



# The Air League Newsletter

Issue 5: September/October 2014



*ABOVE - An image from BAE Systems depicts a possible future stealthy "Transformer" air system, that could combine separate autonomous platforms into one, to carry out extended missions.*

*It was one of a number of visionary developments that the company is examining as part of an evolving future air systems strategy.*

## FUTURE TECHNOLOGIES HIGHLIGHTED

**T**he 2014 Farnborough International Airshow once again highlighted the latest developments and technologies in the global aerospace sector, ranging from hybrid and electrically powered aircraft to all-new conventional and unmanned aircraft programmes, and new variants based on existing programmes. But apart from aircraft, the show also acted as a showcase for a wide cross-section of cutting edge innovation and aeronautical and space activity. It was opened by Prime Minister David Cameron MP who stressed that the government now regarded the aerospace sector as one of the nation's most important for generating future economic growth.

Both Airbus and Boeing had their newest aircraft on display during the trade days – the Airbus A350XWB and the stretched Boeing 787-9. and announced orders and options for over 1,200 aircraft during the show. Both manufacturers had earlier released revised future market forecasts indicating that over the next 25 years, the number of new large aircraft required to meet predicted global traffic growth would result in a doubling of today's passenger air fleets. The most anticipated Airbus announcement was the decision to launch the re-engined A330neo powered exclusively by Rolls-Royce Trent 7000s, offering an 11% lower fuel burn. This modernised A330 is a re-invention of the original A350 concept, before it evolved into the bigger and definitive A350XWB. As well as two 787s, Boeing also had on display an example of its P8A Poseidon, complete with a UK crew, who are serving with the US Navy

as part of the RAF's "Seedcorn" initiative to preserve core ASW crew expertise following the demise of Britain's own maritime air capability. The P-8A is the only jet-powered long-range MR contender that comes close to the performance of the lost Nimrods, though Airbus Military is offering a more affordable option based on the C-295 twin turboprop aircraft. Other low-cost MR solutions are offered by SAAB, L3 and Boeing/Bombardier with the Challenger 604-based MSA. The F-35 Joint Strike Fighter no-show was a great disappointment following further engine problems in the US, but in stark contrast an all-new private venture military jet, the Textron Airland Scorpion, crossed the Atlantic and made its first European appearance, attracting much interest as a potential advanced jet trainer and low-cost ISR and attack aircraft. (More Farnborough and Fairford air show coverage on pages 4-6)

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# The President Writes

## The Aerospace Technology Enterprise: Latent Growth or Losing Ground?

*(From the 2014 RAeS Sopwith Lecture)*

**T**he aerospace sector is a huge revenue-earner for the exchequer but is also key to re-balancing the UK economy away from financial services. Much of its output rests on the application of advanced manufacturing to the fruits of long-term investment in research and technology (R&T). In this respect, its tentacles stretch widely throughout the UK's research ecosystem from university departments, through SMEs, to the laboratories of large manufacturers. But, the sector's level of investment in both civil and military aerospace R&T has been on the decline for a number of years. Warning signs were coming from all directions, not least the European Commission which pointed out that defence companies are surviving on the benefits of investment of the past and that there are now serious implications for the long-term competitiveness of Europe's technological and industrial base. Equally, it was clear that UK civil aerospace was losing market share for lack of novel technology. So, where does the solution lie?

In the past, there would have been a cry for more Government money with the false hope of 'picking winners'. Often such policies would have been wrapped in protectionism which does little to enhance competitiveness. It is thus refreshing to recognise that the current Government has adopted a light-touch industrial policy embracing the notion of Growth Partnerships. The two of greatest interest to the Air League are the Aerospace Growth Partnership (AGP) and the Defence Growth Partnership (DGP). Both share the characteristics of export focus, generating innovative technologies at speed, creating a sustainable skills base and being driven by joint funding between Government and industry. This is not about the 'grands projets' of the past such as Concorde. Rather, it is market-orientated focused investment.

