THE HAWKER ASSOCIATION

NEWSLETTER NUMBER 24 - SUMMER 2009 Published by The Hawker Association for the Members.

Website:www.hawkerassociation.org.uk

EDITORIAL

It's hard to believe, but the Association has just held its sixth AGM; time flies when you're enjoying yourself. The meeting is reported below where you will see that our membership numbers and finances are both healthy so we must be getting something right!

In this issue we have several personal accounts of working for 'Hawkers'; my thanks to the contributors. They make fascinating reading and I hope they inspire more of you to put finger to keyboard or pen to paper. The accounts of talks given to the Association attest to the continuing high quality of our speakers and their subjects; thanks to them, as well.

Following my request in NL.23 some members sent me their e-mail addresses. If you didn't, please do it now! It will make communications much easier for the Committee and more reliable for you.

It has been a sad time for deaths so far this year, including two very long serving 'Hawker' people: Roger Dabbs, stressman, Airframe Engineer and Hawk Project Engineer, and Jack Simmonds, a stalwart of the Experimental DO and the Design Office. They will be missed but theirpersonalities, reputations and achievements live on in our memories.

Write to: The Editor, Chris Farara, at 24 Guildown Road, Guildford, Surrey, GU2 4EN.

Tel. 01483 825955; e-mail <cjfarara@ntlworld.com>

PROGRAMME FOR 2009

Wednesday 13th May	"The Kestrel Evaluation Squadron - and More". **Don Spiers. John Farley** book signing.
Wednesday 10th June	**Summer Barbecue** - 12.30 for 1.00 pm
Wednesday 8th July	"America!". **Dick Wise.**
Wednesday 12th August	Social and video.
Wednesday 9th September	Social and video.
Thursday 17th September	Visit to **Rolls-Royce Heritage Trust museum** - meet there for 10.30 am.
Wednesday 14th October	"Making them Right - an Engineer at Hawkers 1936 - 1976". **David Hassard**.
Wednesday 11th November	"The BAE Systems Heritage Programme". **John L Parker.**
Wednesday 9th December	**Christmas Lunch**

Don Spiers's distinguished Ministry career included the positions of Controller Aircraft (CA) as well as Director General Aircraft (DGA), and **Dick Wise** will probably be best remembered as the Harrier Project Director before he was posted to the USA. Project Manager **John Parker** now has responsibility for BAES heritage activities, and **David Hassard** is Charles Plantin's son-in-law whose talk will cover the work at Kingston of this outstanding engineer.

The visit to the **Rolls-Royce Heritage Trust Museum** at Filton, Bristol, is limited to 20 attendees so please let Barry Pegram (01306 631125) know as soon as possible if you want to go. The visit starts at 10.30 am and finishes at 3.00 pm. Barry will send you details of how to find the museum and explain the security arrangements.

Unless stated otherwise, meetings are at the Hawker Centre, Kingston - the old Sports & Social Club - and start at 2.00 pm. Lunch and drinks are available beforehand, tea afterwards, and there is a large, free car park.

THE 2009 HAWKER ASSOCIATION ANNUAL GENERAL MEETING

This, the sixth AGM, was well attended and those present were pleased to see our President, John Glasscock, once again supporting the Association.

Our Chairman, Ambrose Barber, opened the proceedings with his annual statement. He believed we could be satisfied with the year's popular programme of activities and its many edifying talks from the speakers, a number of whom had had close and distinguished associations with Hawker aeroplanes. In the autumn a party had enjoyed the hospitality of the Royal Air Force Club.

When our Association's constitution was being drafted a stated aim was to publicise the achievements of the 'Hawker' companies, their people and their products. It was, Ambrose said, gratifying to know that we are not alone. Firstly, the Sir Sydney Camm Commemorative Committee has persuaded the Royal Borough of Windsor to allow them to erect a full size Hurricane model in the Alexandra Gardens. Secondly, the Kingston Aviation Heritage Trust has doggedly survived years of frustration but under the Chairmanship of Les Palmer is determined to find a way forward. Ambrose was sure that Members would wish the Association to support both these enterprises.

Being conscious of the pleasure that the Association's activities, its Newsletter and Website continue to give, Ambrose thanked all those responsible. He also thanked Mike Hoskins for his past years as Hon Treasurer, and Martin Pennell for stepping into Mike's shoes. Special thanks were also due to Harry Fraser-Mitchell for his help in launching the Association but who is now regretfully stepping down from the Committee for health reasons.

Our Secretary, Barry Pegram, spoke next, firstly reminding us that sadly we had lost thirteen Members deceased since the last AGM: Bob Coles, David Cooper, Roger Dabbs, 'Doc' Holliday, Trevor Jordan, Bill Marshall, Douglas Realff, Elizabeth Roscoe-Pond, Jack Simmonds, Sadie Simmonds, Don Smith, Mike Stroud, and Herbert Valk. Nevertheless current membership was 371, just 5 down from last year (and 6 up on the previous year). Of these 67.6% were 'local', 27.3% were 'distant' and 5.1% were overseas; of these 15%

were working and 13.4% (49) were ladies. In fact the rate of growth had been fairly steady since 2005. The most popular speaker had been George Black (57 attendees), followed by Al Merriman. Average attendance at talks had been a very creditable 50.

Martin Pennell presented the Accounts for the period 1 January to 31 December 2008. Our finances, he reported, are healthy, with £5072 in the bank at the end of the period. Our income for the year had been £4271 and our expenditure £3090 so there was no need to increase the subscriptions which can remain at £5. (Have you paid ? Ed.)

The Secretary noted a number of points made by Members during the discussion after which Jim Morley demonstrated his remarkable little flying model Harrier. Jim makes the profile-type body, wings and tail unit which are attached to a Snelflight frame mounting four co-rotating electrically powered lifting fans controlled either by an infra-red or radio transmitter, the former for indoor use, the latter for outdoors. The power of each fan is varied to provide roll, pitch, yaw and height control, half the available power being used for hover, the other half for control. Flight duration is 7 - 8 minutes per charge. A left hand lever on the hand-held transmitter is pushed forward for up and left or right for yaw. A right hand lever is moved forward or backwards for nose-down and nose-up pitch, and left or right for left or right roll. Jim flew both IR and RC and demonstrated great precision in his handling of the little aircraft. Jim was an engineer at Vickers but eventually set up his own business, Morely Models, producing helicopter kits. He was a pioneer helicopter modeller, building the first to have collective pitch control. The Snelflight airframe sells for £65 and Jim's Harrier 'bodywork' for £9.95. For more information go to www.snelflight.co.uk. So ended a very enjoyable Annual General Meeting with the Association set for another good year!

