Eurofighter Typhoon Enters Final Stages of Flight Test

In February, the Eurofighter Flight Test Team put Instrumented Production Aircraft Three (IPA3) through several underwing heavy load tests, with four Paveway II bombs, three external fuel tanks, and a complement of air-to-air missiles. These tests come as Eurofighter Typhoon opens the final chapter of the Main Development Contract. The testing of the air-to-air carefree handling Flight Control Software (FCS) is almost finished, while the remaining clearances for the Phase 4 FCS will be finalised over the Summer. The final stage of testing will be the validation of the Phase 5 air-to-ground FCS. The software, written by a Joint Team headed by EADS Military Air Systems in Germany, will undergo rigorous testing in all four Partner Nations and will involve six aircraft from the Flight Test fleet.

On conclusion, the final clearances for the Full Operational Capability will be expected in 2007, followed by the availability of the Phase 5 software to Block 5 aircraft. The first Block 5 Eurofighter Typhoon is already in final assembly in Germany, with deliveries of this standard of aircraft to begin in early 2007.
Following the commencement of operations in its Air Surveillance role with the Italian Air Force on 16 December 2005, the Eurofighter Typhoon new generation combat aircraft was tasked with providing airspace air defence coverage above Turin throughout the duration of the Winter Olympic Games.

In February flight trials, Eurofighter Typhoon Instrumented Production Aircraft Three (IPA3) took off from Manching carrying four Paveway II, three external fuel tanks, and an air-to-air fit of four AMRAAM and two IRIS-T missiles. Take-off weight for this configuration is almost 24 metric tons.

Air Dominance

Eurofighter Typhoon protects the 2006 Winter Olympics

The Eurofighter Typhoon was deployed over Turin together with an Italian Air Force F-16 as well as MB-339CD and HH-3F helicopters.

The air defence structure, in which Eurofighter Typhoon has an integral role, has already been tested during events such as the Genoa G8 summit, Pratica di Mare NATO-Russia summit, the burial ceremony for Pope John Paul II and the coming into seat of Pope Benedictus XVI.
A Piece of ART

Anniiversary Exhibition of Austrian Air Forces

To celebrate 50 years of the Austrian Air Force, Eurofighter Typhoon took centre-stage in an art exhibition based on the genius of Japanese aviation photographer, Katsuhiko Tokunaga.

Using Tokunaga’s photography and the question ‘what does art say to 50 years of Air Forces?’ as a reference point, seven artists worked to provide an answer and create an experience of design, photography, video, sound, sculpture and installation, referring to such aspects as speed, power, command structures and the desire to fly.

The exhibition was held in Hangar VII (Red Bull Hangar) at Salzburg airfield, and ran from 13 – 30 January.

Making the Tornado line then. They were nowhere near as advanced as these”.

Mr Walker commented: “They were technicians who work on the aircraft joined His Royal Highness for a cup of tea during his tour. Production Supervisor Ian Walker, said he remembered the last time the Prince of Wales visited the plant in the 1970s.

The Prince of Wales’ Royal Typhoon Visit

Prince Charles tours Warton

To get a seat in a Royal Air Force Eurofighter Typhoon cockpit you must be either a qualified pilot or the most important of VIPs. The latter got their chance early in February when His Royal Highness Prince Charles, The Prince of Wales, made an official visit to BAe Systems’ Warton facility, UK.

Taking his seat in the cockpit, Prince Charles commented on its comfort, before being briefed on the functionality by Flt Lt James Iddy MCMorgan, an RAF fighter pilot instructor.

“I told the Prince how fantastic the Eurofighter is. It’s an awesome aircraft to fly,” he said.

The Prince was given details on the production and assembly processes, including the division of workshare and the shipping of the major components from the three other Eurofighter Partner Companies to the final assembly facility at Warton. He also viewed simulated missions on the Cockpit demonstrator during his four-hour visit, and met senior management at BAe Systems.

The vast majority of the 190 staff and technicians who work on the aircraft joined His Royal Highness for a cup of tea during his tour. Production Supervisor Ian Walker, said he remembered the last time the Prince of Wales visited the plant in the 1970s.

Mr Walker commented: ”They were making the Tornado line then. They were nowhere near as advanced as those”.

Crew Systems Engineer, BAE Systems, has received the 2005 Young Woman Engineer of the Year award. The prestigious title, sponsored by The Institution of Incorporated Engineers and The Caroline Haslett Memorial Trust and supported by BT and Ford Motor Company, was presented to Sara by Sir Digby Jones, Director-General of the CBI, at a ceremony in London.

