

DEFENCE

Typhoon shows off multirole capabilities

Jon Lake

The Farnborough crowd will be treated on Tuesday to the first public display by a Eurofighter Typhoon carrying a full multirole workload.

Ironically the demonstration, flown by Typhoon project test pilot Mark Bowman in test aircraft IPA1, is a one-day stop-gap to allow regular display pilot Sqn Ldr Matt Elliott to rest.

Laser

In this configuration, carrying six 1,000lb (445kg) Paveway II laser guided bombs, a centreline fuel tank, four AIM-120B AMRAAM air-to-air missiles and a pair of AIM-9 Sidewinders, the aircraft weighs in at some 21t.

But despite this load, the Typhoon retains spectacular levels of performance, as Bowman will demonstrate as he reefs the aircraft into a turn straight after a remarkably short take-off run, and then flies a full display.

"My aim is to demonstrate that Typhoon's agility and performance are unaffected by this heavy load," says Bowman. "Typhoon has so much performance that it eats loads like this, and you're always having to look at backing off the power to avoid exceeding the weapons' limitations. This aircraft is in a league of its own – I'm constantly amazed by it."

"Obviously the aircraft is very heavy, and there is a lot of inertia, but this is transparent to the pilot, because the flight control



Mark Bowman: showing that Typhoon's performance is unaffected by heavy load.

system automatically compensates for the load.

"There is no need for trimming on this aircraft – the flight control system 'knows' that the bombs are

there, and tailors the control inputs."

Bowman insists it is not just a 'fairground' configuration, but demonstrates what Typhoon is really capable of.

"Typhoon is much more than an air defence fighter, but can embrace a number of roles during the course of a single mission – with a real 'swing role' capability.

In a typical swing role configuration, Typhoon goes a very long way, and climbs at Mach 0.85 to 40,000ft (12,000m) plus, while a similarly armed Tornado (with no air-to-air weapons) would be topping out soon after 20,000ft."

This is a capability that the users are crying out for, and IPA 1 is already hard at work in support of the air-to-ground capability, which will start to become available with aircraft delivered at the end of Tranche 1.

Bombardier on a specialised mission

Bombardier has chosen Farnborough as the venue to launch its Specialized Aircraft Solutions (SAS) organisation, set up to promote its special mission range of platforms.

Aircraft from throughout the group, such as the Lear Jet and Dash 8, have been popular aircraft for 'missionising' for years but the company has tended not to go out and actively sell them.

"Bombardier has always had the capability to be a reactive organisation when challenged. We're now looking at taking a more proactive stance," says Derek Gilmour, vice president of Bombardier Specialized Aircraft Solutions (SAS).

Wares

"Rather than wait for people to come to us we're out there now, telling people about our wares."

SAS is a 50-strong group set up in Montreal earlier this year to market the range of Bombardier aircraft available for conversion. Farnborough "seemed like a real opportunity, with the launch of ASTOR, to make the point that Bombardier had a real hand in that, not only as a subcontractor but in developing a solution. We were the principal group for aerodynamic design



Derek Gilmour, vice president of Bombardier's Specialized Aircraft Solutions with the Sentinel R1, which uses a Bombardier Global Challenger as its basis. The Sentinel is a high-end example of the special mission aircraft with which the Canadian-based company is involved.

flight testing and structural design." ASTOR is the UK Royal Air Force's Airborne Stand-off Radar system, which is packaged inside a Bombardier Global Express.

Other recent contracts have included five Lear Jet 35s for a German target-towing requirement and three Dash 8 Q300s for maritime patrol in

Australia. The US Customs Service is also taking three Q300s in the latter role and two other Dash 8s are being modified for classified use by the US Government.

Bombardier is keen to emphasise that it can not only supply the platforms suitable for special mission purposes but also provide associated services such as

interior fit-out and training.

Gilmour says his group is likely to be studying unmanned platforms as well as manned aircraft in the future. One potential candidate for use in the unmanned role is the Lear Jet. "We're just at the beginning of thinking about that. I think that's a market we have to look at in the future."