HARRIER NEWS

The Qinetiq/RAE Bedford two seat VAAC (Vectored-thrust Aircraft Advanced Control) Harrier T4, XW175, recently carried out trials on HMS Illustrious to test the effectiveness of the 'Bedford Array'. The system provides HUD signals allowing the pilot to accomplish accurate rolling landings on a carrier deck. This landing technique, what we used to call a slow landing, may be used on the JSF F-35B when returning to the deck with high value, heavy weapons in hot climates. XW175 will shortly be retired after some 40 years of flight trials. It has been used for much important V/STOL flight control research by the RAE/DRA/Qinetiq which culminated in the development of the flight control system for the JSF, a vital UK contribution to the programme.

It has been reported that the Chief of the Air Staff, Sir Glenn Torpy, has suggested that the MoD could save £1bn by taking the Harrier out of service early, by 2014, and retiring the Ark Royal and Illustrious thus ending the Royal Navy's interest in fixed wing aviation. Not surprisingly, this is opposed by the First Sea Lord, Sir Jonathan Bond, who supports the current Joint Force Harrier. If adopted the result would be what is euphemistically called a 'capability holiday' until the F-35B JSF enters service in late 2018.

HAWK NEWS

The £165 million Design & Development Contract, signed in December 2004, for the RAF Hawk Mk.128 AJT (Advanced Jet Trainer) has been completed "on time and on budget", according to BAE Systems 'Hawk News'. Based on the Australian Mk.127, the contract covered upgrading the mission systems computers with autopilot, energy management cues, mission data loading and recording facilities, traffic collision avoidance systems for use in civil air space, and a moving map on one of the multi-functional displays. Work is now in progress on a further software upgrade, Operational Capability 2 (OC2), to give the aircraft synthetic training capabilities for the simulation of various operational scenarios.

Aircraft deliveries are under way, with the RAF accepting the first T2 (RAF designation) aircraft at Warton in February with six accepted by the end of March. Training of the first six instructors at the BAES site started shortly afterwards and has now been completed using three aircraft. Ground crew training at Warton took place on the two development aircraft, ZK010 and ZK012, both of which are back at Brough to be brought up to full production standard before delivery. Operations will continue at Warton until later this year when some half dozen of the 28 aircraft fleet will move to RAF Valley for "shakedown" flying and "instructor work". The rest will be put in store at RAF Shawbury awaiting completion of the delayed contract, not signed until June 2008, for a new Hawk T2 hangar complex, the foundations for which were not started until February. The planned in-service date is now November 2009. Altogether 22 Hawk T2s will be delivered this year with the last six to follow in 2010. 'Flight International' reported that the first students will fly the type in mid-2011, more than two years from acceptance of the first aircraft. What will be happening in the interim? It all seems very slow compared to the TMk1 story, and that was with a brand new airframe!

A follow-on order from India, for 40 more Hawk Mk 132s for the Air Force and 17 for the Navy, is now in doubt because the Indian Government is to invite tenders for the supply of further advanced jet trainers. An RFI (Request for Information) has been issued to six companies, including to BAES, for an upgraded Hawk AJT. The other contenders are the Czech Aero L-159 ALCA, the Italian Alenia Aermacchi M-346, the Korean KAI T-50 Golden Eagle, and the Russian MiG ATand Yakovlev Yak 130. It has been reported that this change of mind was caused by problems with Hawk spares and the manufacturing programme at Hindustan Aeronautics.

More bad news was that the United Arab Emirates (UAE) Air Force, a long time Hawk operator, has chosen the Alenia Aermacchi M-346 rather than the Hawk AJT. The M-346 features advanced aerodynamics, fly-by-wire and supersonic performance. This, its first export order, is for 48 aircraft. Many years ago BAES decided not to design a Hawk successor but to improve the capabilities of the existing airframe.

F-35B LIGHTNING II NEWS

On 25 February the second F-35B, BF-2, achieved its first (conventional) flight and joined the first aircraft, BF-1, in the flight test programme. BF-1 will concentrate on STOVL flight operations whilst BF-2's programme will include flutter clearance, high angle of attack handling, performance and propulsion testing. On 19 March Defence Secretary John Hutton announced the purchase of three F-35B operational test aircraft confirming the UK's commitment to the Operational Test and Evaluation phase of the JSF programme (production orders expected are now reported to be 66 rather than the original requirement for 138). The UK is investing $2 bn in the F-35 development programme, the largest of eight partner nations, and from the beginning has been deeply involved in research, engineering and development. More than 100 British companies are involved, including BAES and R-R who provide all rear fuselages

plus tails, and lift fans respectively, Martin-Baker who provide all ejection seats, GE Aerospace Cheltenham (was Smiths Industries), Honeywell Normalair, Goodrich Actuation, Selex, and Ultra Electronics. BAES is investing £800m in the Samlesbury factory. A large BAES engineering team is contributing to the development programme in the US which, of course includes Graham Tomlinson, Dunsfold's last Chief Test Pilot, as F-35B CTP. On 26 March BF-1 started hover pit ground testing to demonstrate the operation of the integrated flight and propulsion controls system which will lead to powered lift flight this summer. The design of the hover pit was based on Dunsfold's grid.

If you have broadband go to www.jsf.mil, click on 'video link', 'miscellaneous' and '2008 2nd Quarter Highlights' to see and hear Graham Tomlinson reporting on progress, including the first flight of BF-1. Amongst the film sequences you can spot flight test operations manager Bob Burton ex the A&AEE and Dunsfold Flight Test Department. It's nice to know that Kingston and Dunsfold's jet V/STOL expertise is being put to good use in the JSF programme.

HURRICANE NEWS

After a three and a half year rebuild Hurricane IIB, G-HHII, flew again on 27 January from North Weald. Part of the Hangar 11 collection owned by Peter Teichman, the aircraft was rebuilt by Hawker Restorations of Suffolk and will be flown by Peter at airshows this summer. A full scale Hurricane model, in 249 Squadron livery, has been mounted on a pillar at the former fighter base, North Weald.