The precise catalyst within the export market is different in each case. For civil aerospace with £25 billion of exports in 2013, the focus is on strategic sub-systems such as wings, engines and avionics. By 2032 and the advent of the single-aisle 'green' airliner, the market will expand to \$5 trillion dollars. Already, the AGP with its £2 billion of R&D investment between industry and Government has generated £2.4 billion of growth in the UK sector's revenues. The less mature DGP is focused on growing the UK's impressive £9.8 billion worth of exports in 2013 of which 83%

was aerospace. The key objective is to get ahead of customer requirements and to be first to market with the relevant technologies. The engine-room is the creation of the UK Defence Solutions Centre as a collaborative institution co-funded with £30 million over three years. It recognises that customers seek new and ever more versatile platforms but, increasingly, look for incremental capability enhancement through the insertion of innovative technology in the form of software, systems and sensors.

If this approach bodes well for the future, what other risks exist? There are essentially two: the ready availability of people with the expertise in the STEM disciplines and the sustainability of the UK's research ecosystem. On the former, an ageing aerospace workforce with a median age of 50-54 brings a likely cliff-edge ever nearer. The AGP's 500 MSc bursaries will help as will the DGP's 100 Level 7 apprenticeships (Master's degree equivalent) in advanced systems engineering. But, the problem has to be tackled in primary schools. On our research ecosystem, competition from technology and engineering universities in the Far East is growing fast: The world rankings show one Chinese university at number 12 with institutions in Singapore at 7th and 14th and Hong Kong at 19th. Global companies have choices over where to invest. Overall, we cannot afford to be complacent.

# COMMENTARY *by Aeronautica*

## SEEING IS BELIEVING

**W**hen a new aircraft misses a first appearance at a major air show, many might think it doesn't really matter in a programme that extends over several decades. But, as was seen last year when Airbus went into full throttle to display its new A350 before the end of the Paris Air Show, there is a huge public relations benefit from such exercises. There can be little doubt that in the case of the planned UK F-35 tour, that was timed to create maximum publicity for Britain's most important, and expensive, air programme, all the stops were being pulled out so that everyone in Parliament, the Services, industry and taxpayers could see for themselves this pivotal new aircraft at the heart of policy to regenerate a world-class UK carrier strike capability. The intended schedule included a fly-past over HMS Queen Elizabeth at Rosyth, followed by a close-up demonstration before the world's air forces gathered at RAF Fairford, and finally star-billing at Farnborough International. With joint formations with the Red Arrows and a Harrier, it would have been particularly memorable and with the world's aviation press gathered in the UK, a unique and most timely opportunity to give a global boost to the programme. Months of detailed planning on both sides of the Atlantic was complete, the personnel and support facilities were in place at RAF Fairford, and four F-35B aircraft with their US and UK pilots were waiting in Florida, and a dedicated air tanker was also ready to depart – then an engine fire in a USAF F-35A at Eglin resulted in a grounding order for all F-35s. Despite every effort to restore the airworthiness state and display clearances as quickly as possible it became clear that the decision to cancel the visit was the only option in the circumstances. This was a huge disappointment, especially for the F-35 industrial partners and a very high-level government, service and industry delegation who had flown from the US for the events. In the absence of the actual aircraft many national media broadcasters and commentators understandably homed in on the fact that this impressive new 65,000 ton carrier would go to sea without any fixed wing strike capability, wouldn't start F-35 deck trials until late 2018, and would only become operational in 2020. This was not the sort of message MOD was seeking, and although all this was true, the coverage now lacked a physical focus around which to report on just how advanced the new aircraft is and how transformational it will eventually become.

In reality, great progress is being made to prepare for the introduction of the F-35B, which promises a game-changing ISR/attack combination. It is completely dependent on complex integrated sensors and computerised systems with over 8 million lines of source codes - four times the number on the F-22. Achieving operational reliability in the US is proving a challenge and full weapon system and situational awareness capability is being phased in over many Block phases, reaching out to 2020. In the UK, much detailed work has been undertaken by BAE Systems at Warton to anticipate RN carrier operations using advanced computer simulations. This has created a virtual carrier operational environment that replicates how deck-movements, take-offs, approaches and landings will be carried out, day or night. The integration of the F-35 and the new carriers has required a radical exploitation of CGI technologies to make training for future operations more comprehensive and realistic than ever, much safer and with a high level of automation onboard to reduce crew numbers as much as possible. The synthetic training environment will enable future pilots and flight deck management operators to become completely immersed in, and familiar with, the flying and deck operations before real flying takes place. While there isn't the money in the UK defence budget presently to buy more than a minimum number of F-35s, what would be cause for concern would be an intention to cap the combined RAF/RN F-35 fleet at just 48 aircraft. UK air power has already lost 76 Harriers and 40 Sea Harriers, and more quietly, most of the Tornado GR4s. The RN has had to give up two operational carriers and half its destroyers and frigates to pay for these two new giant carriers, which will require a large proportion