RAF 'ITCHING' TO TAKE DELIVERY OF SENTINEL

"Frankly, we're itching to get our hands on it," commented Sqn Ldr Phil Hoole of the UK Royal Air Force's 5 Squadron as he showed guests around the service's new Sentinel R1 in the Farnborough static park yesterday.

Sentinel, the platform for the Airborne Stand-off Radar (ASTOR), has an in-service date of November this year, when two aircraft and two trained crews are scheduled to be on strength.

Given the current international situation, the aircraft's intelligence, surveillance and reconnaissance capabilities are looking increasingly relevant.

Asked whether it might find itself flying operational sorties 'for real' rather sooner than anticipated, Rob Crook, Raytheon's deputy project manager, said: "That's obviously a matter for the Ministry of Defence, but the in-service date gives them capability to go if they wish."

Raytheon is anticipating an extremely

busy week, with representatives from Europe, North America and Asia scheduled to tour the aircraft.

Showing journalists around the interior, with its three operator stations ranged down the port side of the fuselage, Sqn Ldr Hoole commented on the attention paid to ergonomics in the design.

He had climbed out of the aircraft at the end of extended-range training sorties feeling in better shape than after a commercial transatlantic flight, he said.

"From an operator's perspective we're extremely pleased with what we're getting."

The Sentinel will normally carry a crew of seven – two pilots, with two image analysts (air force and army) plus an airborne mission commander.

There is a crew rest area for two extra analysts and an eighth crew member can be carried for long-endurance, high-intensity missions.

DEFENCE

What a difference a generation makes, says Lockheed Martin

Jon Lake

Fifth-generation fighters will provide the total air dominance required in modern military air campaigns with seven times greater probability of survival than fourth-generation types.

This was the claim of Rob Weiss, Lockheed Martin's vice-president for business development, who was building the case at Farnborough yesterday for the company's two fifth generation fighters, the F-22 Raptor and F-35 Lightning II.

With such assets available, he questioned the wisdom of 'recapitalising' tactical air power with fourth-generation fighters that could not provide total air dominance or survive in the most advanced threat environment.

Weiss says previous fighters were at best at parity with the threat. US and coalition forces had enjoyed an advantage based on pilot skill and training, rather than on aircraft performance and capability, he adds.

Weiss claims the F-22 and F-35's unique blend of integrated avionics, high performance, advanced sustainment features and stealth put them in a different class to today's fourth-generation fighters,

which he lists as including the US 'teen series' F-15, F-16 and F/A-18, together with newer European fighters such as the Dassault Rafale and Eurofighter Typhoon.

Stealth

The key differentiator between these aircraft and the F-22 and F-35 is Very Low Observability (stealth), which Weiss explains "cannot be designed in after the fact".

This low observability results in the F-35 being four times better than legacy fighters in the air-to-air role, and eight times better in the air-to-ground role, for the same acquisition cost and 80% lower operating and support costs.

It also allows the aircraft to operate effectively in the

non-traditional intelligence, surveillance and reconnaissance (ISAR) role, penetrating much further into the battlespace than conventional ISAR assets, and using their advanced sensors and datalinks to send back high quality imagery in real time.

In a typical air campaign modelled by Lockheed, 230 fifth-generation fighters, supported by 100 airlift and tanker types, were able to do the same job as 725 legacy fighters and 230 airlift and tanker aircraft, at one-third of the cost.

And, in recent exercises pitting the USAF's new F-22 against "the most formidable fourth generation aircraft flying today", the Raptor pilots achieved a 108:0 kill:loss ratio, Weiss claims.



Lockheed Martin is discovering that the video generation of pilots has a natural affinity with the F-22's systems.

VIDEO GAME GENERATION REINVENTS RAPTOR'S ROLE

When Ralph Heath was general manager of the programme that grew into the F-22 Raptor, he would probably have had some misgivings at allowing a youngster who spent most of his leisure time hunched in front of computer games anywhere near the cockpit of 'his' aircraft.