TEMPEST NEWS

Complete and partly restored Tempest II MW376 is on the market. After serving with the RAF Handling Squadron in 1945, in 1948 it was sold to India. At present the aircraft is stored in France.

CYGNET NEWS

The Cygnet flying replica, G-CAMM, built to original Hawker drawings by Don Cashmore in 1992, has been acquired by the Shuttleworth Trust. It is powered by a Mosler falt twin, similar to the original's Bristol Cherub.

WORLD WAR TWO EXPERIENCES

David Talbot of The Second World War Experience Centre (www.war-experience.org) wants to interview anybody with WWII memories, civilian or military, child or adult at the time, for the museum's oral history archive. If you would like to participate in this important ongoing historical project - David has already carried out 1,200 interviews - please call him on 020 8657 7584.

TESTING V/STOL PROJECTS

On 11 February Dr Michael Pryce once again addressed the Association, this time on the importance of testing, particularly in the context of pioneering jet V/STOL aircraft and contemporary ASTOVL aircraft including the F-35B. Mike is now working for the Centre for Research in the Management of Projects at Manchester Business School undertaking research on NECTISE (Network Enabled Capability Through Innovative Systems Engineering) (!) looking at organisational aspects of TLSM (Through Life Systems Management), a project 60% funded by BAE Systems. By understanding the current work of the Harrier and Typhoon engineering teams and working with BAE Systems he expects to deliver advice on improving the efficiency of these operations. For his DPhil Mike explored the technical, managerial and political issues around the acquisition of ASTOVL combat aircraft, looking particularly at the design and testing work undertaken at Kingston and Warton from the 1960s to the 1980s. The contents of this talk originated in that work.

In his work with Kingston and Warton people he determined that the two organisations had quite different philosophies. In simple terms, Warton tested a large number of possible configurations then selected the best for design and build, whereas Kingston used the experience and expertise of its engineers to conceive a design which they believed would be successful and then tested and refined it before build.

The classical testing process starts at the concept which is proved by model tests, followed by design, rig tests of systems and components, build and flight test. V/STOL aircraft testing has to deal with unique issues requiring special test facilities and specialist knowledge, the work often being highly empirical. The chaotic nature of the gas flows beneath V/STOL aircraft makes it essential, but difficult, to relate model test results to the full scale, real world regime. It is possible to predict reasonably well nozzle flows until they hit the ground but thereafter the flows, fountains, recirculations and lift losses are so dependent on small changes that only testing can provide the answers. In the case of the P.1127 the first (hovering) flight was, in current academic parlance, a 'TRL7' (Technology Readiness Level 7) event, meaning that Hawkers really knew very little about what went on underneath the aeroplane and what the consequences would be. However, at the time it was the only way to go. There had been some V/STOL model testing at NASA and some transition testing in Hatfield and ARA wind tunnels. The techniques developed from these pioneering efforts are in use today on the F-35B programme, including the Kingston hot gas rig now at Warton. Although the X-35B demonstrator successfully completed its programme some years ago, Lockheed Martin are not proposing to hover the F-35B until some months after first flight, this cautious approach being deemed necessary because of small, but possibly important, configuration changes - no TRL7 events here. Also, an 'accident' is unthinkable because of the political fall-out.

In sub-scale model testing the understanding of scaling is critical to the development of 'fudge factors' relating model results to real world conditions. Lessons from Harrier experience were that accurate nozzle models were vital and trends were what should be looked for. PCB (Plenum Chamber Burning) Harrier testing is a good example. A test Harrier constructed from units from crashed and redundant aircraft plus an intake plug made cheaply by Kingston apprentices, and fitted with a PCB Pegasus, was suspended beneath a gantry at Shoeburyness range. The effects on hot gas ingestion of nozzle toe-in, strakes and cross dams were measured then compared with sub-scale model test by Rolls-Royce Bristol and Kingston. All the results were different, mainly due to nozzle and toe-in differences, but the trends were clear.

Project design testing using sub-scale models include wind tunnel tests on hot gas ingestion and transition, VIFF with PCB and the effects of noise and heat on structures. Special test rigs and techniques are required and the results of all the tests must be integrated. Here Kingston, with its small, closely knit teams, was at an advantage. Systems and specimen testing also plays a part. Reaction controls, flying controls, hydraulics, structures, avionics, cockpits etc etc must be rig tested to support development, certification and production quality control.

Turning to flight testing Mike pointed out that the P.1127 and Kestrel flight tests proved the concept, not just the vehicle. Dunsfold was where V/STOL became an everyday event. There things could be regularly seen that other organisations had been trying for years to achieve. Another very important flight test programme had been the VAAC Harrier. To overcome the Harrier problem of having three pilot's hand operated flight controls (stick, throttle and nozzle lever) which gave different results in V/STOL and conventional flight, and only two pilot's hands, which inevitably led to occasional confusion and accidents, the RAE pushed for a simpler arrangement applicable to more complex ASTOVL propulsion concepts. DB Harrier T2 XW175 was fitted with an adjustable digital flight control system in the front cockpit with the conventional system retained in the rear for a safety pilot. Over 23 years of flight testing, simulating numerous control concepts, the inceptor strategy was defined. Here there are but two pilot's hand controls or inceptors; stick and throttle. No matter which flight regime you are in, pulling the stick back makes you go up, pushing it forward, down. This British system is in the F-35B and will allow any current military pilot to fly the aircraft easily. In fact, a PPL holder has flown the VAAC Harrier from VTO to VL with no practice. This system ensured UK participation in the F-35 programme and will bring £100 bn of business to this country. Some lessons from studying V/STOL testing are clear: the experience gained is sometimes worth more than the results and this experience resides in the people; empirical testing is essential for V/STOL because of the chaotic flows which cannot be modelled accurately on a computer. The importance of testing is often not understood outside the industry; 'design' may be glamorous but testing is vital.

FOLLAND AND THE SPIRIT OF HAMBLE

On 11 March, Chris Hodson, son of 'Mr Hawk', Gordon, and currently Military Project Manager Hamble, addressed the Association on the subject of Henry Folland, his Company, its products and the site at Hamble.

