Good Show, What !

Farnborough 2010

The tail of the Boeing 787 Dreamliner and the Airbus A380; seen at the static display.

The Farnborough Airshow never ceases to surprise one: either its too hot and all the show air-conditioning breaks down or it rains all the time, or entry to the event is a nightmare with very long, chaotic and slow moving queues. None of this happened at Farnborough 2010: wonderful and mildly warm days with bright sunshine, no rain (or hardly any) and best of all, excellently managed queues while the security checks at the entrance were highly efficient. Great show!

Chief Executive of Qatar Airways Akbar Al Baker, seen with Jim Albaugh, Chief Executive Boeing Commercial Airplanes, at Farnborough. They have agreed to accelerate the 787-8 deliveries while also firming up two 777-200LR options. Qatar's first Dreamliner would arrive in the fourth quarter of 2011 which will be the first of thirty 787-8s on order for the Doha-based airline.

Farnborough 2010 (19-25 July) was sold out with an increased number of exhibiting companies (1450) compared to the 2008 show (1393). This year saw good engagement from decision-makers with 11 UK Government ministers, as well as ministers from overseas plus 70 delegations from 44 countries in attendance. With over 120,000 visitors on trade days and over 160,000 on the public weekend, this puts 2010 almost on a par with the total numbers for 2008, which were 285,000. At the end of the week, orders at the show crossed $47 billion! The show also contributes about £20 million to the local economy around Farnborough. The peak boom year was 2008 when the show saw $89 billion worth of orders. For comparison 2006 saw $46 billion worth of orders taken.

Highlights of this year's show included the eagerly awaited international debut of the Boeing 787 Dreamliner passenger airplane offering buyers the first opportunity to visit the aircraft. The flight-test airplane, ZA0003 touched down at Farnborough on the Sunday prior to the show opening and remained on static display for the first two days of the event. Other highlights included the two Airbus flagships, the A400M and the A380, the F-22 Raptor, two Pakistan Air Force JF-17s (on static display), the Gripen NG Demo and the Sukhoi Superjet 100 regional airliner.

Signalling a clear upturn in the aviation industry, Airbus announced commitments at the 2010 Farnborough Air Show for 255 aircraft, valued at around US$28 billion. The commitments included firm orders for 133 aircraft worth more than $13 billion,

plus memorandum of understanding (MoU) agreements for a further 122 aircraft totalling around $15 billion. The firm orders at the show came from GECAS for 60 A320s worth around $4.9 billion; from Air Lease Corporation for 51 A320 Family aircraft worth $4.4 billion; from Aeroflot for 11 A330-300s worth $2.3 billion; from Garuda Indonesia for six A330-200s worth $1.2 billion; and from Germania for five A319s worth $372 million.

The MoU commitments included 40 A320s plus 10 A321s together worth $4.2 billion from LAN; 10 A330-200s worth $1.9 billion plus 15 A350 XWBs worth $3.8 billion from Hong Kong Airlines; 40 A320s worth $3.3 billion from Virgin America and seven A330-300s worth $1.5 billion from Thai Airways International.

John Leahy, Chief Operating Officer, Airbus commented: "Before the Farnborough Air Show we already had 131 orders, and we predicted that by the end of the week we'd double that. Indeed, the commitments which we have received here, bring our total firm orders this year already to over 260 aircraft." He added: "This clearly proves that the market is back, and that our new end of year target for over 400 orders is within reach."

An overview of the Show layout with the main runway, static display areas, chalets and exhibitor halls.

Airbus had two aircraft participating in flying displays at the show: the A380 and A400M. Both aircraft were also on static display alongside Airbus' newest aircraft, the A330 Freighter which will enter service later this year and the C295 twin-turboprop military transport aircraft. The smallest member of the Airbus Family range, an A318 was also on static display. During the week, visitors could see Airbus' range of aircraft products in Hall 4. The stand featured a 1:20 scale cut away section model of the A350 XWB and also an A350 XWB surround-vision cinema. On the military side, there was a 1:25 scale model of the A330 MRTT

Elbit Systems showcases comprehensive capabilities

A broad spectrum of Elbit Systems innovative solutions designed for the changing requirements of the defence industry were on display in Hall 1. The Company's exhibition focussed on advanced training and simulation solutions via an impressive live multimedia presentation. The Company also displayed an array of next generation avionic systems, advanced electronic warfare, electro-optics and unmanned systems demonstrating leadership in its core business areas. Among items on display was the CockpitNG which is based on a smart central large area display (LAD) and includes all avionic components in one suite. The display was fully integrated with the Helmet Mounted and Head-Up Displays. There was a 22" Advanced Panoramic Display with HD resolution: a new generation avionics display system designed to replace all flight instruments and screens, creating a full glass cockpit. The Targo Helmet Mounted Avionics (HMA) enables pilots to plan, rehearse, fly and debrief using their personal helmets. It is available in stand-alone or fully integrated configurations. Targo is "an excellent solution for fighter aircraft, air lifters, trainers, emergency services aircraft and helicopters".