*ABOVE - The new HMS Queen Elizabeth is eased out of her assembly dock at Rosyth.*

of the ongoing navy budget to sustain over 50 years. Although their four acre flight decks are three times the size of those on the Invincible Class, the proposed standard fixed wing air complement is to be similar - only 12 F-35s. The new CVs can operate up to 40 aircraft, and when the two new ships were originally ordered the combined RAF/RN F-35 requirement was for 150 aircraft. This has subsequently shrunk to just 48. However, it is reasonable for the UK government to seek to acquire its aircraft at the best cost negotiable, and at Fairford and Farnborough, US programme chiefs stated that F-35 unit costs are expected to fall from today's \$110 million to \$84million by 2020, so the total numbers to be ordered for the RAF and RN need not be a particular worry just yet. Never before though, has so much been vested in such a key power projection capability, with no Plan B. The sooner the new carriers, and their F-35s can show their worth at sea, the better.



ABOVE - An overall panorama at Farnborough as the Airbus A350 taxis out with the stretched Boeing 787-9 in the foreground.

**T**he summer months of 2014 have seen some of the warmest and sunniest weather for many years, and this has produced a magnificent backdrop for the busy air show season. As ever, RAF Fairford produced a feast of military flying, with visiting aircraft from all over the world. Despite continuing heavy operational demands that include the draw-down in Afghanistan and increased NATO patrols in Eastern Europe, the RAF was still able to demonstrate its professionalism in the shape of the Typhoon and the ever popular Red Arrows. Farnborough International was the



ABOVE - The global fight for new trainer orders continues, and within the Finmeccanica static park at Farnborough were examples of the familiar M-346 advanced trainer and the re-launched M-345 HET, a lightweight single powered trainer offered as a replacement for older turboprops and light jets.



ABOVE: The cockpit of the future – the latest Thales integrated touch-screen cockpit design is fully interactive and enables pilots to select displays showing as much, or as little, as they need, day or night in all weathers, from airport taxiing instructions to route flying and global airport approaches with real-time sensor imagery overlaid on 3-D terrain and obstacle representation.



ABOVE: Involving no US government funding, the prototype Textron AirLand Scorpion, built largely from composite materials, and off-the-shelf systems and components, flew after only 18 months from project go-ahead. It was exhibited at Fairford and Farnborough with a range of potential attack weapons, showing its potential as a low cost replacement close support aircraft for such aircraft as the A10 or armed Hawk or Tucano.

# Show Time!



ABOVE - The Boeing/Bombardier MSA, intended as a long-range surveillance aircraft.



ABOVE - The Red Arrows performed as usual with their superlative flying skills.

**aerospace sector's most important showcase of the year, and there was much to see during the trade days and on the final Futures Day, aimed at young people, but by the public display days most of the newest aircraft had departed and an expanded programme of vintage aircraft was brought in to enhance the flying content.**

The Typhoon received a boost with news that more UK and European government funding was being allocated in the development of the Captor-E AESA radar, together with a speeding up in the integration of the MBDA Storm Shadow stand-off missile. MBDA's new Brimstone 2 air-to-surface missile is also destined for Tornado and later, Typhoon. The RAF and Raytheon received confirmation at the show that the Sentinel R1 and Shadow R1 intelligence gathering and surveillance aircraft are *continues on page 6*



ABOVE - 2014 might be the last time the sleek Avro Vulcan appears at a Farnborough air show, but it never fails to look and sound truly awesome compared to every other item on the flying programme!



ABOVE - The various innovation areas at Farnborough provided plenty of inspiration.



*ABOVE: The Boeing 737-based P-8A Poseidon maritime patrol and anti-submarine aircraft, aboard which US-based RAF "Seedcorn" exchange personnel explained the new aircraft's maritime capabilities.*

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being retained beyond the Afghanistan withdrawal and the Sentinel will now be given an upgrade which will enhance its maritime capabilities, though this is not intended as an interim MPA solution.