Speaking at the ceremony, German National Armament Director, Dr. Jörg Kaeumper, stated “The substantial improvements to our weapon systems of Tornado, and later Eurofighter,”

The German Air Force are set to receive 600 Taurus missiles between 2005 and 2009, in a procurement deal worth in the region of 600 million Euro. The Spanish contract for the procurement of 43 operational missiles includes mission planning and support to aircraft integration.

Development and Testing

Crosswinds, fatigue and electromagnetic forces

Test and certification is an ongoing task. On 13 January, test pilot Mark Bowman successfully landed Instrumented Production Aircraft Five (IPAS) with an underslung fuel tank configuration in a 20 knots crosswind. This achievement for the Flight Test team will ensure that the cleared in-service levels for this configuration will be doubled while remaining well inside the aircraft’s design limit.

On Spanish soil, overseen by EADS CASA, Eurofighter Typhoon IP4a underwent on-ground testing in a series of electromagnetic compatibility (EMG) and Pit-Drop trials. Loaded with four GBU-16 weapons, the aircraft was tested for the successful jettison of the bombs, while maintaining complete functionality of all the aircraft’s critical systems, under electromagnetic conditions. Further tests are planned incorporating a variety of weapon configurations.

The testing was carried out in advance of future in-flight bomb jettison trials, with the recorded data to be added to previously conducted EMC tests, to achieve further weapons release clearances.

A further significant achievement is the 1,000 test hours attained on the Structural Test Facility (STF), based at Brough, UK. The Single-Seat Front / Centre Fuselage Fatigue Test, designated as SFTF, is in the structural fatigue qualification of the non-common components of the single-seat Eurofighter Typhoon airframe. Having achieved the milestone 1,000 test hours ahead of schedule, the team cited the successful implementation of periodically running the test unmanned as a key factor in reaching the benchmark ahead of schedule.

BAE Systems - prize winner

Young Woman Engineer of the Year

Sara Pullen

Crew Systems Engineer, BAE Systems, has received the 2005 Young Woman Engineer of the Year award. The prestigious title, sponsored by The Institution of Incorporated Engineers and The Caroline Haslett Memorial Trust and supported by BT and Ford Motor Company, was presented to Sara by Sir Digby Jones, Director-General of the CBI, at a ceremony in London.

Working with the Head Equipment Assembly (HEA) Team, Sara Pullen, 25, and her colleagues are responsible for the concept, design, development and qualification of the various components of the helmet for Eurofighter Typhoon. Sara, liaising with representatives from the four Nations, has overseen a number of trials, aimed at assessing the effects the HEA helmet has on aircrews’ neck and back following ejection from the aircraft.

“At the end you have a product that you can put your name to – for me it was the first new Eurofighter helmet on its first maiden flight.”

While in flight, the helmet visor presents the pilot with key mission data including fuel levels and weapon status, but on ejection it must protect the head from G-forces up to nine-times that of gravity.

“When you eject you have to make sure the wind blast does not take your head off!” she said.

To make the helmet more aerodynamic, the team designed something that “looks like a normal helmet that a wasp has stung”.

Sara joined BAE Systems as an apprentice, and in 2001 moved into the Ground Support Equipment Team as a flight systems engineer. In 2004, she graduated with a BEng (Hons) Degree in Mechanical and Production Engineering, and is currently applying to study for an MSc in System Safety.

Germany and Spain will be the first nations to integrate the Taurus KEPD 350 Standoff weapon with the Eurofighter Typhoon.

Using Tokunaga’s photography and the question ‘what does art say to 50 years of Air Forces?’ as a reference point, seven artists worked to provide an answer and create an experience of design, photography, video, sound, sculpture and installation, referring to such aspects as speed, power, command structures and the desire to fly.

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The recent deliveries of Block 2 aircraft provide the customer with the Initial Operational Capability (IOC) providing primarily air defence capabilities, encompassing full carefree-handling qualities with external fuel tanks, gun and missile firing clearances, the capability for air-to-air refuelling, and the ability to operate chaff & flares for self-protection as part of the initial DASS Defensive Aids Subsystems package. With their Multi-functional Information Distribution System (MIDS), Eurofighter Typhoon provide network centric capabilities to the Air Forces - a feature high on the list of in-service requirements. Initial Direct Voice Input (DIVI), and sensor fusion, including MIDS, are the main features of the Block 2 Human Machine Interface of the cockpit. The first Block 2B aircraft have been handed over to the Spanish Air Force and the Royal Air Force. The Type Acceptance document signature was achieved in December 2005 on schedule. The Block 2B standard introduces the Phase 4 Flight Control System software for significantly more agility.

The Final Operating Capability (FOC) standard aircraft is Block 5, on order for the customer for deliveries in 2007. It will have the full air-to-air and air-to-ground capability specified in the Main Development Contract, as required by the air forces, with the first Block 5 aircraft already in final assembly at EADS Military Air Systems Manching facility.

