvres, warning systems and countermeasures can reduce the threat from 'man-in-the-loop' (MITL) weapons. DSTL's current tool set combines simulation and live flight, but needs upgrading.

One element is the Helicopter Countermeasure Assessment System (HCAS), a real-time MITL engagement model based on Bohemia Interactive Simulations' Virtual Battlespace 2 (VBS2) synthetic environment.

HCAS consists of a fixed-base helicopter simulator that allows a pilot to fly through a VBS2 landscape presented on a large screen to the operator of a simulated heavy machine gun. DSTL is upgrading HCAS with validated ballistics and representative countermeasures, developing the concepts the simulator before validating them in live flights. The live flight/simulated fire element is the laser-based Helicopter Collective Training System (HCTS), which can only be fitted to the British Army's Lynx Mk 7, an aircraft nearing the end of its service life.

Ian Pothecary of DSTL's countermeasure concepts team outlined the challenges involved in developing a new live/virtual assessment system, for which the organisation wants industry input. Not only must the weapon feel 'real' to the operator, it must also stimulate the aircraft's sensors in real time, and the platform must indicate to the crew that they are under attack, he said.

'This indication needs to cue the aircrew to fly a particular tactic or procedure, and we need to understand how the aircrew react to that particular message set,' he explained. 'And finally, whatever countermeasure we deploy, or we induce as a procedure, then we need to test that effect on the weapon operator down on the ground.'

'And we need to record all those bits of information from the weapon system, from the platform, what the aircrew did and try and fuse all those pieces together to give us a credible answer on the performance of that particular technique, procedure or countermeasure.' ***DH***

The US Army has ordered over 300 Gen 3 CMWS units against a total requirement for around 1,300. (Photo: BAE Systems)

DEFENCE AND SECURITY ON ALL FRONTS

14 - 17
APRIL | 2015
RIOCENTRO
RIO DE JANEIRO | BRAZIL

estaçãobrasil

10th EDITION

LAAD
DEFENCE & SECURITY 2015

NAVY | ARMY | AIR FORCE | PUBLIC SECURITY | CORPORATE SECURITY

WWW.LAADEXPO.COM

Association Support: ABIMDE

Official Publication: Tecnologia & Defesa | T&D Official Show Daily

Media Partner: Shephard Defence Helicopter

Associated with: UBRAFE

Organised by: CLARION EVENTS

Germany is in the process of refurbishing and enhancing its ageing CH-53 fleet to create a reliable asset capable of safe and effective operation on the modern battlefield. **Pieter Bastiaans** untangles the complex web of upgrade packages.

Modernisation agenda

Deliveries of reworked CH-53GA (German Advanced) medium transport helicopters to the German Air Force are currently in full swing, with some 14 converted examples having been handed over by Airbus Helicopters Deutschland (AHD) by mid-April. Another 12 aircraft were undergoing modification at the time.

Involved in maintenance, repair and overhaul work on the German CH-53 fleet since 1992, the company formerly known as Eurocopter Deutschland received a contract for the upgrade of 40 CH-53G and CH-53G-IFR airframes to the new GA standard in February 2007.

The CH-53G has been in service with the German Armed Forces since 1972, after two pre-series CH-53Ds were inducted into service from November 1969 onwards for trials at the Manching test establishment. The Heeresflieger (Army Air Corps) was the initial recipient of a total of 110 helicopters, most of which were licence-built in Germany by VFW-Fokker.

Under a previous upgrade programme, 26 aircraft were fitted with an enhanced self-protection suite, satellite communications, low-level night flight capability and replacement wiring.

The first of these CH-53GS (20) and CH-53GE (6) aircraft entered service in 1999. Two additional examples were later upgraded to GS standard to replace airframes which were written off in accidents in 2000 and 2002.

Two CH-53Gs supported the recent Exercise *Eisregen II* in the Altengrabow training area. (Photos: author)

LOW AVAILABILITY

Confronted by obsolescence issues, the German CH-53 fleet became technically complex and maintenance-intensive and has been suffering from low availability as a result.

Since the early 1990s, only 50% of the operational CH-53G fleet has been mission-capable on a daily basis, leading to challenges in providing crews with sufficient flying hours and making enough helicopters available for deployment.

Another major drawback of the CH-53G is that its survivability on today's battlefield is severely compromised due to its lack of modern self-protection systems.

The goal of the CH-53GA programme is therefore to turn the ageing helicopter into a more reliable platform, which will be able to fly in a contemporary operating environment by both day and night, including at low level.

Introducing a number of operational, mechanical and electrical upgrades, the programme will extend the helicopter's service life from 6,000 to 10,000 flight hours. As a result,

The CH-53GA can be fitted with a Selex Galileo piloting FLIR, as seen here during Exercise *ILU 2013*, which was held in the Münster training area.

the CH-53GA will soldier on as the primary means of tactical air transport for German ground troops until at least 2030, by which time the yet-to-be-selected Future Transport Helicopter (FTH) should have entered service.

Fitted with up-to-date navigation equipment in order to comply with current international IFR standards, the much-improved CH-53GA is powered by two 4,330shp General Electric T64-100 engines, just like the CH-53GS. Reworked by MTU Aero Engines, these provide approximately 10% more power than the previous T64-7s, 267 of which were licence-built by MTU in the early 1970s, and have better hot and high performance.

However, reports have surfaced which indicate that problems with funding may have led to insufficient stocks of overhauled spare T64-100 engines being available, which is hampering sustainment of the fleet.

IN THE COCKPIT

The upgraded helicopter features an automatic flight control system (AFCS) with a four-axis-autopilot and auto-hover, as well as the Rockwell Collins German Avionics Management System (GAMS), a derivative of the company's Common Avionics Architecture System.

The GAMS interface includes five MFD-268C5A multi-function displays and two CDU-7000 control display units. Also fitted are two data concentrator units which convert analogue signals from a wide range of systems, including the helicopter's engines, gearboxes and hydraulics to an ARINC 429 bus for transmission to the control display units.

Whereas the CH-53GS is still equipped with the older Dornier DKG 3 moving map generator, an Airbus Defence and Space Eurogrid digital map generator is integrated into the avionics of the CH-53GA.

This is connected to a Trimble TASMAN ARINC 12 (TA-12) GPS receiver and a Rockwell Collins navigation database which uses information provided by vendor Jeppesen Sanderson.

A CH-53GA cockpit procedure trainer furnished by Telespazio VEGA at Holzdorf.

This gives the CH-53GA an edge over Germany's NH90 Tactical Transport Helicopters (TTHs) which have no such database. The CH-53GA also has provision for installation of a Link 16 data link, the introduction of which would be a huge boost to the aircrew's situation awareness.

Interoperability with German variants of both the Tiger and NH90 has been improved by introducing new communications equipment, which includes an encrypted Rohde & Schwarz MR6000A VHF/UHF radio, an encrypted Thales SEM 91 VHF/FM radio and a Telefunken Racoms HRA 5100 HF radio.

PLUGGED IN

To bring the aircraft in line with the CH-53GS/GE fleet, the CH-53GA also features an improved defensive aids suite, which consists of an Airbus Defence and Space AN/AAR-60 MILDS missile approach warning system, Indra ALR-400 radar warning receivers and Airbus ALTAS-2QB laser warning receivers, together with BAE Systems Rokar countermeasure dispensers. Starting in April, a test campaign with the new suite will be conducted.

Armed with FN Herstal M3M .50cal heavy machine guns, the CH-53GA can also be fitted with mission-specific equipment such as the Selex ES FLIR 111 pilot's FLIR and a Scotty SATCOM computer system. In addition, it has provision for fast-roping equipment and an additional internal fuel tank which, if carried, increases the aircraft's range to up to 1,200km.

Like the Tiger UHT and the NH90 TTH, the CH-53GA relies on the Airbus EUA computer-based operations support system to connect with the German Army's FülnfoSys-H C4I system and the SASPF business management system.

Data cartridges with a 1GB storage capacity are available for CH-53GA aircrews to upload a wide range of data such as mission profiles and frequencies. Likewise, using these bidirectional cartridges, maintenance data can also be downloaded.

Alternatively, a maintenance computer can be plugged directly into the aircraft's avionics, a feature which is not found on the NH90. A data cartridge upgrade to 2-8GB is currently being planned for the CH-53GA, whereas the NH90's data devices store a mere 160MB.