Chris started by outlining HP (Henry Philip) Folland's early career. He was born in 1889 and his engineering life started with an interest in model aircraft and an apprenticeship at Lanchesters whence he moved to the Daimler drawing office. He then joined the Royal Aircraft Factory (RAF) at Farnborough where he was responsible for the design of the SE.4, SE.5 and SE.5A, the latter becoming one of the finest fighters of WW1. In 1917 he joined the British Nieuport and General Aircraft Co where he designed the Goshawk and Nighthawk fighters and a twin engined triplane bomber. When the company closed in 1921 Folland moved to the Gloucestershire Aircraft Co (to become the Gloster Aircraft Co) as Chief Designer responsible for a long line of aircraft including the 'Bamel' or Mars I racer, the Gloster III biplane racer which came second in the 1925 Schneider Trophy seaplane race, the Grebe, Gamecock and Gauntlet RAF fighters, and the Gloster IV and VI Schneider Trophy contenders, the latter being a monoplane. Folland's last commercially successful design at Gloster was the closed cockpit Gladiator, the RAF's last biplane fighter, but Hawker's Hurricane was ordered rather than his monoplane F5/34 fighter. In 1934 Hawker acquired Gloster and Folland moved to British Marine Aircraft Ltd as Technical Director.

British Marine had bought Sydney lodge at Hamble, a late 18th century mansion and home of the Yorke family, in 1936, together with Cliff House for its access to Southampton Water. On the land a huge new factory was built with a slipway. The intention was to licence build Sikorsky S-42 four-engined flying boats but the scheme and the Company failed financially and the first aircraft was never completed. Eventually the Company was refinanced and its new name, Folland Aircraft Ltd, was approved in December 1937. Folland lived in Cliff House.

Subcontract and repair work got the Company going and soon they were major suppliers of airframe assemblies for Supermarine, Vickers, Shorts and de Havilland. An original design to Spec 43/47, the Fo108 was a large, single engined flying test-bed capable of accepting different power units. Twelve were built and were used for testing Bristol, Napier and Rolls-Royce engines. Another unusual project was the fitting of floats to Spitfires for the Norwegian campaign. The campaign was quickly lost before the Spitfires were available but some were later operated from Egypt's Bitter Lakes. Amongst a number wartime aircraft projects was the Fo116 with variable incidence wings, submitted in response to Spec E38/40 for a Barracuda replacement. A contract was received but manufacture was stopped because of pressure from other work. Sub-contract work continued apace throughout the war but when peace came the orders fell away. The Company then diversified into bedroom furniture (a combined bed and wardrobe), refrigerators, light electric trucks and prefabricated aluminium houses. However, aircraft work returned with design and manufacture of the Bristol Brabazon's control surfaces and ground support equipment. Major sub-contract work followed from many other companies including de Havilland and Bristol.

In 1950 WEW Petter joined Folland as Deputy managing Director from English Electric where he was chief designer for the Canberra and supersonic P.1; prior to that he was chief designer at Westland for the Lysander and Wyvern. He succeeded Henry Folland as Managing Director when the former retired in 1951 through ill health. Petter brought with him his notion for a light-weight fighter which was to emerge as the Folland Gnat.

Meanwhile the company was asked by the Ministry to develop a light-weight ejector seat and Folland decided to base this broadly on a SAAB seat adding automatic operation. Ejection tests were made from the rear cockpit of a Meteor 7.

The initial version of Petter's little fighter was the Armstrong Siddeley Viper powered Fo139 Midge which was flown for the first time, at Boscombe Down, in August 1954. The type was well received by A&AEE pilots. By the time Henry Folland died, also in August 1954, Petter had become MD and Chief Engineer. The definitive Bristol Orpheus powered Fo141 Gnat flew in July 1955, also from Boscombe. The Ministry of Supply contracted for six for evaluation but this did not result in RAF orders. However, the Gnat was bought by Finland (13) and Yugoslavia (2 for evaluation but lost to the Galeb), but India was to be the major customer buying 25 direct from Hamble and building 235 at Bangalore.

In the UK it was the two-seat development, the Fo144 TMk1, that served with the RAF, 105 aircraft replacing the Vampire TMk11 as the advanced trainer. The first TMk1 flew on August 1959 and the last was delivered in 1964. The Gnat became famous at air displays being flown by the Yellowjacks and their successors, the Red Arrows. Interestingly, Donald Campbell used Gnat XM691's rear fuselage and fin for his jet boat, K7. In 1959 Hawker Siddeley bought Folland and final assembly of the two-seaters moved to Dunsfold.

Project work on Gnat developments included a naval version for carrier operations, the reheated Mk4 fighter and the twin-engined, area-ruled Mk5 trainer. There were also several studies for variable geometry fighters and trainers as well as a number of light transports.

As HSA Hamble, manufacturing work covered Avro 748 wings, P.1127 components, P1154, yes, P1154, wings and front fuselages, Harrier single-seat front and rear fuselages and tail units, and two-seater rear fuselages, fins and canopies. An interesting aside was the design and mock-up for a proposed P1127 two-seat conversion. In the 1970s work continued on the Harrier and Trident wings and tailplane whilst in India an order was placed with Hindustan Aeronautics for an indigenously developed Gnat fighter, the Ajeet, with increased fuel and weapon loads; 90 would be delivered.

At HSA Kingston the P1182 (Hawk) advanced trainer to replace the Gnat TMk1 in the RAF was moving ahead. The light and compact Folland seat was considered but for commonality reasons Martin Baker was selected. Hamble was to build the canopies and windscreens, a technology in which they were now world class, together with nose cones and rear fuselages, for the Hawk., as well as Sea Harrier front and rear fuselages, canopies and windscreens.

In 1977 British Aerospace was formed and Hamble became part of the Kingston-Brough Division. In the 1980s, export Hawk and T-45 Goshawk assemblies were added as were AV-8B rear fuselages until this work was moved to Brough, role equipment for all BAe aircraft, and parts for the Airbus A300, the BAe146 and the BAe ATP. When BAe was privatised in 1981, Hamble became part of the Weybridge and then Military Aircraft Divisions until, in 1989, renamed Aerostructures Hamble Ltd, it became a wholly owned subsidiary of BAe plc and part of BAe Enterprises.