Recent proposals also cover an initial clearance for use of a laser designator pod and precision guided weapons on the first Tranche of aircraft. All such clearances are progressively retroapplied to aircraft already delivered, so that progressively all Tranche 1 aircraft will be brought up to final Block 5 standard.

Production of the first aircraft Block 5 for Austria is well advanced, with the major components such as the front and centre fuselage already in build. Final assembly of AS001 is scheduled for Spring 2006, with aircraft deliveries due to begin in 2007. By early 2006, 75 series production aircraft had been delivered to the customer, 69 of which are operated by the four Partner Air Forces. The remaining six so called Instrumented Production Aircraft (IPA) are being used for test and evaluation purposes by industry. The combined Air Force and industry fleets had surpassed the 10,000 flying hours mark early in 2006, with over 6,000 hours logged by the in-service aircraft since the first handover in 2003, and the industrial Flight Test aircraft amassing well over 4,000 hours.

While the Air Forces are now training their pilots, the Flight Test programme focuses on development and testing of the FOC Electronic System and the Phase 4 (air-to-air) and Phase 5 (air-to-ground) Flight Control Software, with the Phase 4 standard allowing the aircraft to achieve its maximum agility. Testing is to be finalised in Spring 2006, following the conclusion last year of testing at full 9g loads. Phase 3 software will enable Eurofighter Typhoon to not only carry, but to also operate, air-to-ground weapons like Paveway and Guided Bomb Units (GBU), and while initial flights with four Paveways took place in 2005, more flights are scheduled for 2006.

By the end of 2005, Eurofighter GmbH and NETMA had agreed on the way forward in order to conclude the main development phase: An indicator that this phase is draw ing to a close was the last flight of DA1 in December 2005 at EADS Manching. DA1 was the first Development Aircraft to fly in 1994. The remaining five Development Aircraft will soon follow suit as they fulfill their respective development roles and reach the end of their design life. This fact goes a long way in demonstrating the maturity of the programme, but it must also be highlighted that the retirement of the DA fleet does not indicate that Eurofighter Typhoon has achieved its final performance standard.

The proposals for new capabilities to be introduced with Tranche 2 aircraft were submitted to NETMA in the fourth quarter of 2005, and these proposals included the integration of the advanced Meteor BMRAAM (Beyond Visual Range Air-to-Air Missile) that flew on Eurofighter Typhoon for the first time in December last year. The enabling for the introduction of these and other new capabilities was the signature of the Tranche 2 production contract, signed in 2004.

New capabilities will accumulate over time as the Air Forces themselves further develop the outstanding qualities and potential of the aircraft. The world class performance of Eurofighter Typhoon has been consistently proven in independent assessments where the aircraft, and other Western fighters, were benchmarked against upgraded versions of the Sukhoi Flanker in air-to-air combat. The results are stunning and well recognised by Air Forces and the competition. The F-22 and Eurofighter Typhoon clearly dominate in the win rate with both scoring well in excess of 90 percent, and leaving the rest of the field trailing in their wake quite drastically. The Dassault Rafale managed 56 percent, while other weapon systems, such as Gripen and the legacy fighters, fell well below the 50 percent mark. Eurofighter Typhoon’s superior performance puts it in a class with the F-22. Nothing else comes close.

The results from these assessments ensure that interest in Eurofighter Typhoon from other Nations is high. The Eurofighter Partner Companies are actively pursuing market opportunities in potential Export Nations such as Greece, Turkey and Norway, with Eurofighter GmbH playing a key role in identifying the Nations where Eurofighter Typhoon’s capability matches the national requirement.

For 2006, the challenges facing the Eurofighter Typhoon programme have not changed and, although intense political debate is still to be expected, the main focus remains clear: Deliver world class performance to the customer.

Aloysius Rauen, CEO

Performance is Key

The Programme Advances Through 2006

The Eurofighter Typhoon programme is in a very exciting and challenging phase. The main development activity will continue until the end of 2007; series production is running smoothly with aircraft deliveries to the customer becoming routine; and the Air Force groundcrews are building up the necessary experience for ‘on the ground’ operations including maintenance, logistic processes, and training. But the most exciting prospect for the programme is that Italy has taken the next step and put Eurofighter Typhoon into an armed quick reaction alert role to safeguard Italian air space, with their lead to be followed by the remaining Partner Air Forces later this year.
DA1 also made regular appearances during the exhibition calendar, and was a star performer at Europe’s major airshows. In 2000, and with “smokewinder” pods attached, DA1 turned in breath-taking daily displays at both ILA Berlin and Farnborough International, as well as other exhibitions in the Netherlands and the Czech Republic. The aircraft’s place in airshow legend was sealed when it flew as part of the historic four-ship fly past, with DA2, EA4 and IPA1 (Instrumented Production Aircraft) at Farnborough 2002.