Elbit Systems and Grob Aircraft AG have joined forces to develop a new tandem cockpit version of the side-by-side seating G120 turboprop trainer. The G120TP features an Elbit Systems glass cockpit with three digital 6"x8" independent smart, multi-functional displays (SMFD) enabling maximum situational awareness and flight safety with a high level of mission simulation and capability for visual tactical training.

22 inch panoramic HD display for helicopters.

Shaking hands at Elbit's stand in Hall 1 are Andre Hiebeler of Grob (right) and Yoram Shmuely of Elbit Systems Aerospace Division in presence of Menachem Bargev, Vice President of Elbit Aircraft Upgrades.

(Multi Role Tanker Transport) and an actual size A400M fuselage section with videos showing the aircraft's operational capabilities.

The Boeing 787 Dreamliner made its international debut at the Farnborough Show. The company also featured an extensive display of new, advanced unmanned systems and technologies. "We've chosen Farnborough as a venue for spotlighting the breakthrough capabilities and innovations of both our commercial airplanes and our defence, space and security businesses," said Tom Downey, senior vice president, Boeing Communications. "We look forward to an optimistic mood this year as industry leaders meet amid signs of economic recovery." The 787 flight-test airplane, ZA003, touched down at Farnborough on morning of 18 July and remained on static display for the next few days. Boeing uses ZA003 to test and certify seats, galleys and associated cabin safety and comfort systems, among other test points. Boeing's exhibit at the show focussed on unmanned systems, including the international debut of the recently unveiled Phantom Ray demonstrator, the A160 Hummingbird and the Unmanned Little Bird. The Boeing Unmanned Systems display area showed more than a dozen products, including the new Integrator and the ScanEagle Compressed Carriage. In addition, Qatar Airways displayed its newest Boeing 777-300ER.

On the military side, Boeing demonstrated the capabilities of its multi-role F/A-18E/F Super Hornet fighter. The company and its customers displayed several other systems, including the air show debut of the 737-based *Peace Eagle* airborne early warning and control platform for the Turkish Air Force. Visitors could also see the C-17 Globemaster III military transport, the F-15E Eagle fighter jet and the AH-64D Apache Longbow attack helicopter.

Lockheed Martin Chairman and Chief Executive Officer Bob Stevens said that the company was committed to supporting its customers by providing affordable solutions to meet their needs in a "new reality" characterised by an escalating set of demands and increasing constraints on resources. Stevens addressed a group invited for a breakfast event designed to give media an update on the Corporation's programmes and priorities and an opportunity to interface with the Corporation's senior leadership team and programme experts.

A critical part of meeting the new demands, he said, was avoiding the "boom-and-bust cycle" in US defence spending. Stevens applauded Secretary of Defence Robert Gates' call for regular growth in the defence budget to improve cost-efficiency. "[Secretary Gates] has been relentless and eloquent in demanding a new kind of focus – from the Department of Defence, the Congress, and the defence industry as well, to be extremely rigorous in determining what our requirements really are, to align our priorities with real world needs and to ensure we do everything possible to make every dollar count."

"We are disciplined in setting priorities to address several of the Corporation's critical programmes and capabilities," he said, "including the F-35 Lightning II, the Littoral Combat Ship (LCS), the Advanced Extremely High Frequency (AEHF) satellite programme and company initiatives to include cyber security and renewable energy." Stevens said that the F-35 was a key defence programme for the US and partner nations, and emphasised the company's commitment to perform well by reducing development risks, minimising cost, improving momentum in the flight test programme and accelerating production capability.

Selex Galileo Raven ES-05 AESA radar for the Gripen NG.

Selex Galileo, a Finmeccanica Company, exhibited its latest technology as part of the Finmeccanica Group pavilion. As a supplier of mission and sensor systems, Selex Galileo showcased its range of airborne radar, defensive aids suites, aircraft and mission avionics for surveillance, combat and ISTAR applications in land and airborne domains. Central to the Company's offering is its AESA airborne radar technology, with system solutions that exploit this technology having been provided to customers in the UK, US, Italy and South America. On display in the static area, AgustaWestland displayed the Lynx Wildcat which integrates the Seaspray 7400E and the HIDAS 15 defensive aid suite selected by the UK MoD.

Another key pillar of SELEX Galileo's portfolio is its range of airborne Electro-Optic (EO) systems such as the EOST 46 four sensor turret and the VigilX system. EOST 46 has been selected for

Airbus A400M was on static as well as the flying display The new airlifter was officially named as the 'Grizzly' at the show on 19 July.

The Dreamliner arrives at Farnborough. Though it did not take part in the flying display, it remained on static display for the first two days.

five different platforms and was displayed at the show. The Company's Airborne Tactical Observation and Surveillance (ATOS) system, installed on more than 10 different platforms in 4 different continents, was present at the Show in one of its most successful versions, featuring the Company's Gabbiano radar and the EOST 45 turret, currently in service on board of the Nigerian Air Force ATR42MP. The Gabbiano is a versatile, X-band, pulse doppler radar also selected as a standard fit on the AW139 helicopter.

