

Eurofighter

REVIEW

- **Tranche 2**
 - Final Assembly
 - New Engine Control
- **Export News**



Focusing on the Air Forces

Eurofighter Typhoon In Service

 **Eurofighter
Typhoon**

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Two Italian Air Force Eurofighter Typhoon from 4° Stormo "Amadeo d'Aosta", operating out of Grosseto, Italy.
Picture: Troupe Azzurra



06

Eurofighter exhibitions for 2006 ended in Athens



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A look at Eurofighter Typhoon In Service

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Aloysius Rauen
CEO Eurofighter GmbH



Dear Friends of Eurofighter Typhoon,

2006 marked a significant change in the Eurofighter Typhoon programme. With more than 100 aircraft delivered, the four Partner Air Forces have taken full ownership of the programme. Seven units are already operating the aircraft and, with operational conversion ramping up across the four Nations, Eurofighter Typhoon is becoming increasingly responsible for more and more tasks within the squadrons. The four Partner Nations have accumulated more than 12,000 flight hours.

The end of our work based on the Main Development Contract is approaching. This is a remarkable fact, but it certainly does not mean industry now steps aside. On the contrary, we are as dedicated as before to meet the upcoming challenges the weapon system will be facing in real operations.

This year, the aircraft has flown three air-to-ground configurations with six missiles, six laser guided bombs and an external fuel tank. Final assembly for Block 5 aircraft, as well as for the first Tranche 2 aircraft, is well underway, and 2007 will see the first delivery to the Austrian Air Force. Under the terms of the "Austere capability" contract, we will also prepare to deliver the integration of the laser designator pod on Block 5 aircraft on schedule for service with the Royal Air Force in 2008.

Delivering value to the customer is our major objective for 2007. We aim to terminate the main development of our weapon system and, at the same time, continue developing new functionalities that will deliver the urgently needed capabilities required by our customer. This will ensure that Eurofighter Typhoon's superiority in the international competition is maintained.

May I take this opportunity to wish you and your families a very Merry Christmas and a Happy New Year, and all the best for 2007.

Your sincerely,

Aloysius Rauen
CEO Eurofighter GmbH



BAE Systems officials, including Trevor King (fourth from right), mark the retirement of DA2 from the Flight Test programme

Aircraft Retirement Phase

"Farewell" Fly Past for DA2

On 13 November, the BAE Systems-built development aircraft, Eurofighter Typhoon DA2, celebrated its illustrious twelve year contribution to the Eurofighter development programme with a flypast of the company's Warton and Samlesbury sites watched by hundreds of proud employees.

The aircraft is due to be transferred to RAF Coningsby next year where it will initially be used as a ground training rig for the Royal Air Force. The aspiration of the Ministry of Defence is for the aircraft to eventually be donated to the RAF Museum at Hendon.

Trevor King, BAE Systems Typhoon Weapon System Capability Director said: "DA2 has achieved 650 flights - a stunning achievement for a development aircraft. Today marks an historic milestone as the aircraft completes its work here at Warton.

It is gratifying to see all that hard work and dedication transferred into today's production aircraft. Investment in the programme has ensured effective delivery to the Royal Air Force and the Partner Air Forces of an aircraft at the cutting edge of technology, capability and quality."

The remaining development aircraft are to complete their final flying tasks over the course of the coming weeks, bringing to an end the Main Development Programme. See pages 20-21 for more details on the DA retirements and achievements.

4° Stormo
in AIM-9L firing
exercises



As 2006 dawned, the Italian Air Force demonstrated their confidence in Eurofighter Typhoon as a capable air superiority platform through the deployment of the weapon system as part of their Quick Reaction Alert force (SSSA). The high profile role of safeguarding Turin during the Winter Olympics soon followed and, in September, the Air Force announced the successful outcome of

Italian Air Force Air Superiority

Operational Readiness

a series of missile firing tests using the Aim-9L short-range air-to-air missile.

Held between 24-29 September, aircraft from 4° Stormo at Grosseto participated in five days of operations culminating in the live launch, scoring a direct hit against a remotely-operated Mirach-100 drone target. Italian Air Force pilots, Mark Amort and Max Federico, took the aircraft through the

operation, under the guidance of Lieutenant Colonel Daniele Picco.

Afterwards, the Air Force heralded the success of the firings, in that they demonstrated the increasing operational and combat readiness of Eurofighter Typhoon, and represent an important step towards full capability.

100th Series Production Aircraft moves to Lincoln

RAF Century

On 09 October, the 100th Eurofighter Typhoon to roll off the four-nation production lines arrived at its Main Operating Base of RAF Coningsby, UK.

To mark the milestone aircraft, Group Captain Bob Judson, RAF Coningsby's Station Commander, personally delivered the aircraft himself from BAE System's Warton final assembly facility. On his arrival, Group Captain Judson stated: "It is an immense privilege to accept the 100th Typhoon into

the RAF. I flew Jaguars for many years but the Typhoon is an amazing and highly capable aircraft."

The century aircraft is the 35th Eurofighter Typhoon to be accepted into service with the Royal Air Force, and will be the first on the inventory of No.11 (Fighter) Squadron which is due to reform at RAF Coningsby.



Group Captain Bob Judson is greeted on arrival at RAF Coningsby

Romano Prodi arrives in Grosseto

Prime Visitor

During August, Italian Prime Minister, Romano Prodi, completed two separate visits to the facilities at the Eurofighter Typhoon



Main Operating Base at Grosseto, home to 4° Stormo of the Italian Air Force. On 19 August, Prime Minister Prodi made the first

trip while en route to Trento and, during his stop, took the time for a guided tour of the base and in particular paid special attention to discussions surrounding operational logistics.

The second visit was made just five days later, on 24 August, and was coinciding with a meeting with Israeli Foreign Minister, Tzipi Livni, to discuss the ongoing Italian mission to Lebanon. During his stay, Prime Minister Prodi took the opportunity to visit the flight line and to listen to pilot appraisals of the operational performance of Eurofighter Typhoon.

More details on the role of Eurofighter Typhoon in the Italian Air Force can be found on page 13.

Danish Defence Minister visits Manching

Aircraft Assessment

Throughout the duration of the selection process, Denmark's Minister of Defence, Søren Gade, has been keen to maintain a transparency and fairness to his Nation's procurement competition. Therefore, following similar trips to the United States and Sweden, Minister Gade and a delegation of Parliamentarians and military experts including Allan Niebuhr, Chairman of the Defence Committee, embarked on a two-day fact-finding mission of the Eurofighter Typhoon programme at EADS Military Air Systems' Manching facility.

Welcomed by Dr. Stefan Zoller, CEO of EADS Defence and Security Systems, and Johann Heitzmann, CEO of EADS Military Air Systems, the representatives from Denmark were briefed on all aspects of the Eurofighter programme, with special emphasis given to the spirit of industrial partnership and low cost of ownership. "When it comes to successful collaboration in technology as well as in economical terms, the Eurofighter programme is second to none" stated Johann Heitzmann, adding that "Our programme satisfies not only the Royal

Danish Air Force requirements but also offers ample opportunities for Danish industry."

Minister Gade and his entourage took a hands-on approach during their tour and were allowed the opportunity to test-fly the aircraft in the simulators installed at Manching. In addition, EADS test pilot, Chris Worning, took to the skies in Eurofighter Typhoon and treated the visitors to a flying demonstration of breathtaking power and agility, attributes that have made the aircraft the best-selling next generation combat fighter.

On their departure, the Danish guests praised their EADS hosts for providing them with important information for the evaluation process. A decision from the Danish Government for the replacement of the F-16 is expected in 2008, with deliveries scheduled to begin in 2016. Eurofighter Typhoon is competing against the F-35 and Saab's Gripen.

For more information on export opportunities for Eurofighter Typhoon, see page 7.

State Secretary takes a ride in Eurofighter Typhoon

Norwegian Delegation



As part of continuing campaign activities, the Norwegian State Secretary, Espen Barth Eide, was given a VIP privilege of a flight in Eurofighter Typhoon during a visit to EADS Military Air Systems' Manching site.

The flight lasted for more than two hours and included a supersonic run, air-to-air refuelling from a Tornado aircraft, as well as tests on the auto-pilot functions. On landing, State Secretary Eide commented that he was greatly impressed by the performance of the aircraft.

The State Secretary was accompanied by a Norwegian delegation which included the Deputy National Armament Director, the Defence Attaché in Berlin and a senior advisor from the Ministry of Defence. The German Government was represented by the Defence Attaché in Oslo. During the visit, the invited guests were also given a comprehensive briefing on activities at the Manching site and, in particular, on the Eurofighter Typhoon programme.