Now, however, as president of Lockheed Martin Aeronautics, he has found that it is this 'video generation' of pilots that is expanding the parameters of

knowledge on the type. "They are discovering ways of using the platform never envisaged when it was conceived and deployed," Heath told a pre-show briefing.

It was the younger pilots, who had grown up around video technology and to whom computers were second nature, who were using the aircraft's data fusion capabilities in ways that the programme's test pilots, perhaps more 'traditional' in their way of discov-

ering things, had not.

"They are inventing new tactics on how you operate as a four-ship or a two-ship formation that isn't what we were imagining when we were given the set of requirements.

"It's demonstrating what a force multiplication that can be, to use the information and sensors on your colleague to operate a much wider formation that has a multiplier effect."

Asked if Lockheed Martin

was prepared to undertake further upgrades of the F-16, despite the risk this could affect sales of the F-35 Lightning II, Heath said the company was "absolutely ready" to improve the older aircraft.

However, he believed that "when people realise what the fifth-generation aircraft offers, they won't want anything else. Anything that's not a fifth-generation fighter is going to be disadvantaged."

Parker opens weapons bay doors on MMA

Boeing has awarded the contract for the weapons bay door drive system on the US Navy's P-8A multimission maritime aircraft (MMA) to Parker Aerospace and Curtiss-Wright Controls. The MMA will act as a long-range anti-submarine, anti-surface warfare, intelligence, surveillance and reconnaissance aircraft, capable of broad-area, maritime and littoral operations. It will replace the Navy's fleet of P-3 Orion aircraft. Parker (Hall 4, A16) and Curtiss-Wright (Hall 3, B18) partnered to win the business and will divide responsibilities for the system. Parker will act as project lead.



On left: Magellan's Bill Matthews and Jim Butyniec and P&W's Bill Gosti and Ed O'Donnell.

Sign on the dotted line...

Pratt & Whitney (Hall 4, F13) has signed a letter of intent with Canadian company Magellan Aerospace for work on the F135 engine which is to power the F-35 Lightning II Joint Strike Fighter. The agreement, announced yesterday at Farnborough, has a potential value of more than \$20 million over the life of the programme.

Magellan Aerospace is to manufacture the Fan Synchronising Rings (which synchronises the rpm of the initial compressor blade with the next stage). This is critical hardware that requires precise and advanced machining capabilities, along with a requirement for strict quality standards.

This latest deal now brings the total value of JSF contracts in Canada up to \$250m, and reaffirms the project's aim of international co-operation.

Teal Group reports continuing strong performance across defence sector

US defence and aerospace companies posted strong results in 2005, with revenue, profitability and debt reduction all moving in the right directions, US forecasting company Teal Group says in its annual 'market briefs' issued yesterday.

Focusing on the 15 leading defence and aerospace companies, the report says revenues continued to increase, rising 8% for the

year. This was the lowest increase for three years, but still a strong performance. Philip Finnegan, Teal's director of corporate analysis, notes that defence electronics companies such as Harris and Rockwell Collins turned in growth figures of 18-19%, almost entirely organic.

Operating profit margins also continued to grow, from 5.8% in 2003 to 6.7% in 2004 and further to 7.7%

in 2005: "Thus, in addition to the growth in revenues, companies are achieving significantly higher profit margins," says Finnegan.

Debt also reduced in the sector, with the 15 leading companies recording a drop in debt of around 20%, to \$45 billion, over the two years to 2005. That group also recorded a 13% increased order backlog, but this was entirely down to Boeing's resurgence.

Tornado F3 upgrade completed early

The Tornado F3 Sustainment Programme (FSP) has been delivered ahead of schedule and within budget, BAE Systems said at the show yesterday.

The FSP represents a significant capability upgrade for the RAF's Tornado F3 fleet, finally providing a full integration of the latest AMRAAM and ASRAAM missiles with associated upgrades.

The £25 million (\$46 million) contract

was awarded in December 2004, and introduced a number of innovative working practices to reduce both time and cost, including using the RAF's Fast Jet and Weapons Operational Evaluation Unit (41 Squadron) for trials and development flying, including a live AMRAAM firing.