Unlike the NH90, the CH-53GA has no health and usage monitoring system, with the upgraded aircraft still relying on phase

ADEX 2014

Azerbaijan Defence Exhibition

1st AZERBAIJAN INTERNATIONAL

DEFENCE INDUSTRY EXHIBITION

11-13 SEPTEMBER 2014

BAKU, AZERBAIJAN
BAKU EXPO CENTER

www.adex2014.com

SUPPORT

MINISTRY OF DEFENCE OF THE REPUBLIC OF AZERBAIJAN

MINISTRY OF THE DEFENCE INDUSTRY OF THE REPUBLIC OF AZERBAIJAN

ORGANISING PARTNER

Iteca

Tel.: +99412 404 10 00; Fax: +99412 404 10 01
E-mail: adex@iteca.az

Engine air particle separators for the German CH-53 fleet originate from the US 'boneyard' at Davis-Monthan AFB. (Photo: Bundeswehr)

maintenance. However, incorporated into the EUA is a so-called TechLog subsystem, which provides detailed data on the fault history of selected mission-critical components.

TAKING DELIVERY

The first CH-53GA flew in January 2010, some time after initial trials of the new AFCS, which were conducted on board a CH-53G test aircraft in June 2008.

Deliveries commenced a year behind schedule in September 2012, with the first aircraft being handed over to the Army Aviation School at Bückeburg, a mere two months before the aircraft received its military type certification.

Despite the fact that only two helicopters were initially planned to undergo pre-series modifications, in the end a total of five prototypes were used for various qualification trials and these airframes are now being brought up to final delivery standard.

By the time the first CH-53GA had been delivered, responsibility for weapon systems management of the fleet had shifted from the army to the air force.

Hampered by friction resulting from the 'Helicopter Capabilities Transfer' between two services, the Luftwaffe's Helicopter Wing 64 started operating the CH-53 from former army aviation facilities at Laupheim in January 2013.

A detachment of the wing at Holzdorf air base, meanwhile, received its first CH-53GA directly from AHD's facilities at Donauwörth on 24 September. Initially destined to receive just 12 aircraft, the unit at Holzdorf is now expected to field a total of 20 CH-53s, mostly GA airframes but also including some GS and GE models.

This is due to the fact that the newly ordered EC645 T2 light utility helicopters will now be stationed at Laupheim alongside more than 40 CH-53GS/GE/GAs. Personnel at Laupheim meanwhile welcomed their first CH-53GA on 21 November and in April the technical school at Faßberg got its first example, which will be used for maintenance training.

Due to its close proximity to a series of exercise areas, the German Air Force has plans to turn Holzdorf into a training site which could be offered to the European Air Group for its annual Combined Joint Personnel Recovery Standardization Course.

If these plans come to fruition, the course would alternate between Holzdorf and the French facility at Cazaux.

SPECIAL MEASURES

As part of a personnel recovery capability upgrade package, the CH-53GS/GE fleet has received provisions for new ESG Mission Tactical Workstations (MTAs), a limited number of which have been purchased. The conversion kits feature a pallet-mounted workstation, a FLIR Systems Talon EO/IR pod and direction-finding equipment. Further mission-specific kit for the personnel recovery mission includes additional Kevlar armour protection.

During manned-unmanned teaming trials in 2010, ESG demonstrated that its MTA has significant growth potential, with the system being able to control UAVs from on board the CH-53 in a simulator environment.

The ESG-developed SeLa sensor system for landings in brownout/whiteout conditions or confined areas is also being integrated into the CH-53GS/GE fleet and achieved limited operational capability in February.

New Elbit Systems ANVIS/HUD-24 helmets are being acquired as part of this latest upgrade for the GS/GE fleet. However, CH-53GA pilots will continue to rely on Gentex SPH-4B helmets for the time being.

The CH-53GS's original AN/AAR-47 missile approach warning system has given way to the modern AN/AAR-60 MILDS, but it appears that the Elisra SPS-65(V) radar warning receivers have been retained, to which LWS-20V-3 laser warning receivers have been added. Dispensers from BAE Systems Rokar are also fitted.

Lessons learned during ISAF in Afghanistan operations have demonstrated the need for secure communications, and as a result trials have recently been conducted during which single examples of the CH-53GS and CH-53GE were fitted with an encrypted Thales SEM 91 VHF/FM radio.

Upgraded alongside the CH-53GS fleet – albeit without external tanks but with provisions for additional internal fuel – the CH-53GEs were intended very much as a stop-gap measure.

The CH-53GA is powered by two 4,330hp T64-100 engines. (Photo: author)

For the time being, these airframes will be used to help keep CH-53GS aircrews proficient, although it is planned that most will end their lives as ground instruction airframes at Faßberg or as trials aircraft at Manching.

BASE TRANSFERS

Taking on a steady stream of refurbished aircraft from AHD, the Holzdorf-based training squadron will also gradually induct the CH-53GA inventory which the Army Aviation School has already amassed at Bückeburg.

In early October 2013, Holzdorf hosted its first CH-53GA qualification/conversion course, which involved 12 students and ended in late March. The training comprises an eight-week theory course, four weeks of computer-based training and six to eight weeks of flying practice on the upgraded aircraft.

As part of the reorientation of the German Armed Forces, which was announced in October 2011, all depot-level maintenance of the CH-53 fleet will be transferred to Holzdorf by 2019.

Currently still based at Diepholz, Systems Center 21 has in the meantime taken control of the former Army Air Corps facilities at Rheine-Bentlage. Until recently an operational CH-53 base, Bentlage will now be used to support depot-level maintenance on the CH-53 until 2017, at which time the migration to the yet-to-be-built facilities at Holzdorf will commence.

Defence plans dictate that Helicopter Wing 64 must be able to generate up to nine CH-53s (two of which are medevac-configured) to support army units with air transport of personnel and materiel during out-of-area missions in one or two distinct theatres of operations. It must also be able to generate three more aircraft for specific contingencies such as disaster relief.

Missions include special operations air support, dubbed 'SOF Air' by the air force, and personnel recovery, tactical medevac and support of non-combatant evacuation operations.

Despite the drawdown of forces from ISAF, Helicopter Wing 64 now bears responsibility for sustaining ongoing operations with the CH-53GS as part of the German Air Expeditionary Wing in Afghanistan. A total of six aircraft are currently stationed at Mazar-e-Sharif, two of which are configured as medevac aircraft.

Notably, these rely on engine air particle separators (EAPS) which have been salvaged from former USMC CH-53Ds stored with the 309th Aerospace Maintenance and Regeneration Group at Davis-Monthan AFB in Arizona. Twenty-two sets are currently available, and Germany would like to purchase additional examples in order to equip all operational CH-53s with EAPS.

TRAINING PROVISION

Meanwhile, operations with the CH-53 at Bückeburg continue to be administered by the wing's air transport group at Holzdorf. Bückeburg is home to the CH-53 full mission simulators, two of which have been upgraded to CH-53GA glass cockpit standard under a contract awarded to CAE in 2009. Furnished by Finmeccanica/Thales joint venture company Telespazio VEGA, four cockpit procedure trainers together with 100 mobile procedure trainers for laptop use have been distributed among training and operational units. Concurrently, ESG has been contracted to provide a series of new maintenance training tools.

As part of the ongoing operational test and evaluation of the CH-53GA, which is conducted under the auspices of the Development Branch at Bückeburg, a single aircraft was deployed to Morón in Spain for tests in a hot environment from 26 August until 6 September last year.

This was due to problems which emerged during operations at Bückeburg, where the new CH-53GA flight controls gave invalid readings in temperatures exceeding ISA+15°C.

The latest trials are a precursor to next year's edition of Exercise *FALCOR* (Final Assessment of Limitations and Combat Operational Requirements), during which the CH-53GA will be put to the test over White Sands Missile Range in New Mexico.

In the recent past, the German military has conducted trials with shipborne transport of helicopters. Some CH-53Gs were sent to Portugal by sea in 2012, with these then participating in the European Defence Agency's Helicopter Training Programme Exercise *Hot Blade 2012* which was held at Ovar air base.

Like their British, Dutch, French, Italian and Spanish counterparts, the German Armed Forces are also contemplating readying their CH-53s and Tigers for operations from naval vessels. Trials have recently been conducted which saw CH-53s flying from *Berlin*-class joint support ships as well as helicopter platforms on offshore oil rigs.