"The company is proud of its contribution to the Eurofighter Typhoon programme, where the Company is responsible for the delivery of mission critical systems." These include the CAPTOR M-scan radar, the Praetorian defensive aid suite, including innovative towed decoys, the 'Pirate' Infrared Search and Track (IRST) and over 60 percent of the fighter's avionics suite. Selex Galileo has also been selected by Saab to develop and supply the AESA radar and IRST solutions for their Gripen NG fighter. The Company's Raven ES-05 is a wide field of regard radar system optimised for multi-role/ swing-role operations, while the Skyward G provides full operational passive and stealthy search and track detection capability.

Powering the'planes

CFM International announced that it had completed 150 hours of testing on eCore Demonstrator 1 even as development of the advanced LEAP-X engine continues. Overall, CFM has completed approximately 4,500 hours of component, rig and engine tests of LEAP-X core

The Finmeccanica outdoor display was grand, colourful and spread over a large area.

F-22 impressive at Farnborough

The Lockheed Martin F-22 Raptor demonstrated its unrivaled manoeuverability and aerial prowess at the Show. The Raptor, the world's only operational 5th generation fighter, made its second straight Farnborough appearance after its popular performance during 2008. The F-22 was deployed from Elmendorf AFB, Alaska, and flown by Major David 'Zeke' Skalicky of the F-22 Demonstration Team from the US Air Force's Air Combat Command at Langley Air Force Base, Virginia.

technology to date and the programme is on schedule for engine certification in 2014. The engine manufacturer is currently receiving hardware for the build-up of eCore Demonstrator 2, which will begin testing in mid-2011. eCore Demo 2 will feature a 10-stage high-pressure compressor and two-stage high-pressure turbine, along with the lean burn, low emissions TAPS combustor. CFM will run a third core configuration in 2012, just prior to the first full LEAP-X1C engine test in early 2013.

Earlier in July, CFM delivered the 21,000th CFM56 engine as the company continues to maintain record production rates, producing more than 1,250 engines per year since 2007 and expects to maintain these rates at least through 2012. Through June 2010, the company had received firm orders for 495 commercial, military and spare engines and maintains a backlog of approximately 5,300 engines, which represents four years of production.

Finally, Rolls-Royce secured $1.7 billion in new orders during the Farnborough Air Show. Two new Rolls-Royce powered aircraft made their Farnborough debut, the Boeing 787 Dreamliner and the Airbus A400M. The Trent 700 received orders totalling more than $1 billion for engines to power 17 Airbus A330s from Aeroflot, Russia's national airline and Garuda Indonesia Airlines. Both of these contracts included *TotalCare* long term service agreements. In addition, Garuda extended an existing TotalCare agreement covering its Trent 700 engines and Sichuan Airlines ordered a 12 year TotalCare package for its Trent 700s. Air Transat has ordered extended TotalCare services and Trent 700EP (Enhanced Performance) engine kits, which are designed to improve efficiency and environmental performance. The new seven year extended TotalCare services contract covers five Trent 700-powered Airbus A330s, four of which were covered under previous TotalCare arrangements. The new EP kits will be incorporated into the airline's Trent 700 engines over the next two years. The Trent 700, the only engine specifically designed for the A330, remains the market leader for the aircraft and has secured more than 70% of new orders in the past three years. The engine delivers "the best performance, lowest emissions and lowest fuel burn on the Airbus A330." International Aero Engines, in which Rolls-Royce is a senior partner, received orders for V2500 engines from Yemenia, China Southern and Vietnam Airlines, with value to Rolls-Royce of around $470 million.

AgustaWestland AW159 Lynx Wildcat made its first appearance at Farnborough 2010.

AgustaWestland unveiled its AW169 at the Show.

Helicopters, new generation

The AgustaWestland AW159 Lynx Wildcat made its first appearance at the Farnborough show. The AW159, which will be known as the Lynx Wildcat in Royal Navy and British Army service, is a new generation multi-role helicopter that will replace existing Lynx helicopters. Sixty two aircraft, 34 for the Army and 28 for the Royal Navy, will be built at AgustaWestland's factory in Yeovil with deliveries being completed in 2017. The first aircraft will be delivered at the end of 2011 with the aircraft becoming fully operational with the Army in 2014 and the Royal Navy in 2015. The British Army's AW159 Lynx Wildcat will perform a wide range of tasks on the battlefield including reconnaissance, command and control, transportation of troops and material, and the provision of force protection. The Royal Navy variant will provide an agile maritime capability providing anti-surface warfare capability and force protection and will operate in support of amphibious operations and be an important element in defending ships against surface threats. There will be a high degree of commonality between the Army and Royal Navy helicopters that will mean that an aircraft can switch roles easily, principally through the changing of role equipment.

AgustaWestland also unveiled the AW169, a new generation multi-purpose twin engine light transport utility helicopter designed in response to the growing market demand for higher mission flexibility and multi-role capability in the 4.5 tonne class. A new generation, advanced aerodynamic rotor design will deliver "excellent performance in the most demanding operating environments". The AW169 "eco-friendly design" also benefits from extensive use of composites, advanced airframe aerodynamics, next generation navigation avionics and state-of-the-art

Northrop Grumman and Selex Galileo celebrate IC technology achievements

In July 1995, a team of Northrop Grumman and Selex Galileo engineers convened in Silverknowes, Edinburgh to begin development of a new, revolutionary infrared countermeasures system. This new system, developed for the UK Ministry of Defence, was intended to protect military pilots from the threat of shoulder-fired, heat-seeking missiles, otherwise known as man-portable air defense systems (MANPADS). The resultant Directional Infrared Countermeasures (DIRCM) system, developed and jointly produced by the two defence electronics firms, transformed military aircraft protection capabilities for both the US Special Operations Command and UK Ministry of Defence. Today, 15 years later, the DIRCM system continues to set the standard for military aircraft protection.