Norway is intending to procure 48 aircraft, which are scheduled for delivery between 2016 and 2019, with the country expected to make a decision on the procurement of the aircraft in 2008.



The Danish Delegation, with Minister of Defence Søren Gade, and EADS officials at Manching



Eurofighter Exhibitions end 2006 in Athens

Defendory International

Following the decision of the Hellenic Authorities to support the procurement of additional modern fighter aircraft in the near future, the Defendory International 2006 exhibition provided the Eurofighter Consortium with the opportunity to reaffirm the industrial, technological and military benefits of participation in the Eurofighter programme.



Evangelos Meimarakis, Minister of Defence, meets campaign officials, including Georgios Scarlatos of EADS, at Defendory

Erwin Obermeier, Greek Campaign Director, discusses programme issues with Chief of Hellenic Air Force, Lt. Gen. Georgios Avlonitis



Johann Heitzmann, CEO EADS Military Air Systems (centre) and Deputy Chief of the Hellenic Air Force General Staff, Major General Theologos Symeonidis (right)

Representing one of the highest-profile marketing events for the Eurofighter Typhoon in Greece, the Consortium representatives, under the coordination of Campaign Leader EADS, promoted the aircraft's outstanding capabilities and critical programme achievements to the highly-influential professional visitors who had made the trip to the Piraeus Exhibition Centre outside Athens. The Eurofighter presence featured the ever-popular cockpit demonstrator, highlighting the Full Operational Capability (FOC) standard of the aircraft, an essential tool for performance demonstrations and briefings to interested Export parties. The latest promotional film, "In An Uncertain World...", showing Eurofighter Typhoon squadrons in an operational network-centric environment, was screened for all guests wanting to gain the in-action viewpoint of front line life with the aircraft.

Exhibitions provide a crucial platform in demonstrating product capabilities to the end-user, and at Defendory International, the Chief of the Hellenic Air Force General Staff, Lieutenant General Georgios Avlonitis, escorted by a number of flag officers and members of the Hellenic Air Force Supreme Council, was present. As the top man in the Hellenic Air Force hierarchy, Lieutenant General Avlonitis took some time with CEO EADS Military Air Systems, Johann Heitzmann, and with Campaign Director, Erwin Obermeier, to discuss the issues surrounding the Eurofighter Typhoon, and the Greek Fighter Procurement programmes. Deputy Chief of the Hellenic Air Force General Staff, Major General Theologos Symeonidis, as well as other major

Hellenic Air Force commanders, also visited the Eurofighter Typhoon exhibition, underlining the optimum communications of the campaign team with the key representatives of the Hellenic Air Force.

Politically, the Eurofighter team attracted key parliamentary attention. Following his exhibition-opening commitments, the Minister of Defence, Evangelos Meimarakis, made his way to the Eurofighter stand to be greeted by Georgios Scarlatos, Head of Eurofighter Office for EADS in Athens, reaffirming the good relations between the Hellenic Government and campaign lead Eurofighter Partner Company EADS. From the Hellenic Parliament, Panayiotis Kammenos MP, Chairman of the Standing Committee for National Defence and Foreign Affairs, and Christos Papoutsis MP, representing the main opposition party, spent some time discussing programme issues with the Eurofighter Typhoon campaign team.

At the end of July, the Government Council for Foreign Affairs and Defence (KYSEA) reiterated the need for modern fighter aircraft, and that a decision by 2008/2009 would be acceptable. The Eurofighter Consortium are continuing campaign efforts for the export of Eurofighter Typhoon, and are convinced that the aircraft satisfies the requirements of the Hellenic Air Force.

As well as providing the Greek nation with unmatched air superiority, the industrial benefits that the Eurofighter Consortium can offer are truly unique. Total access to leading edge technologies is guaranteed. In addition, the possibility of industrial project cooperation with 30 of Europe's leading defence companies, and not confined exclusively to aerospace ventures, would provide Greek industry with a true gateway to Europe, demonstrating their commitment as a European member state.

Phillip Lee

Eurofighter Typhoon set to serve the global market

Export Expertise

Exhibitions are just one of many techniques used to engage in discussions with influential decision makers in potential export nations. The sales and marketing effort is undertaken by all stakeholders in the Eurofighter Consortium, each pushing to underline the claim of the American Analysts at Forecast International that the position of market leader is held by Eurofighter Typhoon.

This statement, coupled with the increasingly laboured development of other rivals in the combat aircraft field, has pushed Eurofighter Typhoon firmly into the spotlight with many nations keen to learn of the capability, technological and industrial benefits of participating in the Eurofighter programme. With high-profile campaigns ongoing in Greece and Turkey, the Eurofighter consortium partners are building and maintaining relationships with representatives of many other nations, with the aim of fulfilling the Air Force requirements of these prospective nations with Eurofighter Typhoon.

The Scandinavian countries of Norway and Denmark, although associate members of the F-35 programme, take a great interest in the Eurofighter Typhoon. Denmark and Norway had issued Requests for Information (RFI) in 2005, to which the Eurofighter Consortium had responded. Both nations look closely at industrial participation packages for their national industries.

In September, the Consortium announced the signature of a Memorandum of Understanding with leading Danish aerospace company TERMA, aimed at pursuing areas of mutual interest and industrial possibilities in the event that Eurofighter Typhoon is selected.

Danish delegations have visited Eurofighter Typhoon production facilities in Manching, taking a balanced and transparent approach to their selection process having already visited sites in the United States and Sweden, with the aim of being able to make a truly informed decision in 2009, as expected.

Norway has been industrially linked to the programme for a number of years with the Government and industry investing own funding for state of the art development projects related to Eurofighter Typhoon. Delegations from Norway have also paid visits to the Manching production line, with State Secretary Espen Barth Eide getting a

back-seat view of the aircraft during a VIP test flight in October. With a key announcement due from Norway on their F-35 contribution in the coming months, the Eurofighter Consortium is well-placed to deliver outstanding product capability to the Norwegian Air Force and attractive industrial opportunities to the local defence industries.

In Turkey, Eurofighter Typhoon is facing competition from the less capable F-16 aircraft in being selected as the type to complement F-35 weapon system, which is seen as a solution for the air-to-ground role, similar to Italy and the United Kingdom. The fleet mix of F-16 and F-35 is not able to effectively fulfil the role of future air defence for the country, as they are inferior to many of the air assets operating in the region today, and will remain so in the future.

The envisaged F-16 package that Turkey intends to procure to make up for attrition will cost the country around \$2.9 billion. As this will be a direct Foreign Military Sale (FMS), with no possibility of an industrial participation on Turkey's side. The Eurofighter Consortium are able to offer a substantial industrial participation package with a big share for the Turkish aerospace and defence companies. They will benefit through accessing high technology European aerospace projects and, through the unique opportunity to participate in the future enhancements of Eurofighter Typhoon, will enable them to conduct their own update, maintenance and repair work.

In India, the competition to replace the MiG-21 in the Indian Air Force is gathering pace, with Eurofighter Typhoon a registered candidate to participate in the race for the contract of 126 medium multi-role aircraft. The Indian Air Force had released the Request for Information (RFI) in 2003, which is to be followed shortly by the Request for Proposal (RFP).

On 07 November, a delegation representing the Eurofighter Consortium met with Indian Air Force representatives to deliver a presentation on the product package and aircraft capabilities. This visit followed on the heels of a number of meetings between Indian customer representatives and the Eurofighter community. Delegations have been hosted at both the ILA Berlin and Farnborough International airshows, while

Air Chief Marshal Tyagi has made the trip to the German Air Force base in Laage, on the invitation of the German Air Force, as well as taking in Eurofighter Typhoon facilities in Manching. Air Chief Marshal Tyagi took the opportunity to fly the aircraft and, on landing, stated how impressed he was with the outstanding flight performance.

Alongside Eurofighter Typhoon, the competing aircraft for the India export contract are Gripen, F-16, F/A-18, MiG-29 M2 and Rafale. With the present state of information received with regards to the impending Request for Proposal, the Eurofighter Consortium is convinced that the Eurofighter Typhoon weapon system should fully meet the requirements of the Indian Air Force.

The campaign nations described above are followed closely by marketing efforts in Japan, Bulgaria and Romania. In these instances, the nations have been identified by Eurofighter Consortium members as having serious ambitions in the defence market, with pre-assigned budgets and the known intention to procure new combat aircraft. With BAE Systems taking the lead in Japan, and EADS Military Air Systems and Alenia Aeronautica assuming responsibility for Bulgaria and Romania respectively, the designated campaign teams are working closely with their customer counterparts to gain a full understanding of the national requirement in anticipation of the receipt of the Request for Proposal in 2007.