Meanwhile, AHD has also been awarded a contract to equip all CH-53GA and CH-53GS/GE airframes with a boarding step, swivel door and fuselage mounting for a rescue hoist.

On the aeromedical front, an improved medevac suite for the CH-53 has been demonstrated, while a loading control system is being looked into for the GS/GE fleet. Such a system would provide an automatic weight and balance check.

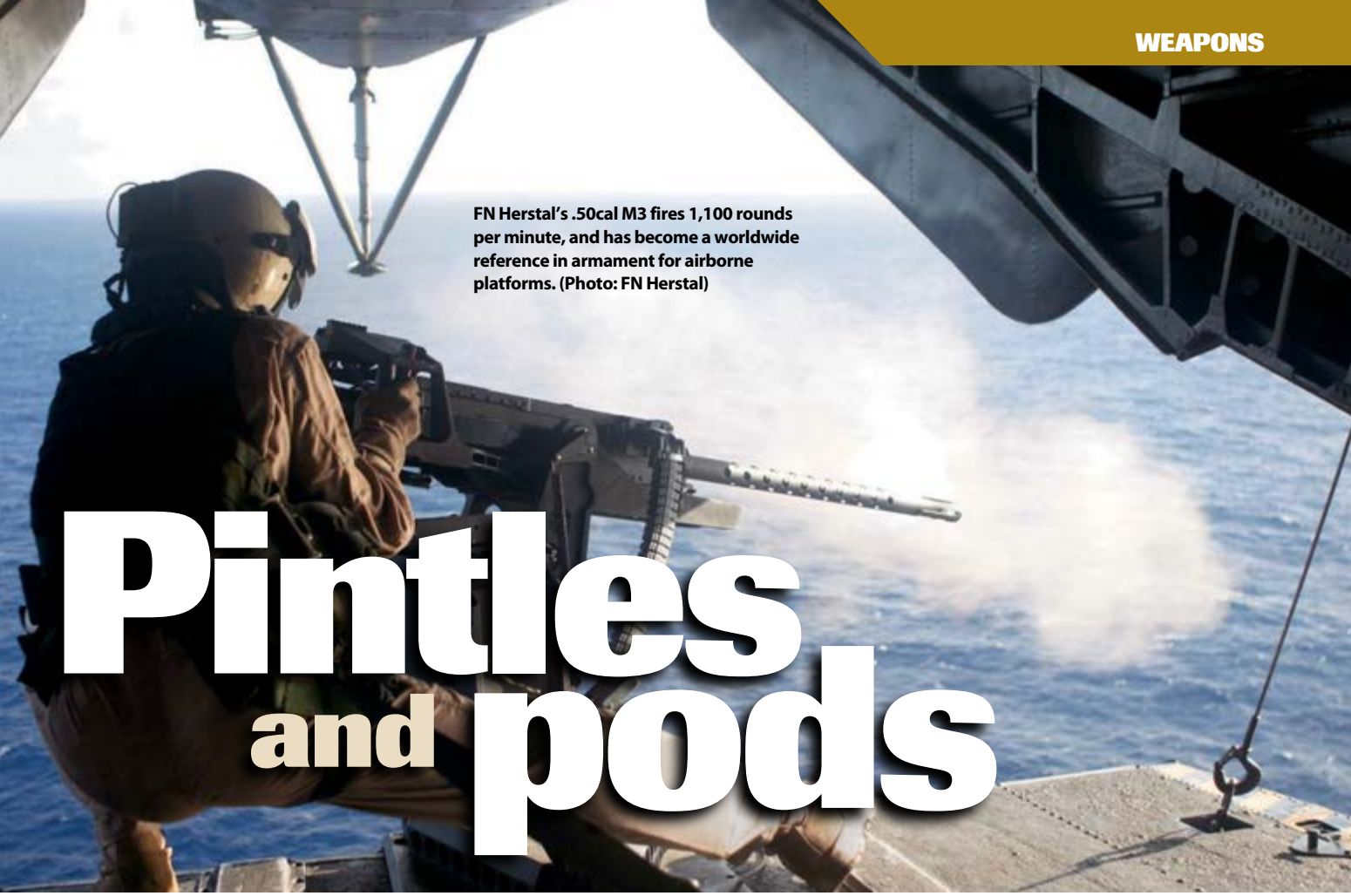
With regard to protection, between 2014 and 2017, five CH-53GSs will receive ballistic armour to protect critical components of the aircraft, and there are options for similar modifications on the remaining 15 in the fleet.

COMMON STANDARD?

Thus far, a lack of funding has only allowed for a small number of additional individual mission systems such as piloting FLIR and EO/IR pods to be purchased. As a result, the German military risks ending up with a panoply of different mission systems spread over various CH-53 airframes, leading to a lack of commonality – a situation not unlike that of the UK's Chinook fleet.

However, the RAF is now aiming to remedy this through the Project Julius recapitalisation of its medium transport helicopter fleet, and such an approach also seems desirable for the German CH-53s.

On a positive note, AHD is already contemplating offering additional upgrades to the CH-53GA which could improve commonality to a certain extent. These include the addition of external fuel tanks and incorporation of an upgraded version of the SeLa landing system. **DH**



FN Herstal's .50cal M3 fires 1,100 rounds per minute, and has become a worldwide reference in armament for airborne platforms. (Photo: FN Herstal)

Pintles and pods

Weaponised helicopters have played a valuable role in combat operations over the years, providing both fire support and direct engagement capabilities. **Jonathan Tringham** talks to industry about the evolving military requirements driving innovation.

As US and NATO forces continue to maintain a stripped-down presence across various conflict zones around the globe, the requirement for helicopters equipped with accurate and powerful, short- and long-range offensive weapons remains high.

The current US administration has effectively ended combat operations in Afghanistan, and is refocusing its air force, navy and marines into the Asia-Pacific region, identified as the likely next operational theatre.

However, a number of US and NATO troops remain on the ground in Afghanistan, conducting armed reconnaissance and peacekeeping operations, supported in an attack capacity by the Boeing AH-64 Apache Longbow, in conjunction with the Sikorsky UH-60 Black Hawk.

EXPANDING ROLES

Historically, the Apache was designed as a tank destroyer, providing an attack role in the context of a conventional war between standard, coordinated force formations. During the campaigns in Iraq and Afghanistan, however, the platform was forced to evolve to help combat the asymmetric and unconventional nature of the enemy's methods of engagement, with the AH-64 being subsequently integrated with ground manoeuvre elements in a close fires capacity.

In this role, the fire support capabilities of the Apache's 30mm cannon were paramount. According to Lt Col Tal Sheppard, US Army product manager for Apache Longbow, the gun has been used on the AH-64 since the beginning of its production in 1984.

'The main requirement [for the gun] was area suppression, with a level of point targeting provided with the design – the actual origin terminology used was "30mm area cannon",' Sheppard told *Defence Helicopter*.

The Apache utilises the M230 Chain Gun – a 30mm, single-barrel automatic cannon originally developed by Hughes, and now manufactured by Alliant Techsystems. The M230 uses external electrical power to cycle the weapon between shots, as opposed to utilising recoil or expanding gas generated by the firing cartridge.

'The Apache can carry up to 1,200 rounds,' Sheppard continued. 'The gun fires ten rounds a second, and is normally selected to fire in 10- to 20-round bursts. The 30mm cannon can be fired from either the front- or back-seat positions, and is assessed as performing admirably in combat.'

He was unable to comment on changes in tactics or procedures related to operational use of the M230 over time, but stated there were no plans to change the gun's basic design from a 30mm single-barrel weapon.

EVOLVING REQUIREMENTS

Christophe Héron, head of marketing at FN Herstal's systems division, noted the gun requirement for combat helicopters had evolved over the past 20 years in concert with the changing operational theatres they

were being deployed to, with Iraq and Afghanistan particularly driving demand for larger calibre weapons.

'Until 1988, 75% of our customer requests were for 7.62mm guns and 25% for .50cal, so they were looking for lightweight, compact solutions,' he said. 'We have redone an analysis between 1998 and 2010, and found it was exactly the opposite – 75% of the requests were for .50cal and 25% for 7.62mm.

'So the trend completely changed from one calibre to the other, and the reason is quite clear: with the threat of snipers shooting at helicopters in the sky – which by the way are quite an easy target – the crew and gunner were in a dangerous situation.'