In ceremonies at the Farnborough International Air Show, officials of both companies marked the 15th anniversary of the DIRCM programme by donating a DIRCM transmitter assembly previously flown on a Royal Air Force (RAF) aircraft to the RAF Museum in London.

Northrop Grumman was competitively selected for the DIRCM development contract and shortly thereafter formed a strategic alliance agreement with Selex Galileo, a Finmeccanica company, to further develop and produce the systems. The combat-proven system functions automatically by detecting a missile launch, determining if it is a threat and activating a high-intensity laser-based countermeasures system to track and defeat the missile. Today, the Northrop Grumman-Selex Galileo team provides "the most experienced laser IRCM" development and production capability in the industry; with five generations of DIRCM systems developed, over 1,600 pointer trackers, and 1,750 lasers produced for 500 aircraft installations on 50 different aircraft types, including large and small fixed wing, rotary wing and tilt wing platforms."

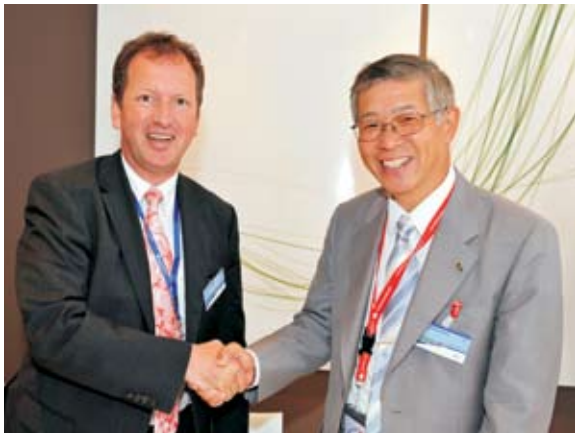
Northrop Grumman's Fire Scout and Eurohawk UAV's on static display at Farnborough.

systems. "Environmental friendliness is core to the AW169 design. New generation advanced turboshaft engines for maximum efficiency/low emissions and advanced rotor aerodynamics producing very low external noise, well below regulatory limits, make the AW169 an eco-friendly helicopter according to the very latest standards. This eco-friendly design also benefits from a wide use of composites, advanced airframe aerodynamics, next generation navigation avionics and state-of-the-art technology", states the company.

CAE announced that it has signed a "master agreement" with aircraft manufacturer, ATR as a framework for providing a range of products and support services to operators of ATR aircraft. As part of this ATR and CAE will collaborate on deployment of simulation equipment and training programmes in ATR, CAE or customer training centres worldwide. Earlier in July, CAE and ATR announced that CAE was now "under contract to provide the world's first ATR42/72-600 full-flight simulator (FFS) and associated training devices." ATR has also partnered with CAE Flightscape to offer flight data analysis (FDA) and flight data monitoring (FDM) services to all operators of ATR aircraft. The CAE Flightscape FDA and FDM services help monitor trends in flight operations to improve safety and efficiency.

At the Farnborough Air Show, Shigeru Murayama, President of Kawasaki Heavy Industries Aerospace Company (KHI) and Lutz Bertling, President and CEO of Eurocopter, signed a new cooperation agreement for the EC145, a new evolution from the BK117 helicopter family. After more than 30 years of cooperation in the BK117/EC145 programme, this signature will extend partnership of the two companies by another 15 years, until 2025. Lutz Bertling, CEO of Eurocopter, stated, "The cooperation between KHI and Eurocopter in Germany works very smoothly despite the long distance, time zone difference and cultural differences. The extension of our contract by another 15 years underlines the success story of our joint product".

The German-Japanese cooperation started in 1977 with joint development of the BK117 helicopter, which had its maiden



Eurocopter and Kawasaki Heavy Industries signed a new cooperation agreement. The picture shows Lutz Bertling, Eurocopter CEO (left) and Shigeru Murayama, President of Kawasaki Heavy Industries Aerospace Company.

Raytheon: a pantheon of products

"As the Indian Air Force (IAF) engages in the Medium-Multi Role Combat Aircraft competition, the nation finds itself with a wide choice of fighter jets. The United States is offering the Lockheed-Martin F-16I Super Viper and Boeing F/A-18E/F Super Hornet, which have an almost unparalleled reliability level proved in thousand of combat hours, and thanks to a continuous upgrade programme, offer state-of-the-art technology", stated Admiral Walt Doran of Raytheon.

As important as it will be to choose the right aircraft to defend Indian sovereignty, perhaps it is just as important to ask the question, "What weapons will arm the newest fleet of fighters?" For Raytheon, which has enjoyed the reputation as the world's biggest missile manufacturer, the question is almost an academic one. "Our weapons are platform agnostic," said Harry Schulte, VP of Raytheon's Air Warfare Systems product line. "In other words, you'll find Raytheon weapons on literally dozens of aircraft."