So in the 1990s new work was gained on the C-17, the MD80 and 90, the Hawker Beechcraft, the Airbus Super Beluga, the Eurofighter and Tornado together with continuing Hawk and Sea Harrier work. The wide product capability now embraced metallic and composite aerostructures (eg wings, control surfaces, tail units, fuselage sections, nacelles, doors), military role equipment (eg pylons, tanks, mission pods, gun pods, flight refuelling probes), and military aircraft canopies and windscreens. Composite work included McLaren Mercedes and Koenigsegg 'supercar' body tubs.

In 1992 there was a management buy-out of the Hamble organisation. In 1995 Aerostructures Hamble became part of the EIS Group; in 1998 EIS became part of the TI Group who merged with Smiths Industries in 2000 to become the Smiths Group, who sold Smiths Aerospace to GEC in 2007 making Hamble part of that division of GE Aviation Systems called Aerostructures and Propellers. Customers include Hawker Beechcraft, EADS, BAES, Airbus UK, Boeing military, Bombardier, Spirit Aerosystems (suppliers to Boeing civil), McLaren and Koenigsegg. A modern aerostructures manufacturing business has also been established by GEC at Suzhou in mainland China doing work for the UK and US operations. Today the Hamble establishment employs 933 people in a 2.3 m sq ft site with 500,000 sq ft covered; the annual output is 136,000 deliverables.

This is but a summary of Chris's detailed, well illustrated talk, which was a real eye-opener to those present with memories of how Hamble was in the 1960s.

HAWKERS IN THE LATE 1930s

Doug Halloway was reminded of his time at Canbury Park road by Tom Clare's story in NL.23...

I started at Canbury Park Road in 1938. I remember well the machine shop on the ground floor, a mass of whirling shafts with belts to each machine, which could be seen through a 15 foot square opening in the first floor, no doubt to improve the light level and air circulation. The first floor was called the 'rib shop' where a lot of, mainly Hurricane, details were made and where I started my career in aircraft. I was regularly moved to other departments to gain experience, and I remember Tommy Sopwith walking through the ground floor Hurricane centre-section shop with his young son holding his hand.

For a while I worked on the 'plane floor' which was on the railway side of Canbury Park Road next to the experimental building which had the canteen on the top floor. The flat roof above the canteen had Lewis machine guns mounted; I don't think they were ever fired at any aircraft although there were several occasions when they were low enough.

The tea trolleys for morning break had lovely hot doughnuts, cold cream ones, and thick slices of bread and dripping. The milk cartons held about one third of a pint and when not quite empty could be a formidable missile, one of which unfortunately hit a supervisor in the chest as he came round the corner into the 'rib shop'. There were three supervisors who walked round at any time - Gamble, Sellers and Simmons - and quite often would sack people on the spot for any slight misdemeanour. This time Simmons's suit was splashed with milk and he just stood there while we all tried not to laugh, until one chap looked up to see him still there. He was immediately suspended for three days without pay; I don't think he threw the carton, either.

Painting heels with Duralac was still done in 1938, personal drawers in the wooden benches would be nailed up, or someone's smock would be hung up in the rafters. Archie, the one armed custodian of the toilet, was still there to put your name in the book and record your time; over ten minutes meant a bang on the door.

Things changed when war broke out and we started working longer hours. Early in 1940 the rib shop moved to an empty factory on the Slough Trading Estate, a long coach ride from Kingston each day starting at 7.00 am and sometimes not getting back until 10.00 pm, quite often during an air raid. I helped start a new department for Hurricane wing skins supervising about fifty women, but that's another story.

THE R&D DEPARTMENT IN THE SIXTIES AND SEVENTIES

Norman Long recalls his time in the Research and Development Department...

I joined Hawker Aircraft at Kingston in 1962 as a sixteen year old Engineering Apprentice. One highlight of my first year in the Apprentice Training School was a talk on structural testing by Derek Thomas from Rochefort's then R&D department. This was followed by an exciting tour round the huge airframe test frame and the labs. in the Experimental building. I remember being introduced to Derek's 'boys' - probably Richard Cannon, Colin Flint, Brian Indge and others - in the main control room and being fascinated by all the sophisticated electronic control equipment and the rigs they had developed. I had an interest in making radios and other electronic devices and after seeing what they did, their enthusiasm, the stimulating work, and the general camaraderie of the team, I was determined that this was where I wanted to work when I finished my apprenticeship. In the years that followed I made frequent visits to the lab., usually on the scrounge for the odd transistor or other electronic component from the scrap box to use in my own projects at home. As a result I got to know Richard Cannon and the other boys in the lab. really well.

Derek Thomas, later Head of Ground Test Services, was one of the most charismatic engineering group managers I have ever known. He had a way with words which would make his engineers feel ten feet tall, invincible and prepared to take on anything! Once when I was in the lab. during one of his weekly tours he said to me, "Oh, you'll have them eating their own young next", likening the electronic equipment I was developing to an animal creation. Such interest and encouragement was really motivating for the young engineer. Derek had a good awareness of the skills and attributes of the people in his group and was always finding new ways of raising the bar and challenging the team. As a result he was adept at selling ideas to the directors and other senior management to fund new and exciting projects and equipment which encouraged success in the group.

One of Derek's 'hot buttons' circa 1966 was an idea to replace the g meter fitted to aircraft to assess structural fatigue. The g meter counted the g excursions encountered during flight and Derek wanted to substitute a meter that counted load excursions measured by strain gauges mounted at key points of the structure. He believed that this would give a far more realistic picture of actual airframe fatigue. Subsequently when I passed through R&D on my apprenticeship tour of departments I got the job, under Richard Cannon's magical mentoring, of doing a design study to investigate the feasibility of this idea. The study started with the writing of a computer programme, for the early Ferranti Pegasus valve computer using the Autocode programming language, to simulate a fatigue counter with, say, twenty or more key load points each with ten or more load excursion counters. Periodically the load excursion spectrum of counts for each point would be dumped and subsequently analysed for cumulative fatigue damage. The study then went on to investigate the viability of producing a prototype based on the Ferranti FM1600 airborne computer that fitted in a standard ATR airborne equipment box.

Once the study was complete I went with Derek and Richard to the RAE Structures Department at Farnborough to discuss the idea with them. While we were there we were invited to go down to the structures lab. to see the Concorde fatigue test which was controlled by a Digital Equipment PDP10 computer. The whole thing was quite something, particularly the way the airframe skin temperature had to be heat cycled, to simulate supersonic flight, in addition to the normal load cycling with which we were familiar.