Héron explained there were two primary factors behind the change – the need to patrol at high altitude and, when a threat was detected, to engage from a long distance.

The 7.62mm is an anti-personnel machine gun, and a lightly armoured vehicle can stop such rounds, even at short distances. Whereas .50cal ammunition, with its armour-piercing incendiary, pierces 10mm-thick armoured plate at a distance of 1km.

'The 7.62mm can be effective at a range of 600-700m,' Héron continued. It can be used at distances of up to 1km, but at that point it is no longer accurate. However with the .50cal, it can be used at ranges of 2.5km, and it is very accurate at 2km, so you more than double the distance that you can put in between you and the target. You can still engage the target and succeed in your mission while putting the crew and the helicopter in a safer position to what you can experience with a light calibre.'

WIDER REQUESTS

In the past two years, the company has received an increasing number of requests to equip transport and patrol helicopters, in addition to CSAR and attack rotorcraft, with .50cal pintle-mounted systems, including the Kiowa Warrior, Puma, Super Puma, Cougar, Fennec, AW109 and AW139.

The company manufactures two main product families for rotary-wing applications: pintle-mounted weapon systems such as the MAG and the M3 – 7.62mm and .50cal weapons; and podded systems, where an externally mounted machine gun is remotely operated by the pilot, aiming through the sighting system of the helicopter. The pod is not permanent, and is capable of being jettisoned.

'It is fixed to the helicopter by 14in lugs,' explained Héron. 'You can connect the weapon mechanically, as well as the electric cabling, in less than one minute. With two people to lift up the pod it is done in less than 30 seconds. It is very quick to configure.'

The company's flagship weapon for aircraft is the .50cal M3, which fires 1,100 rounds per minute (rpm), compared to 550 for the M2. In the US, the weapon is known as the GAU-21. The UK MoD favours the M3M, also used by Belgian forces on the A109.

'Every armament has limitations in terms of overheating, but operationally speaking the ammunition box capacity is not that big to provide a limitation in use to operational guys,' added Héron. 'For pod and pintle-mounted solutions, the request is usually for 300 or 600rpm, with most customers opting for 300rpm.'

EASY INSTALLATION

Héron noted an uptick in requests for systems that can be easily installed or removed from the helicopter, with a specific requirement for unimpeded egress from the aircraft. A pintle-mounted gun hinged on a turning mechanism was developed to meet this requirement. The weapon is deployed and rotated during combat, and locked to maximise the firing window, optimising the helicopter's cabin volume, and facilitating safe egress when rotated and stored.

'We know how to master weapon system solutions, and our helicopter designer counterparts know what is feasible and acceptable from a helicopter standpoint,' Héron concluded. 'So we must share information – it is a triangle relationship between the gun manufacturer, the helicopter manufacturer and the operational end user.'

Meanwhile in the US, massive military budget cuts are having a significant impact across all of the armed forces, with weapons programmes being downsized, de-prioritised and in many cases cancelled.

Following the Pentagon's 2015 budget announcement, the US Army confirmed plans to retire its Bell OH-58 Kiowa Warrior scout and TH-67 training rotorcraft, and will use the National Guard's Apaches to 'temporarily' fulfil the scout helicopter role.

In line with this decision, the army has also discontinued the Kiowa Warrior cockpit and sensor upgrade programmes, with a development programme for the GAU-19 single-barrel .50cal machine gun also likely to be affected.

Dave Stouffer, business manager for ammunition and weapons at General Dynamics Ordnance and Tactical Systems (GD OTS), explained that the company is currently going through a qualification effort for mounting the GAU-19 on the Kiowa Warrior, and is unsure

The GD OTS .50cal GAU-19 is a three-barrel Gatling gun with a rate of fire of 1,300rpm. The weapon can be mounted in a variety of configurations to suit different helicopters and missions. (Photo: GD OTS)

FN Airborne Weapon Systems

FN MRP™ (Medium Ramp Pintle) .50 cal

Taking advantage of its century-long firearms expertise, FN Herstal designs, develops and manufactures fully integrated airborne weapon systems with unprecedented and unequalled firing capabilities for multi-role helicopters and subsonic aircraft. FN airborne weapon systems feature combat-proven, single-barrel automatic machine guns that offer reliability, accuracy, simplicity of use and crew safety.

FN MDP™ (Medium Door Pintle) Turning .50 cal

FN airborne pintle mounted systems are fully mechanical and do not require any electrical power, making firing possible even if the carrier faces problems. They feature either a .50 cal FN M3M™ or 7.62mm FN MAG® machine gun firing in open bolt mode, ensuring full safety and reliability, and are mounted on a soft mount guaranteeing outstanding balance during firing, hence increased accuracy. FN airborne pintle mounted systems can be window-, door- or ramp positioned.

FN airborne podded systems are self-contained and present an all-in-one concept including a .50 cal FN M3P™ machine gun, 250- or 400-round ammunition box, firing actuator and cocking device in one single casing, ensuring optimum performance in sandy or dusty conditions. An optional configuration (FN RMP™) is available with three additional 2.75'' rockets providing extra firepower. FN airborne podded systems feature a fit and plug concept through 14'' NATO standard lugs, for easy and quick adjustment of the helicopter configuration depending on the mission at hand.

FN RMP™ (Rocket Machine Gun Pod) .50 cal - 250 rounds plus three 2.75" rocket tubes

To date, FN Herstal's airborne weapon systems have been selected to equip more than 3,000 helicopters and subsonic aircraft worldwide.

www.fnherstal.com

Firearms Tradition & Technological Innovation

FN HERSTAL

how the recent announcement regarding the mothballing of the fleet will impact it.

'With regards to the recent changes in the aviation structure to the Apache and the Kiowa Warrior, we are all sitting on the edge of our seats trying to anticipate how that may affect future procurement and weapons,' he said. 'Everyone in the weapon community is trying to anticipate what that might look like down the road.'

THE LONG GAME

The .50cal GAU-19 is a three-barrel 1,300rpm Gatling gun capable of being mounted in a variety of configurations to suit different helicopters and missions. Stouffer explained that in a dismounted role, it had a maximum effective range (MER) of 1,830m, a limit largely imposed by the fact that it was iron-sighted. However, the round itself would carry out to 7.5km.

'From an aviation platform where you're firing down on a target, it carries a lot of weight, and it will go a significant range,' he continued. 'It's a very accurate round, and it will go beyond 2,000m and suppress and defeat targets.'

Stouffer said the GAU-19 has been around for a number of years, and recently GD OTS had been working with the programme office to reduce its weight to make it weight-neutral to the single-barrel .50cal high-rate-of-fire Browning machine gun currently used on the Kiowa Warrior, ultimately shaving 16.8kg from the weapon.

'One area that did help us remove a good bit of weight from the system was matching the gun barrels to the size of the Kiowa's 500lb ammunition can,' he added. 'We designed a three-barrel gun system that can fire all 500 rounds out of that ammunition can in one single burst, and the weapon wouldn't overheat.

'We designed this to preclude any chance of barrel degradation or cook-off or anything like that. Originally, the barrels were heavier, and designed for 600 rounds of continuous bursts, so by removing some steel out of that barrel, we were able to match it to that application, while maintaining the high reliability of the weapon system.'

RELIABILITY ADVANTAGES

The most significant advantage of a Gatling-style weapon versus a single barrel is higher reliability. Published statistics for the GAU-19 B verify mean rounds between stoppages of 35,000.

'It's extremely reliable, and one of the reasons for that is it's externally powered,' noted Stouffer. 'It's operated with a battery, so compared to a recoil- or gas-operated weapon system, a lot of things can happen with the ammunition or variability or different temperatures that can affect the operating performance of the weapon. But being externally powered, if there's any variation in the ammunition or the temperature, the weapon just keeps on firing.'

Military helicopters are typically defended using pintle-mounted machine guns sited by a door, window or rear ramp, manned by individual gunners. The field of fire is controlled by incorporating hard stops in the weapon pintle which limits the gun's range of motion, preventing the gunner from accidentally shooting the aircraft's structure.

The FN Herstal Medium Door Pintle gun is hinged on a turning mechanism. (Photo: FN Herstal)

However, next-generation aircraft like the V-22 Osprey are forcing weapons manufacturers to come up with novel installations. The rotating nacelles that afford the hybrid aircraft its unique capabilities also prevent it from being equipped with door- or window-mounted guns, making it an extremely vulnerable target on approach, landing and take-off.