"Should the IAF choose the F-16 or F/A-18, the weapons package offered by the US government is enticing indeed, as they include a full complement of Raytheon weapons: the AIM-120C-7 Advanced Medium Range Air-to-Air Missile (AMRAAM); the AIM-9X Sidewinder; AGM-88B High Speed Anti-Radiation Missile (HARM); Paveway precision guided bomb; and AGM-154C Joint Standoff Weapon", he further stated.

The company also announced that it had received a contract from Boeing to develop an international version of the APY-10 surveillance radar. The long-range, multimission, maritime and overland surveillance radars will be installed on the P-8I aircraft that Boeing is building for the Indian Navy. This is the first international

Admiral Walt Doran, President Raytheon International addresses the Indian media over a round table discussion at the airshow.

contract award for Raytheon's APY-10 programme, extending the company's considerable presence in the international maritime surveillance market. "Our APY-10 radar will provide the Indian Navy with proven, low-risk technology built on generations of successful Raytheon radar systems," said Tim Carey, vice president for Intelligence, Surveillance and Reconnaissance Systems. "We're committed to providing reliable systems that keep our customers safe and help them achieve mission success."

The APY-10 radar delivers accurate and actionable information in all weather, day and night, for anti-submarine and anti-surface warfare and for intelligence, surveillance and reconnaissance mission support. A member of the industry team that Boeing leads for the U.S. Navy's P-8A programme, Raytheon is also under contract with Boeing to provide six APY-10 systems and spares for the P-8A, of which the P-8I is a variant. Four of the six have been delivered, and Raytheon remains on or ahead of the production schedule.

Raytheon has delivered its 200th APG-79 active electronically scanned array radar to Boeing for installation on US Navy F/A-18E/F and EA-18G aircraft and the Royal Australian Air Force F/A-18F Super Hornet. "As we celebrate our 200th APG-79 AESA delivery, it is also significant to note that the US Navy has now flown Raytheon's AESA radars for more than 150,000 operational flight hours," said Fred Lanes, business development executive for the company's Tactical Airborne Systems business division. "Our service members have received 200 critically needed, combat-proven radars. These milestones are a testament to how our AESA technology has revolutionised fighter combat capabilities and dramatically improved situational awareness for aircrews." The APG-79 AESA is in operation with more than a dozen US Navy squadrons. Internationally, the Royal Australian Air Force has received its first five aircraft ahead of schedule, marking the delivery of the first foreign military sale of Super Hornets equipped with an APG-79 radar. In full-rate production, the APG-79 is produced at Raytheon's Forest, Miss., facility. The Consolidated Manufacturing Centre meets the domestic and international needs of radar production for platforms such as the F-15, F/A-18E/F, EA-18G and Global Hawk. "The APG-79 is one of the most reliable radars available today, delivering 1000-1500 percent more uptime than mechanically scanned array radars, which results in lower life-cycle cost".

A snapshot of Raytheon's outdoor exhibit.

flight in June 1979. Several upgrades of the BK117 were carried out over the years until, in 1999, the latest development, the EC145 (designated BK117 C-2 in Japan) made its maiden flight.

By now, more than 800 BK117/EC145 helicopters have been delivered worldwide by the two partner companies who share development and manufacturing, with three final assembly lines: one in Donauwörth in Germany, one in Gifu, Japan and one in Columbus, Mississipi, USA.

The programme's biggest success came in 2006 when the EC145 was selected by the US Army as its new Light Utility Helicopter (LUH). The contract is envisaged to comprise more than 350 LUHs in total. More than 100 helicopters, which are designated UH-72A in their U.S. Army configuration, have been delivered to the customer on time and on cost from American Eurocopter's production line in Columbus, Mississippi. Both KHI and Eurocopter are confident of further market success of their BK117/EC145 family and future derivatives.

Meanwhile, Bell Helicopter continues to ramp up its production of H-1 helicopters after receiving a $546 million contract in June for the manufacture of Lot 7 of the US Marine Corps H-1 Upgrade programme. The contract includes 18 UH-1Y utility helicopters and 11 AH-1Z attack helicopters. Final assembly of the helicopters will take place at Bell's Military Aircraft Assembly and Delivery Centre in Amarillo, Texas, with deliveries of Lot 7 aircraft to begin in 2011. In October 2009, Bell began construction of a $31 million, 137,000-square-foot H-1 flight operations hangar and 500,000 square feet of additional ramp space at its Amarillo facility. Expansion is expected to be completed in October 2010. Bell delivered one AH-1Z and eight UH-1Ys in 2009 and plans to deliver six AH-1Zs and 14 UH-1Ys in 2010. The company expects to ramp up to delivering 27 aircraft per year in 2012. The UH-1Y is currently deployed to Afghanistan, flying with Marine Light Attack Helicopter Squadron 369 (HMLA-369), the *Gunfighters.*