This has enabled a formal service release recommendation (PANSRR) to be issued within 18 months of contract award.

RIDING THE STORM

Flight Daily News journalist Paul Derby was among a small band of writers who, to the envy of thousands of show-goers, had the opportunity to take to the skies in the Bell Boeing V-22 Osprey here at Farnborough.

Flight Daily News enjoyed a close-up view of the capabilities of the MV-22.



When you are asked the question: 'Do you want to take a flight in the V-22?' it's something of a no-brainer.

And when during the pre-flight briefing the aircrew spend time explaining the precise location of the airsickness bags with a glint in their eyes, the feeling that this might be a special experience is inescapable. We are not to be disappointed.

Tucked away in a corner of the airfield, far from the public eye, the second of the two MV-22 Ospreys flying at Farnborough is about to 'go hot' as we pull up on the bus. It is guarded, along with an array of other aircraft, by armed police – a sign of the protective curtain being thrown around the Osprey while it is in the UK.

Enormous

While one MV-22 stands guard outside the enormous Bell chalet on static display, Storm 22 is ready to fly.

As the aircraft powers up it is enveloped by a cloud of smoke, a necessary result of pooled oil in the exhaust system being expelled. A short hike across the shimmering tarmac, with the rotor downwash in full effect and we are clambering up the rear ramp into the heart of a \$69 million aircraft that has been decades in development and is now nearing operational capability.

The fact that this remains an operational test aircraft is crystal clear as the cabin is a maze of

Tiltrotor is poised for sales drive

Bell Boeing will use Farnborough as a platform to launch a drive for international sales of the V-22 military tiltrotor, the joint venture said at a packed press conference yesterday.

Industry sources make it clear that there are four near-term candidates to take the V-22 – the UK, Japan, Israel and Australia – although Mike Tkach, Boeing vice-president and general manager for rotorcraft, declines to name potential customers.

What he does confirm is that a key focus for the programme team during the next 12 months will be to reduce the unit cost of the aircraft.

For the US Marine Corps (USMC) the target cost per aircraft is \$58 million by fiscal year 2010. Bell Boeing says it is roughly halfway toward meeting that target, having taken the cost from \$78 million to \$69 million to date.

Bell chief executive Mike Redenbaugh says

international customers could be accommodated in the production schedule because the 30-month lead time for production of each aircraft fits well within the timescales needed for an international procurement.

Gen John Castellaw, deputy commandant of aviation, says investigations continue into the engine issue which led to a diversion via Iceland for one of the MV-22s en route to Farnborough. The Block A aircraft being displayed here do not feature the anti-icing capabilities of the upgraded Block B MV-22s.

Bell Boeing delivered 19 Ospreys in 2005 and is aiming to surpass a delivery target of 16 aircraft this year. The programme currently calls for 360 MV-22s for the USMC, 48 MV-22s for the US Navy and a further 50 CV-22 variants for the US Air Force Special Operations Command.

electrical wiring and cabling. We are going to fly ramp down for the duration of our half-hour in the air, ensuring that everyone on board checks they are buckled in more than once.

A short roll and we are airborne, the ground disappearing at an incredible rate as the true power of the Osprey in the climb is readily apparent. We are cleared to climb to 3,000ft (900m) during a flightplan that takes us out towards Salisbury.

The aircraft is flown by Boeing test pilot Steve Grohsmeier alongside US Navy test pilot Lt Cmdr Matt Rising, who are clearly relishing having a bunch of journalists 'in back' and waste no time

in executing the first of several steeply banked turns just to keep us on our toes.

Our pre-flight briefing had made it clear that public demonstration of the Osprey during show-week would be a highly sanitised affair, partly due to the airspace restrictions in place at Farnborough. But on this flight there are no such restrictions... and it shows.