During the last six months of my apprenticeship and when it was completed I finally joined Richard Cannon's Control Engineering section working initially on signal conditioning and electronic control equipment for the Kestrel static strength test. It was now circa 1969 and there was some concern over the fatigue life of the Folland Gnats used for training at RAF Valley and by the Red Arrows. Given Derek's earlier load excursion fatigue counter interest I assume he used his influence to utilise this Gnat problem as a means of initiating a project to develop a prototype fatigue counter or meter. The scheme consisted of instrumenting with strain gauges the tailplane or fin of one Red Arrow Gnat and one from Training Command . An electronic unit then evaluated any changes in load relative to four pre-set levels and recorded them on eight numeric counters, four up and four down. I did the electronic and printed circuit board design and Alan Abbot, originally from the lofting department, did the mechanical packaging design and the changes necessary to fit it all into the aircraft. The main unit with counter display was fitted in the cockpit and a small strain gauge preamplifier was fitinatalled in the fin through a small access panel.

For convenience the equipment was fitted first to one of the Red Arrows which at the time was on summer detachment at RAF Kemble. Over the summer we went to Kemble a number of times but could not get access to the aircraft until after flying had finished for the day. Therefore during these airfield visits the drill was that Alan would pick me up at about 11.30 am and we would drive to Kemble, stopping off at the Star Inn in Kingsclere for a nice carvery lunch. Then on to Kemble arriving at the airfield at about 3.00 pm to start work in the hangar as soon as the aircraft was available, working until late evening. Unfortunately, during the initial commissioning trials we had lots of problems with spurious counts. After discussion with the RAF it was decided, that to start with, a pilot would taxy the aircraft round the airfield and along the runway with Alan in the back seat observing any problems. Subsequently we discovered that when the pilot transmitted on UHF, radio frequency interference was induced in the signal cable linking the preamplifier in the fin, from the adjacent UHF aerial feeder in the spine. Given the power this was a difficult problem to solve but after involving virtually all the electronic knowledge in the Control Engineering Section. the preamplifier and screening was hardened sufficiently for the system to work satisfactorily in this harsh EMC environment.

Later the 'Reds' moved down the road to RAF Fairford where Concorde was on flight trials. During our visits we felt privileged in being able to observe some of the Concorde work. One day a very bad thunderstorm broke out while we were working in the hangar and even with all the noise of the torrential rain on the roof we could still hear the Concorde at the end of the runway. Everybody, including ourselves and all the RAF 'erks', rushed to the doors to see what all the commotion was about, only to get nearly drowned in the water gushing off the roof. There she was, in all her power and beauty straining on her brakes with full reheat, then accelerating flat out down the runway for a maximum braking test just before taking off. Of course we realised that the Concorde flight test engineers were using the opportunity to complete some wet runway braking test; but what a sight!

The prototype fatigue counter was subsequently also fitted to the training Gnat and produced some interesting results. Contrary to what one might think, it was observed that the generally higher g flight profile of the Red Arrows was often causing far less fatigue damage than that of training flights. As a result of the fatigue programme, the extrapolated remaining fatigue life, particularly of the training aircraft, was reduced significantly resulting in the Gnat being retired earlier than planned. This put more pressure on getting the Hawks, which would replace them, into service.

The project was a tribute to Derek Thomas who had always been there as the visionary behind real-time airborne fatigue load monitoring. In modern times with fly-by-wire and computerised stress analysis and simulation there is more known data and the problems are better understood. It was with great shock and sadness that I learnt of Derek's premature death in the 1980s after I had left Hawkers to join Digital Equipment Corporation in 1977.

HAWKERS IN THE 1950s PART 1 - TO LANGLEY

Peter Hickman looks back to his time at Langley when he was an Engineering Apprentice...

In March 1951 I was working at Richmond Road on the first two production Sea Hawks, WF143 and 144. It was a frantic time since the Company was gearing up for Hunter production with the installation of the wing jigs and it had been decided to limit Sea Hawk build to twelve aircraft before moving the programme to Armstrong Whitworth, a sister Hawker Siddeley company, at Bitteswell.

Two things stand out for me: the mismatch of the rear fuselage to the centre section, and the engine installation. Unlike the Hunter, the Sea Hawk rear and centre fuselages were united by many 1/4" bolts but unfortunately the first assembly didn't work because one draughtsman had drawn one frame to the inside skin line whilst another had drawn the adjoining frame to the outside skin line. The next problem was the engine installation. The Nene was mounted on a three point fixing; one on each side with the third underneath. The engine was lowered onto the side fixings and then rotated to match the lower attachment point. I have a vision of Wally Rayner and Bob Seth, the Rolls-Royce representative, lying on the floor under the fuselage lambasting eachother because they couldn't get the nut on. Of course we were all standing around the aircraft cheering them on.

At this time I called into the Apprentice Supervisor's Office. Mr Barton said they needed a "good lad" at Langley because the bad winter weather had waterlogged the airfield creating a backlog of production Sea Furies. He advised that I was initially to work in the flight sheds and that the works transport from Canbury Park Road left at 7.00 am! I knew where Langley was because the previous year a group of lads had been taken there by Charles Plantin and Derek Thomas to carry out structural testing in the Sea Hawk. The problem for me was that it already took me an hour to get from my home in Wallington to Kingston by public transport as I didn't drive or have a car. Fortunately I remembered that in 1950 Engineering Apprentices had been classified as staff so Barton agreed that I could use the 8.00 am staff coach; so a two hour journey each way was to be my lot for the next sixteen months.

Duvalls of Kingston provided the very comfortable coaches to transport us to the airfield. The route was via Hampton Wick, Feltham (where we picked up an AID inspector, 'Dolly' Gray), the Green Man pub and the KLG factory on the A30 at Hatton Cross, along a country road on the eastern edge of a much smaller Heathrow to join the A4 at Harlington Corner, then down the A4 towards Slough and up Sutton Lane to the airfield. The car park was at the Northeast corner which meant we had to walk through two rows of hangars to get to our workplace. Ford's occupied the first row where they were assembling tractors, and it wasn't long before they banned us from walking inside which meant that, in inclement weather, we could get very wet.