Thales announced that, together with the Tiger helicopter, its TopOwl Helmet Mounted Sight & Display system (HMSD) had been deployed with the French Forces in Afghanistan, to provide high levels of night vision performance and targeting capabilities for Tiger Helicopter pilots. The Thales TopOwl HMSD has been involved in bringing major operational benefits to helicopter crews. TopOwl is the "only Helmet Mounted Sight and Display system offering both conformal piloting symbology, dark night vision performance and accurate targeting together with an unmatched level of comfort and fatigue reduction – key for war missions and the high levels of stress involved", said company officials. TopOwl night vision performance has recently been upgraded to reach 'level 5,'which corresponds to levels of visibility equivalent to a cloudy night with no moon, no peripheral light source and no starlight. With its exclusive architecture featuring the projection of intensified images directly onto the helmet visor, TopOwl offers a seamless transition between head-up piloting and head-down instrument monitoring, together with a well balanced centre of gravity, eliminating the pilot fatigue generated by standard night vision goggles.

TopOwl is already installed and fully operational on 5 major helicopter programmes: Tiger, NH90, Cobra AH-1Z, Huey UH-1Y and Rooivalk. It is in full-scale production and currently over 700 helmets have been delivered. More than 1,500 systems will be in service over the next 10 years. and has been chosen by 15 countries for their army, navy and/or air force attack and transport helicopters.

Recently delivered Lao Airlines ATR-72-500.

ATR's continued success

Filippo Bagnato, ATR Chief Executive Officer, has announced orders for 42 new aircraft (72 including options) in the first semester of the year. Bagnato stated: "While consolidating our presence worldwide by getting the renewal of confidence from our existing customers, we are continuing to expand our client portfolio with new operators. Our wide array of operators are seeing the benefits from the superior performance and low operating costs of our aircraft and the advantages of our strong support network around the world. Today, we already have 155 operators in more than 80 countries".

ATR delivered 26 new aircraft in the first half of the year. "Both positive results in terms of orders and deliveries underline the good health of ATR", stated Bagnato. ATR's backlog on 30 June is 152 aircraft, which represents more than two years of production. He also underlined recent figures of the International Air Transport Association (IATA) showing some positive signs of recovery in the aviation industry: passenger traffic grew 11.7% from May 2009 to May 2010, being 1% above pre-recession levels. Bagnato also highlighted the evolution of turboprops in regional market forecasts: "Ten years ago, turboprops represented only 15% of the deliveries in 20-year forecasts for regional aircraft. Today, turboprops represent 40%. We know that the reasons of the turboprop success are here for the long term. Our aim is to continuously propose a product optimally matching the needs of the regional carriers." On the ATR -600 series development status, he said, "the 50-seat ATR 42-600 started its flight test campaign in March 2010 and both ATR 42-600 and ATR 72-600 are currently under flight test trials with entry into service of the first ATR '-600s' due in 2011".

‘Typhoon Times’ : the Eurofighter, its weaponry and AESA Euroradar at the Show

Typhoon IPA 5 with full weapon configuration (photo: Neil Bury).

The Eurofighter Typhoon carried out demonstrations of its agility and engine power with a full weapon load in its air display. Two Typhoons participated in the show’s daily display the first from RAF’s No.29 Squadron which flew ‘clean’ as with all display aircraft and the second, a Warton based development jet – IPA 5 – which performed with a full weapon configuration rarely seen at air shows. IPA 5 flew with all 13 hard points occupied in full swing-role configuration, including four Paveway II laser guided bombs, 3 fuel tanks, four AMRAAMs (Advanced Medium-Range Air-to-Air Missiles) and two ASRAAMs (Advanced Short Range Air-to-Air Missiles).

Eurofighter GmbH and Euroradar, together with their industrial partners, have begun full scale development of a latest generation Active Electronically Scanned Array (AESA) radar. The target in-service date for the new radar is 2015 to meet the requirements of Eurofighter Partner Nations and export customers. Eurofighter CEO Enzo Casolini said of the decision “This is an important step in the Eurofighter programme and will ensure that Typhoon continues to lead as the world’s best new generation multi-role combat aircraft. In consultation with our Core Nation customers we can offer an AESA capability that far exceeds any other radar available. This capability will mean that Eurofighter is in the best possible position when offering Typhoon to the export market. The in-service date means we are perfectly positioned to respond to the complex and demanding requirements of air forces”.

The decision means that Eurofighter will further develop capability of the Typhoon aircraft to enhance its radar performance, building on preliminary development and flight testing undertaken since 2007. Although the current Mechanically Scanned (M-Scan) radar is considered to be “best in class,” AESA technology will see the Typhoon’s radar capabilities developed even further. The planned AESA radar will offer a variety of benefits over M-Scan, including increased detection and tracking ranges, advanced air-to-surface capability and enhanced electronic protection measures.

The new radar will retain key features of the existing Captor radar architecture in order to exploit the maturity of the current system and will use latest generation technology to provide a full complement of air-to-air and air-to-surface modes. The large array can be accommodated easily in the Typhoon’s radome and, being fitted on a repositioner, will provide an extremely wide field for Euroradar is a multi-national consortium led by Selex Galileo alongside EADS Defence Electronics and Indra. Euroradar has delivered over 250 Captor mechanically scanned radars for the Typhoon programme to date.