In terms of future prospects, the Consortium analysts are constantly tracking the international combat aircraft market and, with the global reach of the major European aerospace Eurofighter Partner Companies, Alenia Aeronautica, BAE Systems, EADS CASA in Spain and EADS Germany, are ideally positioned in identifying, and tailoring packages to, new customers.

With opportunities on the horizon both in Europe and worldwide, and with rival defence projects shifting further to the right in terms of development schedules, Eurofighter Typhoon, supported by a network of European aerospace expertise, will continue to lead the combat aircraft market and deliver outstanding capability for years to come.

Phillip Lee



International Aerospace Summer School

Team Italy takes the Title

Following in the footsteps of their football heroes, the students from ISTITUTO TECNICO INDUSTRIALE "CARLO GRASSI", based in Turin, collected the trophy from EADS Eurofighter Typhoon test pilot, Chris Worning, at Cranfield University as winners of the inaugural International Aerospace Summer School competition.

The twelve competing teams had submitted their proposals for a "stealthy transport aircraft for military use" in May and had progressed to their week-long stay at Cranfield University, UK. There, an exciting and challenging programme of events had been put together for the students to enable them to get a full hands-on aerospace experience.

Commencing on Sunday 13 August with a Cranfield Welcome and Administrative Briefing, the teams officially began their activities on Monday morning with a presentation on "Basic Aerodynamics" by John Farley, BAE Systems' former Chief Test Pilot on the Harrier aircraft. After Mr Farley's



left: From left-right, Wolfdietrich Hoeveler, Eurofighter GmbH, the victorious Italian Team with their tutor, and EADS test pilot Chris Worning



presentation, the students were handed the first Design and Planning Exercise, the aim of which was to build a structure capable of supporting a house-brick, with the focus as much on teamwork as on results.

Chris Roberts, also a former Test Pilot at BAE Systems before succeeding Mr Farley to become Chief Test Pilot for both Harrier and Hawk, then delivered a lecture relating



The Italian design for a stealthy transport aircraft for military use

to "The Aircraft Design process" followed, after lunch, by the participation in an Air-line Emergency Evacuation procedure, under the guidance of Professor Helen Muir. The day was rounded off with a BAE Systems talk centred on the world's best-selling next generation combat aircraft, Eurofighter Typhoon.

On Tuesday, the competitors had an early start as they were talked through the process of wind tunnel testing, with a Rolls Royce-lead briefing on jet engines and the EJ200 following soon after. A Flight Safety Brief and lunch preceded the start of the flying exercises, one of the week's main events, where the teams were given the opportunity to pilot a variety of fixed-wing and helicopter aircraft.

The undoubted highlight of the week came on Wednesday, with the students being granted special access to the three Royal Air Force Eurofighter Typhoon Squadrons (No.3, No.17, and No.29) based at RAF Coningsby. There they were given the chance to meet with the aircrews and ground personnel and get up-close to one of the most technically advanced aircraft ever built, with their return to Cranfield in the afternoon allowing time to fit in some more flying of their own.

Thursday started early, with the morning programme focused entirely on Jetstream activities, beginning with a classroom brief on how to plot fuel burn in an engine, before taking their seats for a flight in the Jetstream Airborne Flight Test Teaching Aid. The students were given the chance to experience some unusual in-flight manoeuvres

such as a dutch roll, pitch oscillation and the slow entry into a spiral dive. In the afternoon, the teams completed their final flying exercises of the week.

The final Design and Planning exercise kicked off Friday's proceedings, with the students expected to plan a simulated supply drop mission from a military transport aircraft. Again, points were scored on the methodology as well as the outcome. EADS test pilot, Chris Worning, then took centre stage in discussing flight testing with Eurofighter Typhoon. In the afternoon, Professor Riti Singh, Deputy Head at Cranfield School of Engineering, described "Aviation in the 21st Century", followed by John Farley's end-of-course debrief, and the long-awaited announcement of the winners and presentation of the 'Eurofighter Typhoon Trophy'. The teams were judged on their initial entry design of the stealthy transport aircraft, on both Design and Planning Exercises, and on a task performed with the Royal Air Force. The Italians were deemed worthy overall winners.

Each team consisted of three students, aged 16 to 18, accompanied by a supporting teacher who worked with their team in an advisory capacity.

The Eurofighter Consortium, together with Alenia Aeronautica, BAE Systems, EADS CASA and EADS Germany, had announced in November 2005 that it would support this new initiative to involve and attract the engineers of the future into the aerospace industry. It will continue this effort in 2007 and the years to follow.

More than four hundred companies and suppliers throughout Europe are involved in the Eurofighter Typhoon programme, securing a vital technology base for the Nations participating in the project. It is this future generation of engineers who will drive the industry forward in order to meet the challenging tasks that lie ahead.

top: 08 November, Adam Ingram MP presents General Paolo Mazzi, Air Attaché at the Italian Embassy in London, with commemorative plaque to mark the Italian victory in the International Aerospace Summer School competition. Attendees (anti-clockwise from top left): Brian Phillipson, Eurofighter Programme Management Director, Wolfdietrich Hoeveler, Vice President Eurofighter Communications, Adam Ingram MP, General Paolo Mazzi, Mark Bowman, BAE Systems test pilot, and Alec Osborn, President of IMechE.

Operational Training for the Italian Air Force

4° Stormo Deployment

In October, the pilots of 4° Stormo, based at Grosseto, put Eurofighter Typhoon through its paces during an operational deployment to Decimomannu Air Base, Sardinia. Four aircraft from the Eurofighter Typhoon squadron undertook the flight to participate in complex operational scenario training, which ran between 09 - 20 October.

In total, 80 sorties were flown, including joint exercises with AMX aircraft from Amendola, and with F-16 aircraft out of the Italian Air Force inventory. In the air-to-air combat training missions, the F-16 proved no match for Eurofighter Typhoon. Excellent performance was achieved with the radar, Identification Friend Foe (IFF) system, with both working in conjunction with the Multi-function Information and Distribution Sys-



tem (MIDS), to give good results in all Beyond Visual Range engagements. In the short-range scenarios, the performance advantages of Eurofighter Typhoon, including superior carefree handling, power and agility, meant the weapon system was able to

above: Eurofighter Typhoons from 4° Stormo prepare for operation on the Decimomannu flight line

below: in-flight with the squadron during their mission scenario exercises



maintain the tactical upper hand, even during the missions where visual identification of the "enemy" was the rule.

The training was conducted employing the Autonomous Air-Combat Manoeuvring



Instrumentation (AACMI), under the guidance of the Weapons Training Unit (RSSTA) at Decimomannu. Full logistics support was provided by the Italian Air Force throughout, fulfilling the promise laid down in the Decimomannu motto "training the aviators of the free world to maintain the peace." This support will be delivered in the future when further aircraft from both the Italian Air Force and the German Air Force line up for operational training at the base.

Eurofighter Typhoon was moved into front line service by the Italian Air Force in December 2005, and this was the first operational deployment to be implemented since then, demonstrating the maturity of the weapon system, and the confidence in its performance of the customer.

Phillip Lee

The Competitors

Austria

Bundesfachschule für Flugtechnik, Langenlebarn

Denmark

Espergaerde Gymnasium, Espergærde

Germany

Gymnasium Ottobrunn

Greece

German School of Athens

Italy

Istituto Tecnico Industriale "Carlo Grassi", Torino

Norway

Skedsmo Videregaende Skole, Lillestrom

Singapore

National Cadet Corps

South Africa

Waterkloof High School

Spain

Colegio Europeo Aristos, Getafe

Switzerland

Swiss Aero Club

Turkey

TU Ucak M. Facultesi, Maslak, Istanbul

United Kingdom

Lancaster Girls Grammar



The competitors line up on the wing of a 3 Sqn Typhoon during their visit to RAF Coningsby

Second German Fighter Wing begins operations with Eurofighter Typhoon

A Growing Presence



The military presence of Eurofighter Typhoon in European Air Forces grew stronger in July when Fighter Wing 74 at Neuburg/Donau took delivery of the first four, out of a planned 25, swing-role fighters, becoming the seventh Squadron in the Partner Air Forces to operate the aircraft.