In 1998, a programme was established to design and install a nose-mounted slewable defensive weapon system for the V-22, to be operated by one of the aircraft's pilots. However, the system would have provided coverage in the forward quadrant only, and was cancelled in 2000 due to cost overruns.

The tiltrotor was eventually outfitted with a ramp-mounted weapon in 2005 to protect the rear quadrant of the aircraft during ingress and egress operations. The weapon, usually a .308cal M240 or .50cal M2 machine gun, could be fired rearward when the ramp was lowered, but provided a limited means of defence against small arms and rocket-propelled grenade threats.

SMALL CHANGE

In 2007, BAE Systems developed a belly-mounted, remotely operated gun turret system for the V-22 dubbed the Interim Defence Weapon System, subsequently rebranded as the Remote Guardian System (RGS), to provide a defensive capability against small-arms threats.

Developed over several years under an internal BAE Systems programme, the RGS provided 360° of coverage via a remotely operated, retractable weapon sited in the cargo hatch that had a built-in capacity to compensate for the movement of the hybrid aircraft.

The RGS controlled a 7.62mm minigun, derived from the three-barrel GAU-17, capable of firing 3,000rpm with an effective range of up to 1,500m.

'There were more unique challenges developing the defensive systems for the V-22 than there were for other helicopters, and most

The V-22 Osprey's RGS provides 360° of suppressive coverage via a remotely operated, retractable weapon sited in the cargo hatch. (Photo: BAE Systems)

of the key challenges that we ran into related to the transitional aspect of the nacelles rotating down,' Chris Weaver, defence avionics programme manager at BAE, told *DH*.

'How do you provide some kind of defensive capability with an aircraft that is structurally changing during flight? On the V-22, when the nacelles rotate, the field of fire will actually change, and the keep-out zones change as the aircraft rotates in and out of helicopter mode to aeroplane mode.'

The company spent several months studying that problem and looking at the potential concepts that could overcome these limitations. In order to provide the 360° field of coverage, which was a key requirement laid out by the US DoD, BAE realised it would have to be a belly-mounted solution.

'Achieving a 360° field of fire with the V-22 was very difficult, and we debated whether it needed to be continuous 360° coverage or if it was 360° with a centre point,' Weaver explained. 'We concluded that it would need to be [the former] in order to be operationally effective.'

NO LIMITS

While BAE Systems manufactured the weapon system, it did not make the gun. The range of the system was based upon the weapon selected, and the company's goal was to not limit the MER of the particular weapon chosen.

'The first development of the system was for the GAU-17 minigun,' continued Weaver. 'So the minigun has a specific MER, but the RGS was also designed to incorporate up to a .50cal weapon as well, at which point the MER increases.'

He added that BAE essentially reverse-engineered the RGS from the V-22 itself in order to make a mission kit where the installation of all major subsystems could be carried out without any modifications to the aircraft.

'This was another key point of the design, for it to be an installation kit to be taken on and off the platform as required,' he added. 'One of our primary goals was not to change the aircraft structure at all in order to install the system.'

The RGS was installed on half of the first V-22s deployed to Afghanistan in 2009. However, reports quickly emerged of marines complaining the weapon was heavy and difficult to use, with many crews opting to remove the system. No information has been released on whether the RGS has actually been used in combat.

'The [USMC] are continuing to change the system today as its fielded, and they're learning more, and having new desires for it that are constantly changing,' Weaver concluded. 'However, the basic architecture has remained the same since the early design of the system.' *DH*

An analogue technology in a digital age, night vision goggles are not only central to ensuring round-the-clock helicopter operations, but also the safety of crew and passengers. **Peter Donaldson** examines where advances can still be made.

All night long

In a rapidly digitising world, one technology critical to 24-hour operational capability remains resolutely analogue – aviator NVGs. These devices gather the meagre light available at night and amplify it to provide the pilot with a bright, sharp image of the outside world.

While no computers are involved in this process, digitisation nonetheless has much to offer pilots in terms of situation awareness, both by feeding extra information in and sharing the pilot's view for the benefit of others.

Injecting basic flight symbology into the goggles is now common practice with familiar products such as Elbit's ANVIS/HUD, while linking them to the aircraft's flight/mission management system could provide the pilot with a great deal more mission-relevant information.

However, aviation is inherently conservative about safety-critical technologies, so it will be some time before aviator goggles can benefit from the kind of enhancements that are found in cutting-edge ground soldier eyewear. What can be expected are steady improvements to key parameters such as resolution and signal-to-noise ratio (SNR), and reductions in SWaP.

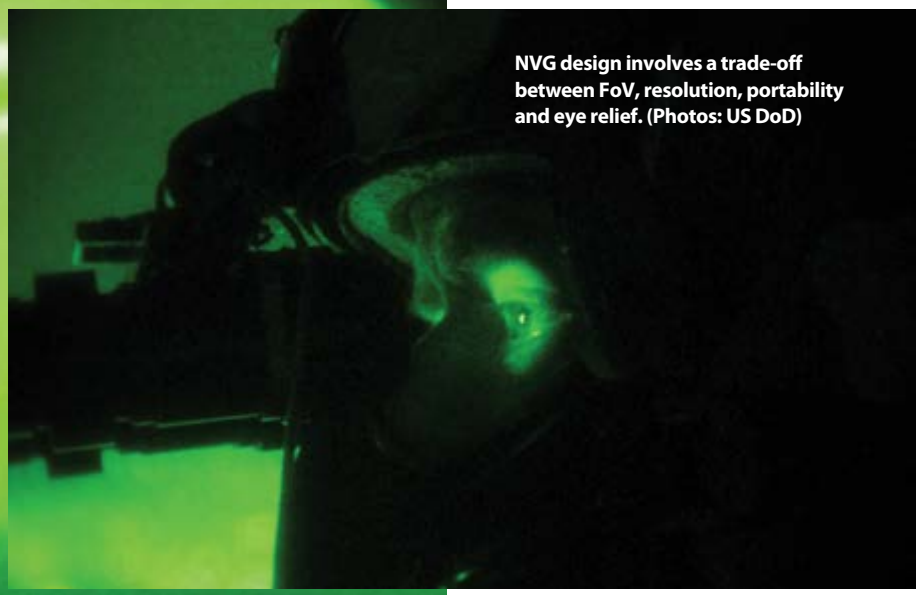
NO CHANGE

'Where we see it going, at least for the foreseeable future, is to continue along the path of analogue technology,' said Ed Yarish, domestic business development director for night vision at Exelis. 'There are human factor challenges right now with the early developmental configurations of digital NVGs [without image intensifiers], specifically a little bit of latency. So, as you turn your head, there is sufficient lag time that, quite frankly, is dangerous on the ground and even more so in aerial operations.'

It is worth recapitulating how analogue goggles work. The amplification occurs in the image intensifier, a high-voltage vacuum tube nestling between the objective lens and the eyepiece that converts photons to electrons, multiplies them and converts them back into photons.

The first component incoming light encounters is the photocathode. Here, photons transfer their energy to electrons, which force their way out the back of the photocathode in an excited state and into the myriad passages of a microchannel plate amplifier (MCP). This is a glass wafer pierced by millions of tiny passages. When the electrons enter these channels, they bounce off the walls and knock free a cascade of others and so on, so that thousands of times as many come out as went in.

After the MCP comes the phosphor screen, which is like a photocathode in reverse, in that electrons go in and photons come out. The light then passes through the inverter, a precisely aligned bundle of optical fibres that twists 180° around the intensifier's fore and aft axis to turn



NVG design involves a trade-off between FoV, resolution, portability and eye relief. (Photos: US DoD)

Despite the availability of white phosphor 'black and white' imaging, many operators still prefer 'traditional' NVG green.

the image the right way up before it reaches the eyepiece. Photons travel at the speed of light and, with no processor to induce latency, the goggles provide a sharp image that does not smear with rapid head movement.

Most aviator goggles provide a 40° field of view (FoV), which is why flying on goggles requires significant scanning with the head to maintain situation awareness.

Thales offers goggles for ground use with a 51° FoV and there is scope for improvement, according to Jean-Luc Espie, deputy manager for night vision equipment at Thales Angénieux. However, optical complexity increases significantly with FoV, he explains.