On my first day I reported to Charlie Ayers who was responsible for the outside work on the flight line. We were based on the ground floor of the control tower where we had a crew room. Here we stored the parachutes and starter cartridges, and an aircraft status board identified the aircraft. The pilots would ring down to establish which aircraft were available, nominate one and ask for their parachute to be installed. Neville Duke had just been appointed Chief Test Pilot and his colleagues were Frank Murphy and Frank Bullen. A fourth pilot, ES Morell, had left the Company and would shortly be replaced by Bill Bedford.

Taking the parachute, five starter cartridges and a screwdriver the ground crew man would go out to the Sea Fury, place the parachute in the cockpit on the seat, undo the Dzus fastener securing the Koffman starter access flap, insert the cartridge, secure the flap and wait for the pilot. (One day I managed to drop a cartridge into the engine bay. That meant undoing the lower cowling and retrieving the item, all under the eye of an inspector who had to certify that the aircraft was once again safe; I wasn't very popular). With the pilot installed the other fitter and myself would stand at each wingtip and signal that all was clear to start up. At the end of his engine checks the pilot would signal removal of chocks which were specially made of steel and were a good fit to the tyres. To prevent chock slippage, during the fairly rigorous engine test, 'U' shaped steel pins were located on the front of the chocks and fitted into tubes set in the tarmac. Also, the tailwheel was held down by two 1" diameter manila ropes that were secured to bars also set in the tarmac. When the pilot signalled 'chocks away' the first job was to undo the tailwheel ropes which were often soaked in water and oil making the work more difficult. Next, to the mainwheels to withdraw the pins and remove the chocks. Sometimes the aircraft had crept forward causing the chock to bite into the pin. Signalling the pilot to ease back on the throttle we would then try to push the aircraft backwards. We then tried to lift the pins from the side otherwise there was a danger of falling backwards into the propeller. The situation was more difficult if drop tanks were fitted and when Service pilots were collecting new aircraft.

When a Sea Fury had been stored overnight the first morning job was to turn over by hand the Bristol Centaurus radial engine two complete revolutions to clear any oil build up in the lower cylinders. My job was to slip a canvas bag with a long rope attached over a propeller blade then stand back whilst two other fitters pulled on the rope to move the blade through 72 degrees (the propeller had five blades). I then put the bag on the next blade and the exercise was repeated until the two revolutions had been completed. The bag procedure was introduced after an engine fired while two fitters were pushing and pulling directly on a blade; one was killed, the other seriously injured.

We also had three Napier Sabre powered Tempest TT5 target tugs in from RAF Germany for modifications. The method of chocking and tailwheel constraint was the same as that for the Sea Fury although the mainwheels were further apart requiring alternative pin locations. Our real concern was always on start-up. If the engine failed to start on the first cartridge there was likelihood of a fire in the chin mounted oil cooler due to excess fuel leaking from the engine. We had to stand-by with a fire extinguisher ready to spray into the radiator housing containing the oil cooler. Then, of course, the flight was cancelled and a big clean-up took place. The usual pilot for these Tempest flights was Frank Murphy who had many hours on-type during World War 2.

One afternoon a Tempest was prepared for flight by Frank. He came out to the aircraft closely followed by 'Dolly' Gray the Ministry AID inspector. They were arguing furiously but Frank carried on and climbed into the cockpit. Checks done he started up and waved for the chocks to be removed. Gray now set off back to the hangar whilst we fitters, one on each wing tip, marshalled the aircraft. To our surprise Frank kept taxying forward after Gray and then quickly turned the aircraft through 180 deg with us

desperately trying to keep up with the wing tips. Then a quick burst of throttle helped Gray on his way, fortunately without injury, and Frank set off across the airfield to his take-off point. We never got to the bottom of this incident.

Arriving one morning at the control tower I was told to get out to the flight line and board the Company Rapide for a test flight; I was regarded as ballast! The pilot was Frank Murphy and we duly set off for the take-off point where we waited for clearance from Heathrow. All Langley flying required their permission as their main runway was E-W whilst Langley's grass strip was basically NE-SW. A TWA Constellation cleared the airspace and we took off, surprisingly still encountering a bit of turbulence from the Connie. We headed to Windsor Castle where Frank did two, fairly low, complete circuits of the round tower before setting off for White Waltham. Tests complete we arrived back at Langley where Frank decided to 'beat-up' the flight line at about 130 mph before a steep climb and landing. Then, it was back to work! **(To be continued)**

MEMBERSHIP NEWS

Sadly we record the deaths of Roger Dabbs, Bill Marshall, Jack Simmonds, Herbert Valk and Elizabeth Roscoe-Pond. Our condolences go to their families and friends.

We welcome new Members Mike Craddock and Kuo Wong.

Guy Black's Retrotec team has been awarded the Historic Aircraft Association's 2009 Conrod Trophy for their aircraft and engine restorations and their commitment to long-term apprenticeships.