A ceremony marking the event began with two of the resident F-4F Phantom II aircraft escorting in to land a twin-seat Eurofighter Typhoon and a four-ship formation of single-seaters, the fins of each adorned with the Wing crest. Upon his arrival in the back of the twin-seat variant, Lieutenant General Aarne Kreuzinger-Janik, Commander-in-Chief, Air Force Command, handed over a symbolic logbook to the Wing Commander Colonel Uwe Klein and stated: "This fighter aircraft will be the backbone of the air force for decades. It will shape the air force like no other."

The first four aircraft were flown in from Rostock-Laage, home to Fighter Wing 73 "Steinhoff", and it was there that ground personnel from Fighter Wing 74 readied the aircraft for flight, before the Wing pilots ferried their new weapon system to the Neuburg Main Operating Base.

The attendance at the ceremony included key military and political figures, plus representatives from industry and media. Secretary of State, Christian Schmidt, attending on behalf of the German Ministry of Defence, hailed the arrival of Eurofighter Typhoon as a "crucial milestone", and added "Today marks a clearly visible step forward in the modernisation of our Air Force, the aim being to increase the operational capabilities

of our Armed Forces and to secure these in the long term."

There will now be an 18 month ramp-up period as the Phantoms are phased out of service and Eurofighter Typhoon brought in. The new aircraft will assume sole responsibility for airspace security over Southern Germany from 2008. Colonel Uwe Klein, Commander of Fighter Wing 74, confirmed: "Our new system will now increasingly be seen in the skies over Neuburg."

With Eurofighter Typhoon, Germany, along with programme partners Italy, Spain and the United Kingdom, are strengthening the interoperability and effectiveness of European Armed Forces. Commenting on the aircraft's arrival at Neuburg, Major General Thomas Gericke, Commander of the 1st Air Force Division, hailed Eurofighter Typhoon as "an excellent example of the successful cooperation of European States in industrial and armament policy", while adding that the aircraft will "strengthen NATO's and the European Union's capacity to act."

History of Fighter Wing 74

The core of what was to become Fighter Wing 74 was formed by a group of the 10th Arms Training School in Oldenburg, with start-up operations carried out using the F-86K all-weather aircraft. In 1960, the Fighter Wing relocated from Oldenburg to Leipheim, near Ulm, and was immediately assigned the name Fighter Wing 75. The number 75 indicates that the Air Force had

initially planned five fighter squadrons, but over the years limited itself to just two fighter squadrons due to budgetary restraints.

Following a further relocation from Leipheim to Neuburg in 1961, the group ultimately took on the name Fighter Wing 74.



In 1964, the squadron converted to the F-104 Starfighter weapon system, providing the wing with one of the most elegant aircraft types. In 1974, the F-104 was replaced by the F-4F Phantom II, thereby ensuring that, on the introduction into service of the F-4F, the German Air Force kept pace with the dynamics of technological and capability improvements, which is a must for an efficient and effective fighting force.

Beginning with the F-86K, via the F-104G and, up till today, with the F-4F Phantom II, the programme of continual weapon system upgrades to keep abreast of modern technologies reflects the willpower to maintain control over the steadily increasing demand on capacity, staff, and material. This trend will be continued with the introduction into service of Eurofighter Typhoon, the next generation of aircraft to operate from Neuburg/Donau.

Phillip Lee

The personnel of Fighter Wing 74 welcome the arrival of the new aircraft

left: Star of the show, Eurofighter Typhoon thrills the crowd

50 Years of the Luftwaffe

Half-Century!



Celebration Highlights

- 1 Formation flight of four F-4F Phantom II aircraft
- 2 Twelve Tornados featured in the display
- 3 Fighter Wing 73 hosted the festivities
- 4 Dr. Jung and Gen. Stieglitz attended the anniversary
- 5 Eurofighter Typhoon will replace the F-4F in the German Air Force



Although 1954 saw the publishing of plans for the intention of establishing a tactical Air Force, 09 January 1956 is considered the true birthday of the German Air Force.

On this day, then Minister of Defence, Theodor Blank, officially welcomed the first pilots of the Air Force to the training division at the airbase in Nörvenich. Later the same year, further important agencies of the Air Force were set up in Cologne, Fürstenfeldbruck, Erding and Kaufbeuren.

To mark these historic occasions, throughout 2006 the German Air Force have hosted several events celebrating their 50 years of operations. In August, the festivities landed in Rostock-Laage where, hosted by Fighter Wing 73 "Steinhoff", the crews of squadrons from across the Air Force put on a dazzling air display featuring aircraft from the past, present and future from right across the German Air Force.

Eurofighter Typhoon played a central role in the flying programme, with a total of six aircraft from both Fighter Wing 73 and the newly-formed operational unit of Fighter Wing 74 producing a formation aerial

display of breathtaking power and precision. Fighter-bomber Wings 31, 32 and 33 provided as many as twelve Tornado aircraft for the celebrations, which also included aerial routines from the Air-Transport Groups 62 and 63 and their Transall C-160D transport aircraft. Also in participation were two UH-1D helicopters, five F-4F Phantom II jets and a NATO E-3A Sentry AWACS aircraft, all combining to showcase the awesome capability of one of Europe's major Air Forces.

Speaking at the event, the Minister of Defence, Dr. Franz-Josef Jung, accompanied by the Chief of the German Air Force, General Klaus-Peter Stieglitz, praised the spirit of the Air Force personnel, and stated that "teamwork is the most successful guidance concept". Coinciding with the anniversary event, Dr. Jung was also on hand for the opening of the Deployable Control and Reporting Centre, a highly-sophisticated mobile unit that provides the force commanders with a comprehensive tactical overview of the combat airspace, allowing them to guide the Air Force operations even when deployed outside German borders.

Phillip Lee



Pilot of Fighter Wing 73 preparing for flight at Laage



Cornerstone of Air Force superiority

In Service

Four of Europe's major European Air Forces are already operating Eurofighter Typhoon. Final assembly on the aircraft destined for the fifth is already in progress. With every accumulated in-service flight hour amassed by the Partner Air Force squadrons, this best-selling swing-role combat aircraft enhances its growing reputation as the cornerstone of European airpower for the 21st Century.

The Eurofighter Typhoon design driver has always been a multi-role platform that will meet the exacting operational demands of the Air Forces of Germany, Italy, Spain and the United Kingdom. The true versatility of the aircraft is reflected with the evidence that few new-generation fighters can start operational life with such a multitude of highly competent Air Forces.

GERMANY

The German Air Force will take delivery of 180 aircraft, to be divided across five wings. Fighter Wing 73, based at Rostock-Laage, were first to accept aircraft and are the unit responsible for the operational conversion of Eurofighter Typhoon. All instructor pilot training for type for the German Air Force is conducted at Laage, which also includes the pilot training of the Austrian Air Force who will take first deliveries of aircraft in 2007.

Fighter Wing 74 began operations with Eurofighter Typhoon in July this year. Operating out of Neuburg/Donau, this unit is the first to be dedicated to tactical flying, and is responsible for the protection of the airspace over Southern Germany. It is interesting to note that two of the five wings that will operate Eurofighter Typhoon, Fighter-Bomber Wing 31 and Fighter-Bomber Wing 33, will be assigned to multi-role responsibilities, highlighting the confidence in the weapon system to deliver the full spectrum of combat capabilities. The third air defence wing equipped with Eurofighter Typhoon will be Fighter Wing 71 in Wittmund.

Armed with AMRAAM and IRIS-T, Eurofighter Typhoon is set to replace the F-4F Phantom II, currently still in service with the German Air Force, and MiG-29 aircraft, which have already been phased out, in the air-to-air role. By 2012, all legacy weapon systems will have been phased into retirement, leaving Eurofighter Typhoon as the only aircraft in German air defence.