Boeing's large Portfolio for India

The C-17 III Globemaster at Farnborough served as the visual centerpiece of the United States' static display. The eight crew members accompanying the newest cargo aircraft to this international event were from the 301st Airlift Squadron, an Air Force Reserve unit at Travis Air Force Base, California. The crew is made up of four pilots, three load masters and one crew chief. Maj. Steve Hahn, an instructor pilot at the 301st AS who participated at the air show, said "The C-17 was designed for multi-role functions, its strategic and tactical abilities join the missions of the C-5 (Galaxy) and C-130 (Hercules) into one aircraft. It does everything, and not many aircraft can do that."

The C-17 is capable of rapid strategic delivery of troops and all types of cargo to main operating bases or directly to forward bases in the deployment area. "Supporting *Operation Enduring Freedom* and *Operation Iraqi Freedom* are our main priorities," Major Hahn said, "but we also support a lot of other missions."

On 22 July Boeing celebrated the 100th CH-47F Chinook helicopter built at the company's Ridley Township facility. "This is an incredible milestone," said Leanne Caret, Boeing Vice President, H-47 Programmes. "More than 2,000 Boeing employees work on the Chinook programme, and they all share in this exceptional accomplishment with the rest of the company and our partners, suppliers and customers. We are dedicated to delivering aircraft with advanced capability and the utmost quality to meet warfighters' urgent needs."

Following delivery to the US Army in August, the 100th Chinook will be fielded by the next unit to be equipped with this new aircraft. Since completing the first production model CH-47F Chinook in August 2006, Boeing has equipped six US Army units and is in the process of equipping the seventh. Four units have completed deployment in Iraq and Afghanistan, where the helicopter logged nearly 50,000 flight hours and maintained an operational readiness rate of over 80 percent conducting air assault, transport and support operations.

To further meet the needs of Chinook customers around the world, Boeing is implementing a $130 million renovation that will enable the Ridley Township factory to gradually increase production levels from the current four aircraft per month to a new rate of six aircraft per month in 2012. The CH-47F features a newly designed, modernised airframe, Common Avionics Architecture System (CAAS) cockpit and Digital Automatic Flight Control System (DAFCS). The CAAS greatly improves aircrew situational awareness, and DAFCS provides dramatically improved flight-control capabilities through the entire flight envelope, significantly improved performance, and safety in the harshest of environments. CAAS also incorporates an advanced digital map display and a data transfer system that allows storing of preflight and mission data. Improved survivability features include the Common Missile Warning and Improved Countermeasure Dispenser systems.

Dinesh Keskar (left) and Mark Kronenberg addressing Indian media at the show. The C-17 has been cleared for sale to India and Boeing's two rotorcraft, the CH-47F Chinook and AH-64D Apache are competing with their Russian counterparts for the Indian Armed Force's requirements.

The C-17 Globemaster III on static display.

USN F-18 Super Hornet comes in to land at Farnborough : a contender for the IAF's M-MRCA requirement

Flavour and Fancy at Farnborough

Stealing the Thunder, alongside the Gripen NG

Even before the gates formally opened at the Show, on the eve of 19 July, the Saab Gripen NG Demo from RAF Fairford and a pair of Catic/PAC JF-17 Thunders from Kamra-Minhas landed at Farnborough. The former had made its first public appearance outside Sweden at the RIAT (tattoo) that weekend while the latter type were seen for the first time outside Asia, having been flown in by Pakistan Air Force service pilots from their airbase in northern Pakistan, some 9,000 kms away.

These were the cynosure of all eyes, both the Gripen NG and the Thunders on static display fairly close to each other. While the Gripen NG's attributes were more than skin deep, with its greatly changed internal configuration, 21st century cockpit and prime weaponry including the outstanding Meteor BVR missile, the JF-17 Thunders surely were proof of what can be achieved when there is a 'champion of the cause', in this case the Pakistan Air Force (which many wryly compared with the less than enthusiastic attitude of the Indian Air Force on the Tejas LCA).

The Gripen NG Demo has also had a remarkably short development time and in an extraordinary demonstration of panache, the powers-that-are in Sweden cleared the dispatch of this single example for extreme flight evaluation trials in Ladakh, also known as 'Little Tibet', some 10,000 kms away from Linköping to Leh whose airfield is at 11,524 feet above sea level. In words of the officials present, the Gripen NG Demo performed "flawlessly".

At Farnborough, attributes of the Gripen NG Demo were explained to key visitors by Eddy de la Motte, Programme Director for India. The co-incidental meeting of senior Indian and Brazilian officials was captured in the above photograph which has the Swedish Air Chief General Anders Silwer with the Indian Minister of State for Defence MM Pallam Raju, Brazilian Air Force Chief General Juniti Saito, Secretary Defence Production R K Singh and Air Marshal Sumit Mukerjee of the Indian Air Force.

Air Chief Marshal Rao Qamar Suleman, CAS of the Pakistan Air Force (in cockpit, above) spearheaded the large delegation from the PAF and Pakistan Aeronautical Complex (PAC) at Farnborough. The two aircraft (10-113 and 10-114) are PAC-built examples from No. 26 Squadron ('Black Spiders') formerly operating Nanching A-5s from Peshawar. Their CO Wing Commander M Khalid was at hand to explain highlights of the aircraft and various weapons on display. JF-17 programme manager Air Vice Marshal Mohammad Arif stated

that "the proficiency of his engineering team extends beyond their ability to work with the Chinese onboard systems and weapons that are part of the JF-17's original configuration."