MEMBERSHIP LIST APRIL 2009

A: Mike Adams, Ken Alexander, Peter Alexander, John Allen, Martin Alton, Peter Amos, Terry Ansty, Alma Apted, Steve Apted, John Arthur, Alan Auld, Bryan Austin, Mike Azzopardi. **B:** Brenda Bainbridge, Arthur Balchin, Colin Balchin, Ambrose Barber, Paul Barber, Ray Barber, Derek Barden, Peter Barker, Geoff Barratt, Graham Bass, Ken Batstone, Dennis Baxter, Colin Bedford, Anne Beer, George Black, Guy Black**,** John Blackmore, Keith Bollands, Paul Boon, Betty Bore, Pat Bott, Steve Bott, Bob Bounden, Alan Boyd, Pat Boyden, Phil Boyden**,** Roy Braybrook, Clive Brewer, Laurie Bridges, Doug Britton, Arthur Brocklehurst, Capt. Eric Brown, Peter Brown, Ron Bryan, Christopher Budgen, Maurice Budgen, Roy Budgen, Reg Burrell**,** Robin Burton. **C:** Richard Cannon, Maurice Carlile, Chris Carter, Bob Catterson**,** Ken Causer, Jeremy Cawthorne, John Chacksfield, Colin Chandler, Keith Chapman, Keith Chard, Gerry Clapp, JF Clarke, John Cockerill, Hank Cole, Percy Collino, Brian Coombes, Paul Cope, Patricia Cosgrove, Ron Cosgrove**,** George Cotterell, Nick Cox, Mike Craddock, Shirley Craig, John Crampton, Richard Cripps, Tony Cripps, Russ Culley**,** Richard Curtis. **D:** Clive Dalley**,** Andy Dalton, John Danse, Afandi Darlington, John Davie, Jo Davies, Ken Davies, Trevor Davies, Charles Davis, Michael Davis, Diana Dean, Ralph Denning, Norman Deviell, Mike Diprose, Richard Dobbs, Mike Dodd**,** Colin Dodds, Lambert Dopping-Heppenstal, Jack Dowson, Brian Drew, Peter Drye, Dick Duffell, Jean Duffell, Gwen Duke, Chris Dunhill, Mike Dyke. **E:** John Eacott, John Eckstein, Andy Edwards**,** Dave Edwards, Barry Elliot, Tony Elliott, Eric Ellis, Celia Evans, Norman Evans, Roy Evans. **F:** Russ Fairchild, Paul Fairweather, Ian Falconer, Mike Fantham, Chris Farara, John Farley, John Farrow, Max Fendt, Donna Ferguson, Stan Field, Geoff Fieldus, Mike Finlay, Wilf Firth, Anne Fletcher, Richard Fletcher, Colin Flint, Dave Fowler, Mike Frain, Steve Franklin, Harry Fraser-Mitchell, Geoff French, Mike French, Heinz Frick. **G:** Roy Gaff, Mike Gane, John Gardner, Patricia Gardonio, Peter Gates**,** Sandie Gear, Tim Gedge, Mark Gerrard, Tony Gibbs, John Gilbert, John Glasscock, Pat Goodheart, Eric Goose, John Gough, Andy Green, Barry Grimsey. **H:** Douglas Halloway, Liz Hargreaves, Simon Hargreaves, Bryan Harman, Guy Harris, Thelma Harris, Brian Harvie, David Hassard, David Hastie, Norman Hayler, Eric Hayward, Bob Head, Sheila Hemsley, Jock Heron, Keith Hertzenberg, Frederick Hewitt, Merlin Hibbs, Richard Hickey, Peter Hickman, Vince Higbee, Reg Hippolite, Keith Hobbs, Chris Hodson, Gordon Hodson, Derek Holden, Richard Hooke, Ralph Hooper**,** Linda Hopkins, Paul Hopkins**,** Mike Hoskins, Gerry Howard, Dawn Howes, Terry Howes, Simon Howison, Gordon Hudson, Gavin Hukin. **I:** Pete I'Anson, Len Illston, Maive Impey, David Ince, Brian Indge. **J:** Keith Jackman, John Janes, Gordon Jefferson, Harry Johnson, John Johnson, Brian Jones, Ian Jordan, Robin Jowit, Alf Justin. **K:** Andrew Keech, Brian Kent, Dennis Ketcher, Bill King, Dave King, Charles Kirk. **L:** Barry Laight, Mike Laker, Charles Lamb, Richard Lane, George Latham, Paul Latham, Pam Lawrence, Andrew Lawson, Stanley Lawson, Ron Leader, Geoff Lee, Gordon Lewis, Mark Lewis, Vernon Lidstone, Gary Lillistone, Andrew Lloyd,Dawn Lloyd, Gary Lockley, David Lockspeiser, Norman Long, Basil Lockwood-Goose, Gordon Lorrimer, David Lovell, Lynda Lucas. **M:** Albert Magee, Al Mahoon, Mick Mansell, John Marsh**,** Ann Martin/Disspain/Turk, Dennis Mason, Brian Maton, Don McGovern, June McKeon, Ronald Mears, Mike Mendoza, Alan Merriman, Jim Middleton, Buffy Milford, Robert Millar, Jack Mills, George Mitchell, Brian Monk, Pat Moon, Leslie Moore, Pauline Moore, Nicholas Morland, Pete Munday, Carole Murphy, Gloria Murphy, Martin Murray. **N:** Anthea Newman, Jennifer Nicholas. **O:** Roger O'Brien-Hill, John O'Sullivan, Robin Owen. **P:** Les Palmer, Glynne Parker, John I Parker, John L Parker, John Partridge, Bernard Patrick, John Pearce, Barry Pegram, Martin Pennell, Bill Phillips, Ted Pincombe, Dick Poole, Don Pratt, Dave Priddy, Mike Pryce. **Q:** John Quinn. **R:** Clive Radley, Raharto, Frank Rainsborough, Colin Raisey, Paul Rash, Diane Raymond, Vanessa Rayner, David Rees, Peggy Remmington, Francis Rhodes, Geoff Richards, Bill Richardson, Kelvin Richardson, Chris Roberts, Graham Roe, Chris Russell, Peter Ryans. **S:** Ian Sandell, Bernie Scott, Alex Seaman, Ray Searle, Maurice Shakespeare, Mike Sharland, Arthur Sharpe, Bill Sherwood, Douglas Shorey, Peter Sibbald**,** Duncan Simpson, Derek Sims, Gerry Sims, Charles Smith, George Smith, Harold Smith, John Smith, Karl Smith, Pete Smith, Selwyn Smith, Roy Sparrow**,** Peter Spragg, Vivian Stanbury, June Stephens, John Strange, Carroll Stroud, Christine Strudwick, Tony Strudwick, Douglas Stubbs, Bill Swinchatt. **T:** David Taylor, Stuart Taylor, Brian Tei, Reginald Thompson, Geoff Tomlinson, Graham Tomlinson, Rod Tribick, Peter Trow, Ron Trowell, Bert Turner, Michael Turvey. **U:** John Underhill. **W:** Terry Walker, David Ward, Harry Webb, Patrick Webb, Graham Weller, Rob Welsh, AP West, Bryan West, Judith Westrop**,** Jenny Wheatley, Phil Wheatley, Jan White, Mick White, Roy Whitehead, Peter Whitney, Annette Williams, Don Williams, John S Williams, Ron Williams, Sally Williams, Colin Wilson, George Wilson, Hilda Wilson, Paul Wilson, Dick Wise, Helen Woan**,** George Woods, Len Woodward, Alan Woolley.