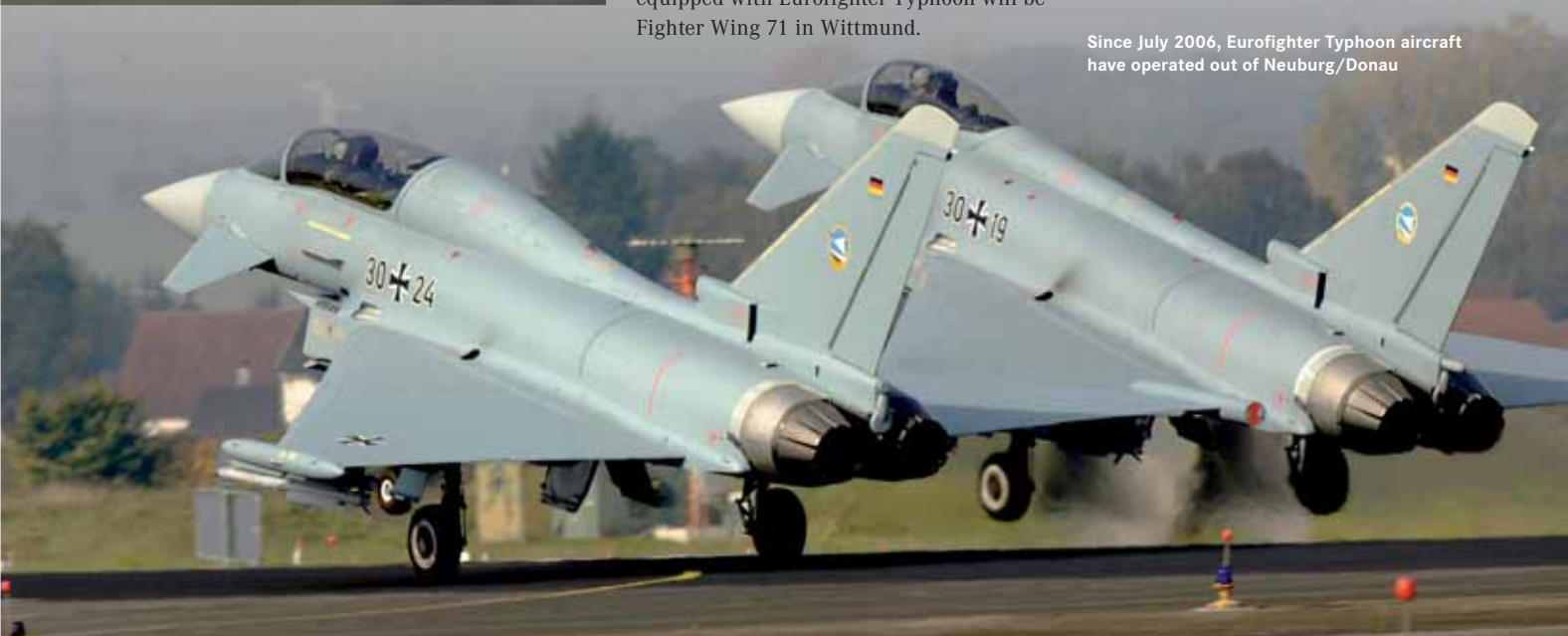
The German Air Force is to adopt a single-type force structure, highlighting Eurofighter Typhoon's versatility as a multi-role platform. From 2007, work will begin within the Air Force to introduce a multi-role variant into the fleet structure so that by 2015, when the Tornado fleet has been reduced to 85 aircraft, the ability of the German Air Force to deliver on air-to-surface stand-off missions, will not be diminished. The Chief of Air Staff, General Stieglitz, has commented to Defense News (Sept. 2004) that: "The capabilities we put our clear emphasis on are stand-off range, precision effect...flexibility and...the ability to operate in a coalition."

By 2025, the last of the Tornado aircraft will have been phased out, meaning that Eurofighter Typhoon will be the single fast-jet type in the German Air Force. With the future integration of the Taurus weapon, combined with Eurofighter Typhoon's network-centric capability, the new look German Air Force, spearheaded by Eurofighter Typhoon, will be fully equipped to deal with all predicted future and emerging threats.

Since July 2006, Eurofighter Typhoon aircraft have operated out of Neuburg/Donau



Ready for take-off, a Eurofighter Typhoon of Fighter Wing 74 taxis out of the Hardened Air Shelter



The Italian Air Force demonstrate an intercept mission, which is part of the responsibilities of the Quick Reaction Alert aircraft



4° Stormo Eurofighter Typhoon taking off from Grosseto

ITALY

Adopting the approach used by the United States, the Italian Air Force will operate two types of complementary multi-role fighters. Eurofighter Typhoon, in-service with 4° Stormo at Grosseto, with its optimisation for air superiority, will replace both the F-104 "Starfighter" and F-16 as the single type in the air defence role. Such is the belief of the Italian Air Force in the maturity of the weapon system that they deployed two aircraft on Quick Reaction Alert (SSSI) at the start of 2006. Additionally, Eurofighter Typhoon has undertaken several high-profile missions including the protection of airspace over the 2006 Winter Olympics in Turin. More recently, in October, the Italian Air Force deployed four Eurofighter Typhoon aircraft to Decimomannu Air Base, Sardinia, for a two week operational training exercise.

Out of the 620 aircraft ordered in the Umbrella Contract, 121 are destined for the Italian Air Force. These are to be split between four Wings. 4° Stormo, acting as the operational conversion unit, was the first to receive Eurofighter Typhoon and, with 5° Stormo, 36° Stormo and 37° Stormo, based respectively at Cervia, Gioia del Colle and Trapani, soon to follow, will give the Italian Air Force an air superiority capability above and beyond all perceived threats.

The two-type strategy will see F-35 replace the AM-X and Tornado as the designated air-to-surface bomber aircraft of the Italian Air Force. Operating both Eurofighter Typhoon and F-35 has been deemed the most cost-effective solution by Italy in covering the two main aspects of future conflicts and threats. Although the role of Eurofighter Typhoon is air dominance, its capacity for expansion into a versatile multi-role fighter means that the Italian Air Force will have the option of deploying Eurofighter Typhoon on strike missions. Additionally, F-35 is not due to enter into service with Italy until 2015 at the earliest, by which point Eurofighter Typhoon will be fully integrated into the Air Force structure and will be able to offer air-to-ground capability should development schedules of F-35 encounter any difficulty.



SPAIN

Mirroring the strategy of the Luftwaffe, the Spanish Air Force will move from a force structure of two multi-role fighters, the Mirage F-1M and the F/A-18A "Hornet", to a single-type approach capable of covering all air combat operations.

The Spanish Air Force will take delivery of 87 Eurofighter Typhoon weapon systems, to be directed to Wings Ala 11 and Ala 14 based at Morón and Albacete respectively. Ala 11 is the dedicated operational evaluation unit, as well as bearing the responsibility for pilot training and conversion to type.

By the middle of the next decade, all Mirage F-1M aircraft will have retired, leaving Eurofighter Typhoon as the sole custodian of Spanish air superiority capability. The aircraft's built-in growth potential will see it develop into a full multi-role fighter and, with the F/A-18A projected to be phased out shortly after 2020, may well see its role within the Spanish Air Force increased to cover air-to-surface strike missions.

above: the Spanish Air Force will take delivery of 87 aircraft

left: on the flight line at Morón Air Base





left: 3 Sqn Typhoon loaded with external tanks and air-to-air missiles lifting off from RAF Coningsby

below: 3 Sqn are the third unit of the Royal Air Force to operate Eurofighter Typhoon

UNITED KINGDOM

On appearances, the Royal Air Force is set to follow a two-type approach for their force mix. Eurofighter Typhoon, already in operation with 17 Sqn, 29 Sqn, 3 Sqn and soon 11 Sqn, will be the primary air defence platform, to be joined by F-35 for its optimised strike capability.

17 Sqn and 29 Sqn are the units responsible for bringing the aircraft into full operational service, the results of which are already evident with the formation of 3 Sqn as the first operational Eurofighter Typhoon squadron. All aircraft conversion and pilot training is conducted from the Main Operating Base at RAF Coningsby, with RAF Leuchars also scheduled to receive aircraft following the future formation of 6 Sqn.



From 2008 onwards, Eurofighter Typhoon is set to be the sole air defence aircraft in the fleet with the Tornado ADV gradually being phased out of service. All 232 aircraft bound for the Royal Air Force are to have multi-role capability, and the recently signed "Austere capability" contract between the Eurofighter Consortium and NETMA, over the integration of the laser designator pod, will ensure that air-to-surface mission availability is delivered.

Royal Air Force planning indicates that the role of Eurofighter Typhoon is to be increased more than initially envisaged. As well as the air-to-air roles, the flexibility of the weapon system will see a far greater operational overlap with the F-35. In reality, this would leave just two exclusively F-35 front line squadrons in the Royal Air Force. In numerical terms, this means just 16 F-35

aircraft to operate in the deep strike role, a compression due to the versatile capabilities of Eurofighter Typhoon on one side and the increasing trend towards potentially deploying UCAVs (unmanned combat aerial vehicles) in the strike role on the other side.

As Eurofighter Typhoon moves to the front line, the aircraft will play an increasingly more important part in combined operations and, with its full swing-role capability, will be at the forefront of European and NATO security policy well into the 21st Century.