*ABOVE - The D-Day stripe adorned RAF Typhoon provided a dramatic demonstration of the fighter's agility in the air.*

The truly awesome Vulcan and a visiting Spanish Navy AV-8B+ Harrier were both highly popular, and a reminder of Britain's proud aviation heritage. British built aircraft visible at this year's Farnborough show were a Britten Norman Defender in Army colours, Royal Navy AW Merlin 2 and AW159 Wildcat helicopters, Hawk T2 and Typhoon. A single Air Tanker A330 Voyager made a fleeting one day visit. Familiar British jets from yesteryear included the Canberra PR9, Vampire, Meteor and Gnat. More nostalgia flew in the shape of the Anson, Spitfire, Sea Fury, C-47 Dakota, Super Connie and a World War One "flying circus" of replica British and German bi-planes. But as ever the true value of Farnborough was to be seen during the week in the exhibition halls where companies such as Rolls-Royce, Martin Baker, Safran and hundreds of SMEs were able to showcase their world-class products. Elsewhere the growing number of large company pavilions, including those of Thales, Raytheon, GKN, CFM, Embraer, Lockheed

Martin, Boeing, BAE Systems and Airbus, were also full of interest, the Airbus and BAE Systems pavilions including major areas devoted to future innovation and transforming technologies.

The Space Hall and science-related exhibitions were larger this year and attracted crowds of young visitors. The UK space sector, which is expanding at a dynamic rate, received an uplift with news that a short-list of potential runway locations for a planned UK Spaceport was being examined by the government with the aim of building Europe's first facility of its kind to operate future tourist carrying and satellite launching spaceplanes. In case anyone was in doubt of the seriousness of this proposal, they only had to visit the large Reaction Engines stand to see and hear of the progress being made developing the revolutionary Sabre hybrid engines and continuing design refinement of the accompanying Skylon space vehicle that will one day allow easier space access into Low Earth Orbit. This innovative design has the potential to make repeat journeys into space an everyday possibility, carrying a significant payload and at a far lower cost than today's expendable rockets requiring massive launch infrastructure.

*(All photos by Editor)*



*ABOVE: A most welcome return to UK skies was this Harrier. The Spanish Navy intends to retain its radar-equipped AV-8B+ Harriers until at least 2025. This one thrilled the crowd each day with its hovering and ultra-short take off and landing.*

# LEADING EDGE at Farnborough

Scott Pendry reports

The Air League Leading Edge put in a strong showing at the Farnborough International Airshow and were set up with a stand alongside the Aviation Skills Partnership in the show's 'Innovation Zone'. This was an area that focused on capturing the imagination of what is possible within aviation and in attendance were many interesting organisations showcasing their latest innovations such as UAVs and advanced engines.

Many of the organisations present in the zone were focused on the younger element of the show and so it was the perfect place to be to generate interest in the Leading Edge and the wide range of scholarships and bursaries made available by the Air League Trust. Sporting some newly designed bright blue polo shirts, the Leading Edge members made the most of this high profile opportunity to share their enthusiasm for flying with young people.



ABOVE - The Leading Edge Group at Farnborough International poses in front of a Qatar Boeing 787.



It was also a good opportunity for the members of the Leading Edge Panel to network with a variety of different aerospace firms, in particular Grob Aircraft, Martin Baker, Diamond Aircraft and Cobham. Armed with the new corporate brochure, the Panel Members made a strong case for the fellow exhibitors to get more involved!

All in all it was an excellent show and a great opportunity for the Leading Edge to spread the word.

LEFT - Enjoying the sun and flying display, the group take advantage of a prime viewing location above the Diamond Aircraft chalet.

## Andy Ballantyne sent us this report:

"I am writing to thank the Air League and British Airways for the fantastic opportunity to visit Cranebank for a tour of the SEP facilities and to fly a 747 simulator.