'Each solution is a trade-off between FoV, resolution, portability and eye relief, so it is difficult to achieve fields wider than 51° for an optical channel with a single intensifier tube.'

UNCONVENTIONAL EXTRAS

Adding extra tubes is an unconventional route around this problem, but Elbit Systems of America offers the modular Quadeye goggle which can use four 16mm tubes – a central pair provides a 40° FoV and an optional outer pair can add 30° to each side.

Remaining with unconventional technologies, Yarish reported growing interest in white phosphors, which provide a black and white TV-like image instead of the familiar green.

'Over the last year or so, we have had a lot of enquiries about these,' he told *Defence Helicopter*. 'As our customers are asking about them, we are providing prototypes for them to evaluate.'

They are not, however, making rapid inroads into aviation, and US Army studies continue to rate green more highly.

'On the surface, white offers a bit of clarity over green, in my opinion,' said Yarish. 'But again, we keep getting back to the science, which says that from a snapshot perspective white may look better, but if you are wearing goggles for hours upon hours, the long-term effects of green probably offer a [physiologically] better environment.'

While the core technology may not be changing rapidly, the market is evolving in ways that affect who ought to have access to the best equipment as missions transfer from the military to paramilitary, parapublic and even commercial entities – SAR in the UK being a prime example.

There is also a clear moral imperative to provide those who put their lives on the line to help others with the best equipment available – SAR, HEMS and police crews in particular.

Special forces have always been first in the queue for the best equipment, particularly when it comes to NVGs, and the gradual transfer of some of their capabilities to mainstream forces and beyond is an established route.

BUILDING THE CASE

The creation, training and mentoring of overseas forces in places such as Afghanistan, including SOF aviators, is of growing importance to the US special forces in particular, which helps build the case for releasing higher performance equipment to them.

The State Department decides who is allowed access to what level of US technology and uses the figure of merit (FoM) as the defining performance measure for image intensifiers. The FoM is a function of the SNR and the image resolution expressed as line pairs per millimetre, resolution being the ability to distinguish between closely spaced objects.

The F9800FG Pinnacle image intensifier from Exelis, for example, has a minimum resolution of 64lp/mm and an SNR of 25. Multiplied together they give an FoM of 1,600, which is the current limit for tubes exported from the US, although different customers are allowed different levels of capability.

The highest FoM Exelis reveals is for the F9800VG Pinnacle tube, which, with a minimum resolution of 64lp/mm and SNR of 28, works out at 1,792. L-3 Warrior Systems quotes FoMs of 1,400 and 1,600 for exportable versions of its 10160/M890 aviation-grade tubes.

The upper figure is the same as that for Photonis' XR5 tube with the minimum SNR and resolution the France-headquartered company quotes. 'Typical' figures for the XR5 are 28 for the SNR and 72lp/mm, giving a FoM of 2,016. Canadian company Newcon Optik offers tubes with FoMs from 1,600-2,000.

While tubes with higher FoMs are made, manufacturers do not quote numbers, usually describing their top-performing devices as 'unlimited' in FoM, although Yarish admits to tubes 'probably in the low-to-mid-2,000s kind of range'.

SENSITIVE APPROACH

Other parameters besides SNR and resolution are important to image intensifier tubes and NVGs. One of these is photocathode sensitivity, which relates the amount of electric current that comes out for each unit of light that goes in. It is expressed in microamps per lumen (µA/l) and affects the light levels at which the goggles will work effectively.

This is a fairly constant source of controversy between US and European tube manufacturers as the introduction of photocathodes made from gallium arsenide (GaAs) in the US in the late 1980s came to define third-generation (gen 3) intensifiers, differentiating them from gen 2 devices, which used – and still do – 'multi-alkali' photocathodes.

GaAs photocathodes are significantly more sensitive than their multi-alkali counterparts, with Exelis quoting between 1,800 and 2,200µA/l for its Pinnacle tubes. Photonis does not quote photocathode sensitivity in its literature, but some sources indicate that sensitivities of 500-800µA/l are possible for multi-alkali devices.

Sensitivity, however, is not the whole story for photocathodes. Halo formation and service life are also important – and connected. The former is an undesirable effect in which fuzzy circles form around bright light sources, which can be a particular nuisance when flying over urban areas at night when the halos can merge into a blur. The size of the halos is a function of how close the photocathode is to the microchannel plate amplifier – the closer the better.

European representation

UK-BASED COMPANY PREMIAIR RECENTLY CUT A DEAL to represent US NVG experts Aviation Specialties Unlimited (ASU) in Europe.

Under the agreement, signed at Heli-Expo in February, PremiAir and ASU will jointly supply, sell and support night vision products, maintenance, training and aircraft modification services. ASU has provided more than 800 aircraft with NVG-compatible cockpits and trained more than 2,500 pilots.

'Mike Atwood and his team set the standard, frankly, for night vision modifications to aircraft, night vision training and all of the associated ancillary aspects of operating at night, including things like GPS letdowns and so on,' PremiAir CEO Keith Marshall told *Defence Helicopter*. 'What they also have is access from the OEMs to the latest equipment. Because of the association they have with the government bodies, they have streamlined processes to get it out of America, and that is really important for night vision technology.'

Because of the work they have done with US officialdom, ASU can export everything except the goggles without the need for an export licence. ASU has FAA supplemental type certificates and PremiAir has the EASA approvals it needs to bring them to Europe.

'We are the partner in a joint venture that translates the immense work that has been done to provide cockpit-compatible modifications for NVG operations on a range of platforms under the FAA. We have now got the relationship that allows us to deliver that onto platforms through the EASA jurisdiction,' Marshall concluded.

This is a problem for gen 3 tubes because their GaAs photocathodes suffer from degradation caused by positively charged ions that the microchannel plate spits back at them, by-products of the process that strips electrons from the channel walls. As a prophylactic, gen 3 tubes have an ion barrier film between the microchannel plate and the photocathode, increasing the distance between these components and, therefore, the size of those undesirable halos. The latest gen 3 tubes use very thin films to minimise the halo effect, but gen 2 tubes do not need barrier films at all.

An 'autogated' power supply – one that continuously switches on and off much too rapidly for the pilot to perceive – also mitigates halo/blooming effects. Another power supply refinement is bright source protection, a function that reduces the voltage to the photocathode when the goggle is exposed to a strong light source, but at the cost of some resolution.

One implication of this is that there is a trade-off to be made between performance on very dark nights and performance around significant cultural lighting.

Not everyone who flies at night does so on NVGs, and thermal imaging has long been a viable alternative for some missions and flight regimes. However, pilotage thermal imagers on attack helicopters and special operations transports are costly cooled devices, often coupled to a head tracker and a helmet-mounted display. Controp's A-View is different in that it

is based on an uncooled 7.5-13.5µm 384 x288 element vanadium oxide microbolometer detector with a 648x480-element amorphous silicon detector as an option in a turret that is stabilised in elevation and azimuth.

The company offers A-View for what it describes as 'night mission support' purposes, including flight safety applications such as verifying that landing areas are clear, checking tail rotor clearance and general assistance in poor visibility. There is also an optional navigation capability with point-to-co-ordinate and co-ordinate-hold modes.

Optimising cockpit lighting for NVG use is a complex process. (Photo: Lockheed Martin)

COMPATIBILITY CONSIDERATIONS

Deciding between image intensifier generations, and weighing up features such as autogating and bright source protection, is complicated and nuanced, and getting the kind of compatible cockpit lighting that best suits the goggles and the mission is an important part of that. Different photocathode materials respond to different optical wavebands, with peak sensitivities in different places and of different widths. This affects what sort of cockpit lighting and filtration will interfere with the goggles least while enabling the pilot to see the instruments through or under them.

Bringing aviator goggles into the digital world will be a slow process because of concerns about safety and certification standards, but processing speed could reduce latency to a point at which it is not an issue.

Also, the benefits of geo-referenced virtual reality symbology could compensate for some loss of image quality in a system – veteran pilots recall flying on the monocular first-generation FLIR in early Apaches – a problem that could evaporate in any case as core sensor technology begins to exceed the resolution capabilities of the human eye. Today, however, getting the best available equipment to more aviators is probably more important. ***DH***

Making it big

The unique utility of heavy-lift helicopters has long been recognised, leading manufacturers to push for larger and larger designs. **Matthew Smith** explores some of the future plans of the leading OEMs.