The weapons on display alongside the JF-17s included the PL-511 infra red CCMs, SD-10A active homing air-to-air missile, LS-6 glide bomb, WMD-7 targetting pod, KG300G electronic warfare pod and the ubiquitous C-802A anti-ship missile. However, continued AVM Arif, "the long term objective is for the PAC to produce JF-17s for export and so be able to tailor it to their requirements."

It is worth recording the statements made by informed professionals at the

Gripen media conference on 21 July. The first was by a pilot who had access to both the Gripen NG and Thunder cockpits and found that the latter was not only comparable but that "the JF-17 had better avionics, glass cockpit and the airborne radar (KLJ-7) than the F-16C" and that "the cost performance trade-off ratio for the JF-17 is exceptionally good considering the price." Many observers at the Show felt that the JF-17 would be a spirited competitor to the Gripen in the world market as replacement for the large numbers of early model F-16s, MiG-21s, Mirage III/5s and F-5s still in service.

A Pakistan Air Force fighter pilot who has over 2,000 flight hours on the F-16A/B, had earlier flown Mirage IIIs and was part of an evaluation team which also flew the Gripen in Sweden and Mirage 2000 in France, when the PAF was desperately scouting for new fighters in the late 1990s, commented that, in context of the IAF's M-MRCA programme, the Gripen was "easily selected" but that the IAF would never get it. Questioned on the basis of his 'judgement', in deadpan manner he observed "it is too good for you and as you have always bowed to Russian pressure, it will be the MiG-35, mark my words!"

We shall soon see !

VSC

Meteor new generation BVR missile now standard with the Gripen.

C-802A anti-ship missile displayed with the JF-17s.

Former Pakistani Prime Minister Nawaz Sharif visited the PAF JF-17s on static display and is seen with the CO No. 26 Squadron Wg Cdr Khalid.

.... and a glimpse into the "Future of Flight"

Air passengers got a glimpse into the future of flight as Airbus unveiled its 'Concept Plane' at the Farnborough International Airshow. More than a flight of pure fantasy, the images released illustrate what air transport could look like in 2050 - even 2030 if advancements in existing technologies continue apace. Airbus experts in aircraft materials, aerodynamics, cabins and engines came up with the design which is an 'engineer's dream' to meet the expectations of the passengers of the future. Ultra long and slim wings, semi-embedded engines, a U-shaped tail and light-weight 'intelligent' body all feature to further improve environmental performance or 'eco-efficiency'. The result: lower fuel burn, a significant cut in emissions, less noise and greater comfort.

Charles Champion, Executive Vice President Engineering at Airbus, said "The Airbus Concept Plane represents an engineer's dream about what an aircraft could look like in the long term future. It's not a real aircraft and all the technologies it features, though feasible, are not likely to come together in the same manner. Here we are stretching our imagination and thinking beyond our usual boundaries. With the Airbus Concept Plane we want to stimulate young people from all over the world to engage with us so that we can continue to share the benefits of air transport while also looking after the environment."

A recent poll suggests that the passengers of 2050 will be more environmentally aware while also recognising the many benefits of air travel. For the British public aged under 35, 'environmental issues' are second only to 'cost' as a barrier to flying; those aged 55+ rank ease of getting to the airport, flight duration and comfort as being more important. Yet the majority of under-35s also look forward to flying more in the future. Over 40 percent think that for every two flights we make today, we will take at least three by 2050. One in ten of us expects to fly at least twice as much. Behind the numbers is a belief that we will live in an increasingly multicultural world where friends and family will be based further from home, according to 68 percent; 64 percent cite a growing desire to travel further and see more of our planet; and 54 percent the need for greater flexibility between life at home and place of work. At the same time, independent forecasts predict the global population will almost double - more than nine billion.

Further future-gazing by Airbus reveals blueprints for radical aircraft interiors. In 'The Future by Airbus' the company talks of morphing seats made from ecological, self-cleaning materials, which change shape for a snug fit; walls that become see-through at the touch of a button, affording 360 degree views of the world below; and holographic projections of virtual decors, allowing travelers to transform their private cabin into an office, bedroom or Zen garden! 'Green' energy sources like fuel cells, solar panels or even our own body heat might provide energy for powering some systems on tomorrow's aircraft. As aeronautics engineers continue to use nature as a source of inspiration, some of these aircraft may even fly in formation like birds to reduce drag, fuel burn and therefore emissions.

Beyond nature, Airbus is looking to the passengers of 2050 themselves for inspiration as the company enters its next 40 years of innovation.

Friday (23 July) was Futures Day at the airshow, with a programme of activities to engage young people. Airbus ran focus groups to ask the next generation what they wanted from air travel. The same day, registration opened for Airbus' 'Fly Your Ideas' - a global competition challenging University students to develop new ideas for a greener aviation industry. The winners will share the top prize of Euro 30,000; the runners-up will get Euro 15,000.