Hover

We transition to forward flight after a rock steady hover which is so precise that it would have been possible to sip a cup of tea without spilling a drop. Cruising at close to 240kt (440km/h) in forward flight we have the oppor-

tunity, one by one, to take a peek 'up front'. It is spectacular both in terms of the technology on display and the view from the aircraft of golden and green fields in a uniquely British patchwork.

The airstrip at Everley is our destination for a series of tactical manoeuvres designed to demonstrate how the MV-22 will be able to deploy Marines into the field, from the final quarter of 2007.

A rather gentle first approach, confined by the presence of British Army Lynx and Squirrel helicopters in the vicinity, lulls us into a false sense of security. Next time around we complete a straight deceleration approach, one of several occasions during

the flight when it feels like the 2g we are experiencing is somewhat higher.

The agility of the Osprey in a low level hover, transitioning to sideways flight is extraordinary and although it is impossible to hear a word inside the aircraft, the looks on every face tell a story.

We conduct a series of equally jaw-dropping approaches, with every moment committed to memory as any form of note taking is impossible for most of the flight. On the return approach to Farnborough, the chalet line is clearly visible, dominated by the unmistakable Airbus A380. We see everyone within sight stop and stare, transfixed by the Osprey on approach.

Question

The question of just how far we have pushed the envelope quickly puts our adventure into perspective – about six on a scale of one to 10 we are told. It's a sobering thought that VMX-22, the USMC Operational and Test Evaluation Squadron, takes the aircraft far closer to the limit every day.

As we touch down back at the show, the interior is a swirl of tinder dry grass from the baked earth alongside the airstrip and although nobody articulates it, there is a sense of satisfaction that not only have we seen for ourselves a truly transformational aircraft in operation, but those dreaded airsickness bags never saw the light of day.

IN BRIEF

Elisra unveils jamming system

Israeli electronic warfare specialist Elisra (Hall 1, C17) is showing its new ALQ-903 Escort Jammer for combat aircraft at Farnborough for the first time.

Designed to provide automatic radar detection, identification and jamming, the fully digital, pod-mounted Escort Jammer is compatible with most current combat types.

It is carried by a single aircraft in an attacking formation and can operate autonomously or under crew control.

AgustaWestland targets Turkey

AgustaWestland's A129 International, on display here this week, is one of two shortlisted platforms competing for the revised \$1.5 billion Turkish attack helicopter programme, with a final decision due in September.

The A129I is head-to-head with Denel's Rooivalk for the order, which covers 50 aircraft with 41 options.

Turkey cancelled its original attack helicopter contest after a protracted five-year acquisition competition during which Bell Helicopter's AH-1Z King Cobra was initially identified as the aircraft of choice.

Hawkeye fuselage takes shape

Northrop Grumman announced yesterday it has completed fuselage assembly of the first E-2D Advanced Hawkeye airborne early warning and battle management aircraft at its St Augustine, Florida, plant. System components are now being installed.

Compared with earlier members of the Hawkeye family, the E-2D moves from using sheet metal components for structural assemblies to a number of substructures redesigned as machined components.

DEFENCE

Huey upgrade gives Iraqi fleet 20-year life extension

Efforts to increase the capabilities of the Iraqi air force will be boosted by US Helicopter's involvement in a programme to upgrade 16 Bell UH-1H helicopters to enhanced Huey II configuration.

US Helicopter, a division of Bell Aerospace Services, has been awarded the upgrade contract by ARINC Engineering Systems as part of a plan to develop Iraq's organic defence capability. US Helicopter will be responsible for all aircraft refurbishment,

modification and flight test at its Ozark, Alabama plant.

The Huey II upgrade starts with a zero-time overhaul to the UH-1H and adds a more powerful engine along with new dynamic components and tailboom.

There is also a new navigation and communication suite, special mission systems and total rewiring. Bell says that the Huey II upgrade gives a significant performance increase and extends service life by 20 years.



Boeing pushes C-17 to avoid line closure

Jon Lake

The planned delivery of the first Block 17 Boeing C-17 to the 15th Airlift Wing at Hickam AFB, Hawaii, on 18 July will leave just 27 more C-17s to be delivered to the US Air Force, and one more for the RAF. Thereafter, without further orders, the C-17 line would close, and the costs of restarting it might make further orders unlikely.