Having had an excellent visit to Waterside the previous week as part of my university course to see first-hand how the airline deals with crisis situations and learn more about their safety management systems, the informative tour of the SEP facilities was invaluable. Using the emergency evacuation slide was great fun whilst giving me a real appreciation of just how important they are. Being in a confined aircraft cabin which is rapidly filling with smoke is something one never hopes to experience, but the simulator enabled me to gain an insight into what it would be like and

demonstrated how flight crew train for such situations. Although I had seen photographs of the simulators, seeing them for the first time was highly impressive and it is safe to say that everyone was excited to go in it and sit at the controls of a 747! With the obligatory photos taken, we were able to appreciate just how unbelievably real the simulator felt which was reassuring given that the pilots undergo the majority of their training on them. Senior First Officer Dave Stanley, the pilot in command of the simulator, made sure that we got the most out of the experience by letting us try a take-off, some flying and a landing in wherever in the world we wanted. Having some experience flying gliders as well as light aircraft through

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## LEADING EDGE at Farnborough - continued from page 7

an Air League scholarship, lining up on the runway at SFO in a 747 was somewhat surreal, not to mention just a little bit daunting. I was fully immersed in the experience due to the authenticity of my surroundings both inside and outside the cockpit, although attempting to fly a jumbo jet under the Golden Gate Bridge made me quite glad I was in a state of the art simulator worth £10m rather than the actual aircraft! Flying a 747 is something that any aspiring pilot like me would love to be able to,

and I cannot thank the Air League and British Airways enough for the opportunity. The whole evening was impeccably well organised and run by Andy Perkins and Andy Clubb, whilst the contagious enthusiasm of the pilots who had given up their own time was inspiring. Being able to enjoy the evening with Aerobility as well as fellow members of The Air League and such encouraging pilots made the atmosphere simply brilliant and further strengthened my motivation to become a pilot.

### **Peter Harb writes:**

“The visit to British Airways Engineering at Heathrow was a remarkable and rare opportunity to gain insight into the airline’s daily operations where our members visited several aircraft including, but not limited to, the Boeing 747, 767, and 777. It also gave them a chance to find out more about the BAE Graduate Programme which proved to be very valuable.” Edward Allen added: “Our

visit provided us with an in-depth insight into the workings and structure of BA Engineering. We were lucky enough to be shown round by engineering graduates who were enthusiastic and informative about every aspect of the tour. It was a fantastic opportunity to find out what goes on behind the scenes to keep the large and diverse fleet of British Airways operating around the clock”.

## MEMBERS' NEWS

**S**eventeen year old **Hayden Jakes, a first year apprentice with Marshall Aerospace & Defence Group, who lives with his parents in Newmarket, and who is a member of The Air League, achieved a life-time ambition of flying solo in an aeroplane when he was sent off for his first solo in a Cessna 172 of the Cambridge Aero Club.**

Hayden said: ‘It was absolutely amazing to be flying without somebody sitting beside me, although the penny didn’t actually drop until I nearly came into land that I was all by myself! It really was an amazing experience. I am so grateful to my instructor, Michael Skakles and the Cambridge Aero Club for the instruction they have given me.’

Cambridge Aero Club Managing Director Terry Holloway said: ‘I was thrilled and delighted to be present when Hayden completed his solo and it was an added bonus that our Group Chief Executive Officer, Robert Marshall, whose grandfather founded the Cambridge Aero Club in 1929, was also on hand to congratulate Hayden on this fantastic achievement of a first solo.’ Terry added: ‘Hayden completed an immaculate circuit and a very good landing and we now look forward to him completing his Private Pilot’s Licence.’

### **New Members**

**Corporate Members:** 1140 Steyning ATC

**Individual Members:** Esther Akor, Irfan Al-Faradhi, Thomas Bevan, Nicholas Brown, Jordan Dickinson, Damon Dornan, Ibrahim Farah, Sophie France, Bryony Foyle, Mohammed Hadi, Harry Holmes, Enoch Inyang, Rhiannon Jones, Dizem Kurucan, Thomas Maddock, Miguel Martin, Skyler May, Jack McGillvray, Dzikamai Mudamburi, Danielle O’Driscoll, Aamina Qureshi, Christopher Robinson, Lucie Rycott, Ibrahim Sayid, Christine Scharrer, Stephanie Searle, Aaron Stein, Enrika Teteriukovaite, Kate Thomas, Ugur Tokgoz, Gokhan Tuna, Dylan Turpie

### **Diary Reminders**

20 October: Red Arrows 50th Anniversary Banquet

29 October: Youth in Aviation, House of Lords

26 November: Andrew Humphrey Memorial Lecture

For up-to-date information on all our activities please visit our website at [www.airleague.co.uk](http://www.airleague.co.uk) where you can register for changes to be sent to you by email as they are announced.



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