The aircraft of 17 Sqn, seen here taking off from BAE Systems Warton, are responsible for bringing Eurofighter Typhoon into full operational service

Final Assembly begins on Tranche 2

Production Progress

Although the manufacture of long lead items for Tranche 2 aircraft had commenced long before pen had been put to paper on the Supplement 3 Production Contract, the first tangible evidence of the progress on the Tranche 2 programme was highlighted in November with the shipping of major components in preparation for the start of final assembly.

The front and centre fuselages of BS037, a British single-seat aircraft and the first from the second Tranche that will be handed over to a Partner Air Force, have been delivered to BAE Systems' Warton final assembly site from Manching and Salmsbury respectively. BS037 will fly for the first time in 2008 and will be handed over to the Royal Air Force in the same year.

Before this, however, the first Tranche 2 standard Eurofighter Typhoon aircraft will be Instrumented Production Aircraft Seven (IPA7), which is scheduled to be moved to the final assembly rigs at EADS Military Air Systems' Manching facility at the end of the year. The first flight of IPA7 is due in 2008 with the aircraft to be used for testing the Block 8 capabilities together with IPA6 (British single-seat BS031), a Tranche 1 aircraft that will be upgraded to receive the Tranche 2 standard avionics.

IPA6 has been undergoing initial tests at Warton, including the Stage One build-test (B-test). The engineers at Warton achieved



The front fuselage of BS037 has been delivered to the Warton final assembly site, UK

'power on' with IPA6 in late October, aimed at mitigating aircraft-related build issues such as hydraulics or fuel leakages. The Stage One test will be followed up by the Stage Two testing early next year, as the team at Warton move to ensure equipment functionality ahead of the commencement of the Tranche 2 certification programme.



above: IPA6 (BS031) achieved "power on" in October

below: IPA6 will undergo Stage 2 B-Testing early in 2007



The aircraft of 17 Sqn, seen here taking off from BAE Systems Warton, are responsible for bringing Eurofighter Typhoon into full operational service



The leader in the design and manufacture of aerospace equipments and systems

Secondo Mona S.p.A.

The fuel transfer pumps are a reliable and efficient part of the fuel system

Located in Somma Lombardo, Italy, Secondo Mona S.p.A. are firmly established as an industry leader in the design and manufacture of aerospace equipments and systems, and are recognised for their consistently high levels of performance as a key supplier to the Eurofighter Typhoon programme.

Company Profile

Their story begins in 1903 when Mr Secondo Mona opened a shop for the sale and repair of bicycles and motorcycles. Attracted by the rising adventure of modern aviation, he expanded into the repair and overhaul of aero-engines installed on the first aircraft flying out of the nearby Malpensa airfield.

In 1923, Secondo Mona was awarded the Albert Moulet quality certification for the design & production of on-board fuel equipment. The company would go on to make important contributions to the famous long-distance flights achieved during the following years.

Following his graduation in Aeronautical Engineering from Zurich Polytechnic in 1931, Dipl. Ing. Bruno Mona, Secondo's son, joined the company and immediately began establishing cooperative agreements within the European aerospace community, which helped them achieve maximum production capacity in 1942 with over 1,000 people employed.

A post-war production suspension, from the aftermath of World War II, was lifted in 1950 and Secondo Mona was allowed to restart aerospace operations. The launch of the F104G Starfighter programme in 1960 led the company to establish close connections with U.S. companies, and to the acquisition of production licences and agencies.

During the 1970s, Bruno Mona's sons, Dr. Roberto and Dr. Renato, entered the company and worked for the development of important contributions to the newly-born Tornado MRCA programme. It is during the 1980s that they grew into developing applications for Land and Naval programmes, while the 1990s played witness to Secondo Mona stepping up to meet the challenges of the Eurofighter Typhoon programme, while acquiring new technical competencies in hydraulics and electro-mechanics.

At the turn of the Millennium, the fourth generation of Mona joined the family business, with Dr. Riccardo and Dr. Claudia ready to lead Secondo Mona into its new role of systems supplier. Enduring support has been granted to Alenia Aeronautica for the entire fuel system and fuel rig of the advanced jet trainer M346, as well as to National Aerospace Laboratories for the fuel system of the Indian commuter LTA Saras, both systems are now being refined to production configuration.

2003 was a very important year for the entire Aerospace world with the Celebrations of the Wright Brothers' First Flight and so it was for Secondo Mona with their own celebrations for their First Centennial.

Over the last five years Secondo Mona has been implementing a "continuous improvement" programme to drive down costs, remove waste and increase efficiency and is now implementing since January this year a "lean supply chain project" in which it will help, with the support also of the British Industry Forum, its top 12 suppliers improve their working practices and become more competitive. Cascading the knowledge will further support the company's improvement process contributing to its success in the global market.

Secondo Mona's strategy of cutting costs and increasing efficiency was rewarded with Eurofighter's nomination as Best Supplier with 100% schedule adherence on the deliveries of Tranche 1. Academically, the company recently received a special



The Secondo Mona actuators can be found in the cockpit and airbrake mechanisms

mention within the industrial benchmarking project International Best Factory Award.

Today, their client base features some of the biggest names in the global aerospace directory, such as AgustaWestland, Eurocopter, Goodrich, Safran, Parker Aerospace and Zodiac. Amongst the Eurofighter and Eurojet Partner Companies, Secondo Mona can count on firm business relationships with Alenia Aeronautica, EADS, BAE Systems, Rolls-Royce and Avio.

below left: iron bird test bed for the Eurofighter Typhoon fuel system

below: the air valves are a key regulatory feature on the aircraft



The afterburner fuel control unit features components designed by Secondo Mona

The most recent contracts won by Secondo Mona can be found in fixed wing or rotary wing configurations both for military and civil applications.

Messier-Dowty, a SAFRAN Group company, the prime contractor for the Landing Gear for the Boeing 787 Dreamliner, has selected Secondo Mona for the production of the Drag and Side Brace Lock Link Assemblies. In order to meet the forecasted production rate and to adequately support the Programme, Secondo Mona is investing in human resources as well as dedicated CNC machine tools and software.

Another important selection of Secondo Mona, again by Messier-Dowty, is for the production of landing gear doorlocks and uplocks for the Bombardier Global Express, CL300, CL604 and Q-300, and for the Raytheon Aircraft Company's Hawker 4000.

In addition to the long lasting cooperation with Alenia Aeronautica for the fuel system equipments of the tactical transport aircraft G222, the new C27J is now also equipped with Pressure and In Flight Refuelling Systems including a special-to-type weak-link for the refuelling nozzle.

Another pressure refuelling system (with two fully separate lines, control panel and tank relief valves) is being designed and produced for the GROB G180 light jet.

Secondo Mona has also been awarded a contract by Goodrich Actuation Systems for the production of an Hydraulic Actuator for the F-35 programme and the first units have already been delivered.

On top of a variety of fuel, hydraulic and electromechanical equipment previously won on the NH90 helicopter, Secondo Mona can now also equip the NH90 with a pressure refuelling system for the Internal and External Auxiliary Tanks.

The AgustaWestland Helicopters all fly with Secondo Mona products and the most recent achievements are a Fuel Manifold (combining engine shut-off and cross-feed valves and pressure transducers), designed and qualified for the AW139 helicopter, and the Free-Wheel Actuator, designed and qualified for the AW149 helicopter.

Secondo Mona intends to be a key industrial leader for years to come in support of the Aerospace industry.

BSc. Riccardo Mona
Secondo Mona S.p.A.

Eurofighter Typhoon - Equipment Supplied

All Eurofighter equipments detailed below are now fully qualified with production deliveries of Tranche 2 well under way.

FUEL TRANSFER PUMPS AND FUEL VALVES

Fuselage Transfer Pump - Quantity per Aircraft: 2 This unit is designed to provide reliable and efficient pumping of the fuel out of a fuselage tank. It includes in a single package a double flapper, butterfly, Non Return Valve (NRV) and a removable Pressure Switch (PS).

Forward Wing Transfer Pump - Quantity per Aircraft: 4 This unit has the same function of the Fuselage Transfer Pump and is installed in the wings.

External Tank Transfer Pump - Quantity per Tank: 2 A derivative from the Forward Wing Transfer Pump has been developed for the External Tanks.

External Tank Refuel and Shut-off Valve - Quantity per Aircraft: 1 This unit is a Shut-off Valve, solenoid activated, designed to control fuel flow into the External Tanks during pressure refuelling operation.

AIR VALVES

Internal and External Tanks Pressure Regulating Valves - Quantity per Aircraft: 1 each type The Internal and External Tanks Pressure Regulating Valves are designed to guarantee an almost constant downstream value of the air pressure, in a wide range of upstream pressures and through flows.