Boeing is working on upgrade paths that will keep the CH-47 in service beyond the 2020s. (Photo: US DoD)

A critical capability for militaries across the globe, the heavy end of the helicopter spectrum remains tied to platform designs that are decades old. With little funding expected to be available for new designs until the middle of the century, the future for heavy lift will continue to be one of incremental evolution.

The sector is dominated by three aircraft: Sikorsky's CH-53 series; Boeing's CH-47 Chinook; and the Russian Mil Mi-26.

All three manufacturers are currently working on new versions of their existing platforms, which are likely to stay in service until well into the 2040s and 2050s.

At Sikorsky, work has been under way on the replacement for the USMC's marine heavy-lift helicopter capability since December 2005, with 200 CH-53Ks expected to fully replace the service's existing CH-53E fleet.

The current programme schedule is aiming for a first flight in late 2014 followed by a Milestone C production decision in the June 2016 time frame, according to Col Robert Pridgen, programme manager for the H-53 at Naval Air Systems Command. It will then achieve IOC in mid-FY2019 and a full-rate production decision review is expected in late FY2020.

SPECIAL K

Although superficially similar to the CH-53E on which it is based, the K-variant has been significantly redesigned and contains a number of cutting-edge technologies.

'The CH-53K is designed and being procured to deliver 27,000lb [12,250kg] externally for 110nm [203km] under high-altitude/hot temperature conditions,' Pridgen told *Defence Helicopter*. 'This is a significant feat and no helicopter in service today can achieve this. The capability improvement is driven by key technology advances in the areas of engines, transmissions and rotor blades.'

Russian Helicopters is targeting export customers for the Mi-26 in Africa, Asia and Latin America. (Photo: Russian Helicopters)

For example, the CH-53K's four 3m-long tail rotor blades have 15% more surface area compared to those on the CH-53E. To give a sense of what this means, Sikorsky notes that the tail rotor blades on the former aircraft collectively produce as much thrust as the main rotor blades on its S-76.

With key project milestones fast approaching, Pridgen said system-level testing is on its way to completion, to be followed by full aircraft integration.

'The other key challenge is not related to any one subsystem, but rather the integration of all of the aircraft systems,' he explained. 'This integration effort has already successfully progressed through multiple layers of subsystem testing, including risk reduction, qualification and system integration lab testing, but what remains is the aircraft-level system testing, which is now under way on the ground test vehicle, to be followed by flight test verification.

'The programme is also looking forward to transition to production and fleet operations. In that regard, many fleet support activities have been initiated earlier than typical past programmes, including the stand-up of a fleet common operating environment, but it remains a focus to ensure both the transition to rate production and full fleet operational support will be successfully accomplished.'

POWERING UP

On 1 May, Sikorsky announced it had begun full system testing of the CH-53K, with all seven main rotor blades and four tail rotor blades attached for the first time to a non-flying prototype called the Ground Test Vehicle (GTV).

The powered tests with blades spinning follow a 'bare head' test phase without blades of the GTV's systems powered by its three 7,500hp GE38 engines. This is followed by a two-year test programme involving rotor blades, transmission, engines and all subsystems while the GTV is anchored to the ground.

Also developing an evolved version of an existing platform is Boeing, which expects upgraded iterations of its CH-47 to stay in service with the US Army into the 2050s.

The service is modernising its entire Chinook fleet – 464 aircraft in total – to CH-47F standard. Deliveries began in 2006 and in 2013 Boeing signed a second multi-year contract worth $4 billion, which will complete the programme of record and carry production through to 2019.

However, the OEM is already looking beyond the F-model and is mapping out the next upgrade path for the Chinook, aimed at reducing operating costs and keeping it in service beyond the 2020s.

'We go in cycles,' said Mark Ballew, director of business development for cargo helicopter programmes at Boeing. 'Chinook has a long history of upgrades – you don't get to be a 50-year aircraft by flying the same thing for 50 years. The cycle with the F-model was a new airframe, reduced vibrations, increased situational awareness.'

Key elements under the knife include the drive train, rotor and fuel system, Ballew explained. 'The next upgrade is going to be in the drive train. We are already working on the advanced Chinook rotor blade, which will look at new designs, tips and materials. We are going to be able to generate an additional 1,500lb+ of lift just by changing the rotor blade.

'We also want to be able to increase the shaft horsepower availability of the transmission. We have had teams working on that for the last couple of years, looking for the sweet spot (for want of a better word) of how to get the maximum capability from the dimensions of the airframe as it stands today.

'You find out a lot of things you can't do, but you also find out what you can improve. We can increase payload by about 4,000lb. So we will go from a 50,000lb aircraft to a 54,000lb aircraft.'

FUELLING CHANGE

He continued: 'We are also going to be changing the fuel system to an extent. We'd like to take some of the weight from the fuel pumps and look to increase fuel loads to increase range and also look at fuel flow. Then there is a new vibration reduction phase we are looking at to help reduce stress on the airframe.'

The constant cycle of upgrades does raise other issues, noted Ballew, such as how do you improve on one area without life-limiting some of the components – and how do you do it so that it is affordable?

'I've got to be able to increase lift, reduce weight on the airframe and still provide safety, and I have to be able to do that economically,' he said. 'It's the same with the international customers – everyone is asking how can you make it more affordable, how can you bring down the operating costs? So we are very conscious of how we can make improvements, increase longevity of parts, increase fuel efficiency and reduce drag.'

According to Ballew, one area where savings can be made is in multi-year contracting, through which the US government has acknowledged cost reductions compared to single-year procurements of approximately $450 million as a result of the first F-model multi-year contract (signed in August 2008), and 19% or $800 million in the second multi-year contract (signed in June 2013), with trickle-down benefits for FMS export customers.

Another is through upgrades to Boeing's manufacturing capability. 'We have completely modernised the Chinook production line over the past three and a half years,' explained Ballew. 'It cost $130 million, but has made it much more efficient, and this helps us deliver the aircraft at a better price.'

ATTRACTIVE PROPOSITION

The economies of scale generated by the US programme also make the Chinook a more attractive prospect for export customers, argued Ballew, with Boeing looking at opportunities across Europe and the Middle East in addition to ongoing programmes it has with Canada (15 ordered, eight delivered) and the UK (14 ordered, three delivered).

'As we upgrade the US Army's fleet, a lot of international customers come to us and want to modernise their fleet at the same time,' Ballew said. 'There are a number of advantages to that. There is commonality of parts and of course it is also more economical, as the economies of

scale generated by the US programme make it more cost-effective for international operators to participate.'

In Europe, the likelihood of direct export sales has increased as the prospect of a domestically manufactured pan-European heavy-lift helicopter has faded, with little evidence in recent years of progress on the European Defence Agency (EDA) Future Transport Helicopter programme.

The need to replace the heavy-lift capability in France and Germany remains, but the absence of a new-build programme in the US until the mid-2050s has reduced the potential range of partners, and effectively leaves European militaries looking at either Boeing- or Sikorsky-based platforms when, or if, they decide to go ahead.

Both companies are keen to meet demand and appear willing to offer the prospect of lower costs and industrial participation packages should a programme of record emerge.

'We understand that both France and Germany have a need for heavy-lift helicopters and we have had communications with both countries. A lot of that will come down to working with industry in those countries and whether they can put the requirement and funding together to procure additional aircraft,' Ballew said.

SENSIBLE OPTIONS

He argued that the absence of a major recapitalisation programme in the US makes participation in existing programmes a sensible option for countries looking for a heavy-lift helicopter capability, particularly when the alternative requires a significant outlay.

'One of the challenges when you look at the future of heavy lift is the cost of the development of a new aircraft,' explained Ballew. 'By the time you have done development, engineering, testing and validation, you are looking at a fairly significant bill.

'The US is going to fly the Chinook well into the 2050s before the military starts building the next-generation platforms, so you'll be looking at the 2060s before there are significant numbers of new aircraft in the fleet. So the question is, if the Chinook is going to continue to be modernised and sustained through the 2060s, doesn't it make sense to join the US and 20 other nations to look at the capability and be part of the next growth generation in the 2020s?'

Sikorsky is also aware of the European opportunity and will look to leverage its existing installed base in Germany (see p18).