In an effort to win new orders and to keep the line open and operating at the most cost effective rate of 15 aircraft per year, Boeing offered to hold the current \$220 million price until June. This may have helped the company gain a letter of intent for up to four aircraft from Australia, and a reported order for four aircraft from Canada.

Some studies suggest that the USAF has an eventual requirement for up to 220 or even 300 C-17s, and Boeing sources seem confident that Congress will fund at least three of the seven attrition replacement aircraft required by the USAF.

It is understood that the company has already 'cut metal' and ordered long lead



Decision: The C-17 production line is under threat.

items for 22 aircraft beyond the 180 now delivered or on order.

But despite an obvious requirement for more C-17s, and despite the aircraft's well-deserved reputation, there is real doubt whether the programme will continue.

Problem

The problem is not that there are no customers for the C-17 – Boeing claims interest from Sweden, the Netherlands and NATO – the problem is finding customers soon enough to avoid a production gap.

The C-17 enjoys a formidable reputation. Boeing

has now delivered 100 aircraft ahead of schedule and below cost, and claims that the aircraft is the most efficient airlifter in service today, with an unmatched 87-88% mission capable rate, and a dispatch reliability of 98%.

Though the aircraft has small overall dimensions (similar to a 767), it has a cavernous cargo bay, capable of housing two trucks side by side, or of swallowing any NATO helicopter without major disassembly. The cabin cross section is tailored to fit C-5 Galaxy-sized loads (though it is of course shorter) and the floor is strong enough

to carry main battle tanks. The ramp alone has as much floor area as an entire C-130 cargo bay, and can carry 40,000lb (18,000kg).

Though it can carry strategic loads over strategic range, the C-17 also has superb short field capabilities, and does not rely on extensive ground support, giving the aircraft powerful tactical capabilities. These are exploited by the USAF, which maintains 15 aircraft in a Special Operations Low Level 2 (SOLL 2) fit, replacing C-141Bs previously used in the Special Forces support role.

Taking into account the aircraft's range, speed and payload, Boeing claims that two C-17s give the same capabilities as five A400Ms or no fewer than 11 C-130s.

The USAF is pursuing a homogeneous fleet strategy, and is progressively upgrading all aircraft to the latest standard. Today, most aircraft are Block 13s, but all will be brought to the same standards as the Block 17, with combat lighting (NVG compatible lighting in the cargo area and NVG covert external lights), and a Formation Flying System.

Favourite Rafale opts out of Farnborough

Dassault's Rafale fighter, long a favourite with Farnborough audiences, is missing from the flying display this year, though away from the show, the programme is making rapid progress.

Escadron de Chasse 1/7 'Provence' (EC7), the first frontline Rafale squadron of the French air force, achieved an initial operational capability at St Dizier on 27 June. The unit had nine aircraft (six two-seat Rafale Bs and three single-seat Rafale Cs) on charge, and two of the new squadron's two-seaters and all three single-seaters were immediately assigned to Quick Reaction Alert (QRA) duties.

EC7, previously equipped with the Sepecat Jaguar, operates primarily as an operational conversion unit, but will gain further operational commitments when fully re-equipped, with 20 aircraft, including five single-seaters, at the end of the year.

By then, the 10 operational crews should have been joined by 10 more pilots and five more navigators.

Delivered

By the end of June, 34 Rafales had been delivered, and the type entered service with the Aéronavale in 2004, but EC7 is the first unit to take delivery of the new F2 standard Rafale.

The new variant is equipped with MIDS/Link 16 datalinks and is armed with IR-guided Mica AAMs in addition to the radar-guided versions already in use on the F1 version.

The AASM powered glide bomb will be added to Rafale's armoury at the end of 2007, and the Damocles laser designator and GBU-12 Paveway II LGB in late 2008, when the further improved F3 standard Rafale is also expected to enter service with the next squadron to stand up at St Dizier.

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