Ground Connection & NRV - Quantity per Aircraft: 1 This unit is a pneumatic connection used to provide power to the Eurofighter Typhoon turbine starter. It guarantees connection with ground cart coupling, for air supply, and prevents excessive leakage to the outside when the cart hose is not connected and the system is pressurised.

Power Take Off Shaft (PTO Shaft) - Quantity per Aircraft: 2 During usual operation the PTO Shaft transmits power:

- From the gearbox of the Aircraft-Mounted Accessory Drive (AMAD)
- To the gearbox of the Engine-Mounted Accessory Drive (EMAD).

During starting operation the PTO Shaft transmits power:

- From the gearbox of the EMAD
- To the gearbox of the AMAD.

HYDRAULIC and ELECTROMECHANICAL ACTUATORS

Onboard Cockpit Ladder System Actuator - Quantity per Aircraft: 1 The OCLS Actuator is used to lock and release the door of the pilot's ladder compartment of the aircraft. The unit provides position retaining for door lock in absence of power supply.

Airbrake Actuator - Quantity per Aircraft: 1 In a worksharing partnership with Liebherr and Goodrich Actuation Systems, Secondo Mona produces a Kit of parts for the Airbrake Actuator that is then assembled and tested by Goodrich in the UK.

Kit for the Brake Parachute Lock and Release Unit (BPLRU) - Quantity per Aircraft: 1 In a worksharing partnership with Flight Refuelling, Secondo Mona manufactures a Kit of parts for the BPLRU that is then assembled and tested in the UK by Flight Refuelling.

LANDING GEAR EQUIPMENT

Secondo Mona manufactures the following equipments for Messier-Dowty

Landing Gear Telescopic Locking Stay (TLS) - Quantity per Aircraft: 1 The TLS is used to lock the Nose Landing Gear in the extended position.

Nose Landing Gear Uplocks - Quantity per Aircraft: 1 The Uplocks are a locking device that automatically lock and release the Nose Landing Gear in the Up and Down Positions.

Nose Landing Gear Doorlocks - Quantity per Aircraft: 2 The Doorlocks are mounted on the airframe to provide automatic locking to secure the Nose Landing Gear bay doors in the closed position.

Main Landing Gear Uplocks - Quantity per Aircraft: 2 The Uplocks are a locking device that automatically lock and release the Main Landing Gear in the Up and Down Positions.

Main Landing Gear Doorlocks - Quantity per Aircraft: 4 The Doorlocks are mounted on the airframe to provide automatic locking to secure the Main Landing Gear bay doors in the closed position.

ENGINE EQUIPMENT

In addition to the equipment installed on the aircraft Secondo Mona also works on the EJ200 engine that powers the Eurofighter Typhoon.

Afterburner Fuel Control Unit (ABFCU) - Quantity per Engine: 1 The ABFCU is an engine driven integrated unit, combining fuel pumping and metering to the reheat (afterburner) section of the EJ200. In a worksharing partnership with Goodrich Engine Control Systems, Secondo Mona manufactures a kit of parts for this unit. Secondo Mona also assembles and tests 50% of all units while the other 50% is being performed by Goodrich in the UK.

Afterburner Fuel Shutoff and Distribution Valves (ABSODV) - Quantity per Engine: 11 The ABSODV is a shut-off fuel valve used in the afterburner fuel system of the EJ200 in order to cut the fuel supply to spray-bars, in case of afterburner not operative, as well as guaranteeing uniform distribution of fuel among spray-bars when afterburner is engaged. In a worksharing partnership with Goodrich Engine Control Systems, Secondo Mona manufactures 33% of all valves that are then assembled and tested in Germany by Goodrich.

Fuel Coolant Oil Cooler (FCOC) - Quantity per Engine: 1 In a worksharing partnership with HS Marston, Secondo Mona manufactures the Engine and Hydraulic Oil Section that make up the FCOC. This unit is assembled and tested by HS Marston in the UK.

The innovative Digital Engine Control and Monitoring Unit (DECMU)

EJ200 - An Intelligent Engine

The EJ200 engine powering the Eurofighter Typhoon features from Tranche II a further step in engine control and monitoring technology, integrating all elements necessary for Digital Engine Control and Monitoring into a single unit (known as DECMU) as well as incorporating potential for future enhancements. The EJ200 DECMU combines the functionality of the engine mounted Digital Engine Control Unit (DECU) and the aircraft mounted Engine Monitoring Unit (EMU).

Control System element

The full authority Digital Engine Control and Monitoring Unit is engine-mounted for accessibility and is a twin-lane, fault tolerant system linked to the aircraft flight control system. It constantly monitors the functional status of the engine and allows precise, responsive and safe control at all times.

The digital electronic control system, as part of the electronic sub system, processes all inputs from the engine sensor data and aircraft inputs, in order to control the hydro-mechanical elements of the system. All signal conditioning of the engine sensors used for control purposes is carried out by the DECMU.

Monitoring System element

The health monitoring system element of DECMU includes features such as individual component life usage, continuous vibration and oil debris monitoring, and event reporting.

The whole engine is designed for on-condition maintenance and low life cycle costs, which is supported by this technology.

Data is collected, stored and processed on-aircraft within the DECMU to produce information on the status of engine life usage, condition, incident status and testability. The data is downloaded to a Ground Support System (GSS) after flight for further detailed analysis.



The DECMU is engine-mounted and linked to the aircraft's flight control system



above: improvements in engine reliability and maintenance mean increased aircraft availability for the Air Forces

below: a Spanish Air Force Eurofighter Typhoon roars skyward with EJ200 engines on full reheat

DECMU Benefits

The EJ200 engine enhancement for Tranche 2 in the form of the Digital Engine Control and Monitoring Unit provides benefits in terms of cost, mass and reliability. Fulfilling at least the same control system design requirements, the DECMU provides the following system benefits:

- Reduction in mass by 3 kg, volume by 5 litres (equivalent per engine)
- Increased computing power by 20% using advanced computer technology
- Improvement in Reliability, Maintainability, Logistics by using less line replaceable units
- Increased component standardisation, higher utilisation of digital technologies, reduced obsolescence risk
- Simplification of aircraft interface (single aircraft/engine interface)
- Simplified handling of engine health monitoring data (EMU becomes integral to DECMU)
- Production solution for thrust vector control and future enhancements
- Increased functionality

The DECMU system has been developed by the European Military Engine Consortium EUROJET Turbo GmbH, led by the German company MTU Aero Engines in partnership with AVIO, ITP, Rolls-Royce and European hardware suppliers.

The EUROJET Technical Director, Mark Thomas, stated that "DECMU is an exciting development in engine control and health monitoring technology, offering considerable benefits over other systems and ensuring that the EJ200 remains at the leading edge of military aircraft propulsion"

With this advanced and innovative Control and Monitoring System, the EJ200 powerplant sets new standards in military engine technology, supporting both current and future capabilities of the Eurofighter Typhoon.



The Main Development Contract draws to a close

Major Programme Milestone

It was announced at the start of 2006 that the final chapter of the Main Development Contract had commenced. As we reach year end, the fleet of Development Aircraft are approaching their final flight activities which, when completed, will move the aircraft into retirement status, and bring to an end a major chapter in the life of Eurofighter Typhoon. Development Aircraft One (DA1) was retired in December 2005 and, with four more of the test fleet to finish their assigned tasks by the end of the year, the maturity of the weapon system in terms of certified capability, and also programme maturity, is unquestionable.

DA2, shown here with smokewinder pods, regularly thrilled the crowds at the Farnborough International airshow



The Italian DA3 was at the leading edge of gun clearance trials

DA2

DA2, the "black" Eurofighter Typhoon, caught the imagination for many reasons, and not just on its appearance. The edge-of-envelope work carried out by DA2 gave this aircraft the privilege of being the only Eurofighter Typhoon in the fleet to be fitted with the anti-spin gantry. A sign of impending retirement was recognised through the removal of this safety device at the end of August and, after having accounted for over 600 flying hours on behalf of the development fleet, DA2 will go into retirement with the accolade of "job well done".

Achievements

- First 'carefree handling' flight
- First Eurofighter Typhoon to achieve Mach 2.0
- First supersonic flight to deploy towed decoy
- First aircraft to reach 55,000ft (contracted envelope ceiling)
- Completion of Automatic Low Speed Recovery testing

DA3

The third Development Aircraft, the Alenia Aeronautica-operated DA3 was at the forefront of armament activities. Since achieving

lift-off in June 1996, the aircraft racked up over 500 flying hours and, as the only single-seat development aircraft to be fitted with the Mauser cannon, DA3 was utilised for many firing clearance tasks. With all pre-assigned tasks complete, DA3 is awaiting final approval before settling in to a well-earned retirement.