'The NATO and German requirements for the Future Transport Helicopter were approved and remain valid. We believe the CH-53K is a viable solution to the Heavy Transport requirement when that effort moves forward,' said Pridgen.

For its part, Airbus Helicopters told *DH* that it remained open to the prospect of a European programme.

In a statement, the company said: 'Airbus Helicopters continues to investigate the potential for a future heavy-lift helicopter (also known as the Future Transport Helicopter), within the parameters of market demand. The company maintains an effort to understand the requirements of such a programme in a complex civil and military market environment, while exploring all avenues that could facilitate further development of the project. A dual-use (civil/military) pre-design concept based on NATO staff target requirements was finalised in 2012, generally acknowledging the technical feasibility to transfer the currently defined capabilities into a new-generation rotorcraft.'

System testing of the CH-53K with all rotor blades attached commenced in May 2014. (Photo: Sikorsky)

OPTIMISTIC OUTLOOKS

Beyond Europe, there is optimism that demand for heavy lift is strong. Ballew added: 'One of the advantages of the multi-year contract we signed last year is that there are options for FMS. We've already got a number of customers that have exercised those options through the US government.

'We've been making progress on a number of international programmes. We are in contract discussions with India and we are getting closer to that being finalised. We believe that will be signed in late summer or early fall. We've met the requirements and been able to work through most of the detail, and now it's getting down to the final approvals to get it signed. We're making good progress and working very well with the Indian customer. We have had lots of discussions of how to make it beneficial for both sides, so I think that will happen in 2014.'

Beyond India, Ballew is confident that the aircraft will see further sales in the Middle East. 'We took a Chinook to the Dubai Airshow in November. We are making progress on a couple of new customers that have not operated the platform before, so I think the next couple years will definitely see new countries joining the programme.'

MIDDLE GROUND

Of course, Boeing is not the only helicopter manufacturer interested in meeting heavy-lift requirements.

Pridgen was confident the CH-53K will see export sales, particularly with existing operators of the CH-53E. 'Other countries have expressed interest in the Kilo,' he said. 'Israel will be looking to replace its current fleet in the next decade. Several other nations have expressed interest in heavy-lift and maritime helicopter capabilities.'

Russian Helicopters, meanwhile, has identified the CIS countries, Africa (Russian military news agency ARMS-TASS reported in February that Algeria would acquire six Mi-26T2s), Latin America (where it is in service with Mexico, Peru and Venezuela) and China (which already operates the Mi-26T) as key potential markets for the Mi-26.

Although it offered the Mi-26 to France and Germany in respect of the European heavy-lift requirement, this was not taken up. ***DH***

The cavalry has arrived

Lt Col Victor Hamilton, of the US Army's 2nd Combat Aviation Brigade, 2nd Infantry Division, talks to Gordon Arthur about the OH-58D and the unit's future composition.

The 2nd Combat Aviation Brigade (2 CAB), part of the US Army's 2nd Infantry Division on the Korean Peninsula, received a capability boost when a rotational OH-58D squadron joined it last October. It transformed 2 CAB into a medium aviation brigade, according to its deputy commander, Lt Col Victor Hamilton.

Talon Brigade is headquartered at Camp Humphreys near Pyeongtaek. Hamilton explained that it is home to 2,800 personnel and 130 rotary-wing aircraft. The brigade's equipment has been constantly modernised – for example, it is now fully equipped with CH-47F Chinooks, after the last seven of 14 refurbished CH-47Ds were handed over to the Republic of Korea (ROK) Army in late March.

The arrival of the 4th Attack Reconnaissance Squadron, 6th Cavalry Regiment (4-6 ARS) and its 30 OH-58D Kiowa Warriors in October 2013 brought 2 CAB back to full strength after being significantly eroded due to extended commitments in Iraq and Afghanistan over the past decade.

Hamilton, himself a Kiowa pilot, told *Defence Helicopter* the OH-58Ds 'add depth and redundancy' to the brigade. 'They bring a cavalry mindset,' he explained. 'They gather information quickly and enable real-time decisions.'

In the event of North Korean aggression, dispersed 2 CAB assets would support ground forces in the western corridor approach to Seoul.

CLOSING IN

He added that the Kiowa Warrior is ideal for close-in intelligence gathering. 'It has the ability to get into a few more corners of the room to look for dust balls. With the OH-58D's small size, you might possibly sacrifice some persistent lethality, [but this is made up for] in nuances of reconnaissance, surveillance and target acquisition.'

However, the US Army is planning to divest all single-engine helicopters under the Pentagon's FY2015 budget plans, including the entire OH-58D fleet.

While noting that it was possible the role of the Kiowa will soon be taken over by Apaches on the peninsula, Hamilton said that would make logical sense. 'I do not believe it's the platform that makes the mission – it's the soldiers. So long as the mission does not significantly change, there's still a need for information early and often. I think it makes no difference where that information source comes from, ie the vehicle or platform.'

PLUG AND PLAY

Asked about the nine-month rotation of 4-6 ARS – the first US Army unit on the peninsula to perform such a deployment – Hamilton praised this 'plug-and-play' model. Units in Korea typically suffer 50-60% natural attrition rates that require a continuous training model. 'But when a rotational force comes into theatre, they're fully trained,' he pointed out.

4-6 ARS's replacement unit from Alaska will take over the OH-58Ds later this year, Hamilton revealed. Another advantage of the cyclic rotations, as he sees it, is that they maintain an expeditionary mentality for CONUS units.

In late January, the 1-12 CAV combined-arms battalion arrived as another rotational deployment to the 2nd Infantry Division. Hamilton indicated he would not be surprised if such rotations become more commonplace: 'It will only get more effective in the future as we get more chances to do it.'

He said cooperation between US and ROK forces was critical. 'We do a lot in a combined setting with our ROK counterparts,' he explained, adding that US Army units on the peninsula train for conventional warfare, which makes a welcome change to counter-insurgency operations.

WATER WORLD

Another theatre-specific characteristic is the need for over-water flying, according to Hamilton. With North Korea favouring the use of high-speed boats and mini-submarines, targeting such craft is an important skill.

Indeed, 2 CAB is located just 55km from the Northern Limit Line that demarcates the maritime border between the two Koreas. Pilots are also competent in landing aboard USN vessels, something that may well be required in wartime.

Camp Humphreys, which has a single runway, is currently the subject of a significant expansion programme. US Army Garrison – Humphreys (USAG-H) will eventually host all ground units of the 2nd Infantry Division as US forces consolidate at two major hubs south of Seoul.

2 CAB has already received what it calls a 'super-hangar', a $42.5 million multipurpose building that services all helicopter types and which opened in November 2012.

The deputy commander believes another such hangar is in the pipeline at USAG-H. The depth of available maintenance capabilities (eg an engine-run facility) means 2 CAB is a 'self-encapsulated team'.

The US Army is planning to reduce its active-duty combat aviation brigades from 13 to ten over the next five years. However, Hamilton was unaware of any plans to modify 2 CAB's makeup, which reflects the renewed emphasis the US is placing on the Korean peninsula. ***DH***

22-26 FEBRUARY 2015
ADNEC, ABU DHABI, UNITED ARAB EMIRATES
Under the patronage of His Highness Sheikh Khalifa Bin Zayed Al Nahyan,
UAE President & Supreme Commander of the UAE Armed Forces.

NAVDEX 2015

DEFENCE TECHNOLOGY FOR THE FUTURE

THE INTERNATIONAL DEFENCE EXHIBITION AND CONFERENCE

The Middle East and North Africa's largest defence exhibition returns to Abu Dhabi in February 2015, attracting more than 1,100 exhibitors and 80,000 local, regional and international trade visitors and officials from governments, industry and armed forces.

For detailed information about IDEX 2015 visit www.idexuae.ae
To book an exhibition stand or outdoor space email info@idexuae.ae

Strategic Partner: TAWAZUN

NAVDEX 2015 Principal Sponsor: ABU DHABI SHIP BUILDING

Co-located With: IDEX 2015

Organised By: IDEX LLC, An ADNEC Group Company

In Association With: UAE Armed Forces

THINK
SPECIAL OPERATIONS

Armed with cutting edge defense helicopter technology. All-weather capable, unrivalled in the harshest environments, combat proven. Ready for special operations from most remote areas or warships.
EC645 T2 - Deploy the best.

AIRBUS
HELICOPTERS