Achievements

- First supersonic flight with EJ200 engines
- First EJ200 re-light flight
- First supersonic flight with external stores (2 x 1,000l tanks)
- First in-flight gun firing
- First pit-drop tests with air-to-ground weapons

DA4

The first of two twin-seat aircraft, this BAE Systems-based Eurofighter Typhoon was actually the last of the Development Aircraft to take flight. However, as the first test aircraft to be fitted with the Captor radar, DA4 has been the leader in the development of the avionics suite in Tranche 1 and at the leading edge of Tranche 2 avionics testing. Over 450 flights later, plus the highest average flight time of the development fleet, DA4 will go into retirement at the end of the

DA4 played a key role in radar testing



year, with the acknowledgement of its priceless contribution to the Tranche 2 and the future capabilities programmes assured.

Achievements

- First supercruise flight
- First AMRAAM guided firing
- First in-flight DASS operation
- Longest flight for a Development Aircraft - 262 minutes
- First night air-to-air refuelling with external tanks

DA5

The second of the two German Development Aircraft, the single-seat DA5, having also been fitted with the Captor radar, assisted DA4 in the field of avionics testing. This Eurofighter Typhoon also underwent upgrades to be able to develop the Tranche 2



avionics capabilities and, with around 600 flying hours to its credit, will join DA1 in retirement at EADS Military Air Systems' Manching site towards the end of the year.

Achievements

- Aircraft flies 1,000th flight for the Eurofighter Typhoon fleet
- Radar assessment flight against 20 targets
- First High Velocity Vector Roll completed during aerial display for ILA Berlin airshow
- First flight with an active IRIS-T
- First aircraft to visit potential customer Nation - Norway

DA7

The seventh Development Aircraft is a key player in armaments clearances having carried out the majority of first-firing exercises. With retirement scheduled for mid-2007, DA7 is still playing a significant role in navigation and avionics testing and, before eventually completing its final flight next year, will potentially claim the flights-achieved record off DA2.

Achievements

- First missile firings - AIM-9L, AMRAAM, ASRAAM, IRIS-T
- First external tank jettison
- First supersonic weapon firing with AIM-9L
- First flare (DASS) firing
- First in-flight refuelling from Italian B-707 tanker

DA7 accounted for the majority of missile first-firings



The EADS-operated DA5 helped develop the Tranche 2 avionics capabilities

With their place in Eurofighter Typhoon folklore assured, the Development Aircraft fleet, although a different animal in comparison to the Series Production Aircraft in service with the four Partner Air Forces, will go into retirement having helped shape the capabilities that have made Eurofighter Typhoon the world's best-selling swing-role combat aircraft.

Aircraft-assisted flight on Eurofighter Typhoon

Automatic Assistance

For a weapon system with such a complex flight control system, it should come as no surprise that some onlookers have described Eurofighter Typhoon as being "fully automatic with manual override!" The design of Eurofighter Typhoon is such that it enables the pilot to concentrate on the tactical tasks, safe in the knowledge that the weapon system itself provides a safety net to recover the aircraft should the flight envelope be breached.

There are a number of automatic recovery features within the Eurofighter Typhoon flight control computers that restore the aircraft to stable flight in the unlikely event of pilot disorientation. Perhaps the most prominent feature is the Automatic Low Speed Recovery (ALSR) system. This was introduced as a safety feature to eradicate any "too slow" worries. Should the aircraft decelerate to undesirably low speeds, the flight control system will initiate a warning to the pilot and wait for a manual recovery action or manoeuvre. In the event of a no-response,

the flight control system will take over, recovering the aircraft to stable flight, before handing control back to the pilot.

Another important automatic safety feature of Typhoon is the Disorientation Recovery Facility (DRF). Should the pilot become spatially disoriented, he simply presses the DRF button, whereby the flight control system will take over the aircraft, bringing it to a wings level, slightly climbing, medium speed position, until such time as the pilot is spatially re-aware. The FCS releases control as soon as the pilot recommences aircraft manoeuvres.

The system health of Eurofighter Typhoon is continuously monitored on the pilot's behalf using C-BIT (continuous built-in test) technology. It is a form of aircraft "house-keeping" that will only alert the pilot should a problem be recognised and, even then, only if he either needs to know about it, or he needs to take action. No alert = no problem! This means that the pilot can fly Eurofighter Typhoon with total focus on the mission.

But there is more than just safety automation on Eurofighter Typhoon. There is automation of a kind that actually increases the flying performance of the aircraft. The Carefree Handling capability of Eurofighter Typhoon translates from automation in the flight control system. For example, a pilot will attempt a manoeuvre in the form of a movement of the stick, which the flight control system translates into optimum control surface movements, always ensuring the aircraft is kept within the flight limits without the need for the pilot to consider the majority flight limitations for himself.

Additionally, there is the Autopilot function. Similar to most fighter aircraft, the autopilot allows for "hands-off" flying, so that the pilot can devote increased amounts of time to other tasks, such as data analysis. The autopilot system also has the ability to be continuously reprogrammed as the situation changes in-flight.

These systems combine to give maximum performance with maximum safety. The high workload situations of the single-seat pilot demand total confidence in the aircraft systems, and Eurofighter Typhoon delivers.

The Eurofighter Typhoon flight control system is fully-equipped to aid the pilot should the aircraft depart from safe controlled flight

Start of Major Retrofit for early Eurofighter Typhoon aircraft

Fleet Wide Capability

Twin-seat Block 1 aircraft will be the last to go through the Retrofit 2 programme

Ensuring a fleet-wide Block 5 Final Operational Capability (FOC) standard for the Eurofighter Typhoon operators, in combination with the in-step capability insertion philosophy that drives the Eurofighter Typhoon programme, requires a pre-planned retrofit and upgrade timetable for the earlier Tranche 1 aircraft. In November, the first of the 115 aircraft that constitute Blocks 1, 2 and 2B of Tranche 1, entered the Retrofit Programme R2 in order to upgrade them to the Block 5 standard and maximise Eurofighter Typhoon capability at a fleet level.

An upgrade management philosophy is in place to combine Eurofighter Typhoon capability upgrades with routine scheduled maintenance to enhance overall fleet availability. With ongoing development on Tranche 1 and Tranche 2 aircraft, maintenance



philosophies and Capability Insertion Upgrade planning will need to be integrated to keep all aircraft to the same standard, whilst retaining high fleet availability.

The first non-Block 5 aircraft to have begun the upgrades to FOC standard is BS021, the 21st single seater of UK production. Only a few days later, German aircraft GS019 joined the programme. Both are Block 2B aircraft with a functionality standard representing the full air-to-air functionality. Block 5 includes this plus the enhanced carefree handling air-to-ground capability to drop laser guided bombs.

Priority in the R2 programme is on the upgrade of Block 2B aircraft, as less work is required to bring these aircraft to the higher performance level. By the end of 2007, the combination of Block 5 new aircraft deliveries and upgraded R2 aircraft will enable the Partner Air Forces to meet their NATO commitment goals.



Following on from Block 2B aircraft, Block 2 Eurofighter Typhoon aircraft, currently operating with the initial air-to-air capability, will be upgraded. Finally, early Block 1 aircraft (all of them twin seaters) will enter retrofit, after which the Return To Works Programmes in place with the Eurofighter Partner Companies will deliver a ratio of single seat and twin seat aircraft to satisfy each Nation's operational

requirement. R2 is scheduled to upgrade all Tranche 1 aircraft to the Block 5 FOC standard by early 2012.

The R2 programme is paving the way for future upgrades to Tranche 1 and Tranche 2 aircraft with an option in the medium term to upgrade Tranche 1 to Tranche 2 capability standards as required by the Partner Air Forces and Austria.

left: The first aircraft have already been entered into the Retrofit 2 programme

The Retrofit 2 work will coincide with scheduled maintenance timetables





At the beginning of November, the three Eurofighter Typhoon squadrons of the Royal Air Force took to the skies from the Main Operating Base of RAF Coningsby for a spectacular “Diamond Nine” formation flight. It was the first time that all the aircraft included in the formation were single-seat type.

The lead Eurofighter Typhoon was piloted by Group Captain Bob Judson, with aircraft from 3(F), 17(R) and 29 Squadrons making up the formation.