As the Eurofighter programme has reached a high maturity level and is reaching the end of the main development phase, the Development Aircraft have almost fulfilled their tasks. DA1 now goes into a well-earned retirement, with the others soon to follow.

Phillip Lee

On 21 December 2005, eleven years, eight months, and 24 days after making the historic first flight for the Eurofighter programme, Development Aircraft One came in to land for the last time at EADS’ Manching facility.

Piloted by test pilot Chris Worning, DA1 was greeted by the EADS Groundcrew, and the technicians who have endeavoured to enable the aircraft to play an integral role at the forefront of the Flight Test programme.

In terms of achievements, DA1’s contribution to Flight Test has been immense. Right from the off, the certification and data gathering conducted by DA1 has helped shape the performance and capability on what is today the most advanced combat aircraft in the world. Primarily involved with initial, and ongoing, airframe and FCS development, DA1 later moved into aircraft handling, envelope expansion and engine development.

Final flight of the number one

DA1 Lands for the Last Time

DA1 was a key player in Flight Test, amassing almost 500 flight hours.

Over the course of its 578 flights and just short of 500 flying hours, some of the milestones achieved by DA1 include:

- First ever flight of a Eurofighter Typhoon
- In-flight icing trials behind a Do 228 Tanker
- First formation take-off and landing
- First in-flight refuelling from a Tornado with Buddy-Buddy pod
- First in-flight refuelling with 3 (wet) external tanks
- Completion of supersonic caretfree handling manoeuvres
- Autopilot testing completed

Following its final flight, DA1 lines up with EADS Test Pilot Chris Worning and the Groundcrew at Manching who have serviced the aircraft during its Flight Test career.

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The Highs and Highs during a Key Year for Eurofighter Typhoon

2005 Programme Review

The signature of the Tranche 2 Supplement 3 contract for production of a further 236 aircraft still fresh in the memory, and with the Type Acceptance of the single-seat variant also recently achieved, the Eurofighter programme moved into 2005 confident that the successes of 2004, climaxing in December with the two key contract signatures, would be built on and that this level of achievement would be maintained throughout the duration of the coming 12 months. Here we take a retrospective look at the headline-making events of the now confirmed best-selling next generation fighter aircraft!

January

Turning defence into attack

Even with Tranche 2 confirmed and deliveries of single-seat Eurofighter Typhoons underway, the programme began 2005 having to explain and reiterate the process of planned capability insertion to the public following fierce criticism from the German weekly publication “Der Spiegel”.

To further emphasise this chosen track of ongoing development and qualification, the Flight Test team achieved the first flight with six advanced medium-range air-to-air missiles (AMRAAMs), fully integrated with a successful simulated firing, as well as the completion of Autopilot Official Assessment Flights.

February

Missiles, first flights, and an Austrian in the cockpit

February was dominated with a variety of flying achievements. In Flight Test, BAE Systems-operated DA4 carried out a successful guided firing of the AMRAAM missile, scoring a direct hit against its target, while the first single-seat Typhoon bound for the Italian Air Force made its maiden flight out of Alenia’s test facility at Castellana.

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In support of ongoing Export efforts, the Chief of the Austrian Air Force, Major General Erich Wolf, and a delegation from the Turkish Air Force, both gained first-hand experience of the manoeuvrability of Eurofighter Typhoon. After his flight, General Wolf commented: “This was the most impressive aircraft I’ve ever flown and I’ve flown many aircraft including the F-16, F-18, MiG-29 and the Gripen. An outstanding aeroplane with outstanding performance that meets our expectations and requirements. The man machine interface is superb and pilot orientated.” Austria as the first Export customer signed the procurement contract for the delivery of 18 aircraft in 2003.

March

Surviving the cold and a US detachment ends

EADS Military Aircraft announced in March the delivery of the 100th Centre Fuselage section to EADS CASA. The milestone component was assigned to SS007 of the Spanish Air Force, and was delivered to the final assembly line at Getafe.

In the middle of March, the Spanish Eurofighter Typhoon IPA4 completed the longest and most exceptional test campaign on foreign soil when it touched down at Getafe following Cold Environment Trials in Vidsel, Sweden. During the trials, the aircraft was subjected to temperatures as low as -31°C and it provided verification for system operations in extreme cold weather.

The increasing maturity and confidence in the aircraft was further demonstrated when BT005 / EPS1 returned from detachment in the United States. The aircraft had been undergoing operational testing, and this deployment success adds to the achievements from the Singapore deployment in mid-2004.

April

RAF relocation and an Export elimination

The Royal Air Force took the headlines in April with the announcement that 17 (R) Squadron had relocated to RAF Coningsby, from the BAE Systems Warton facility. The aircraft of 17 (R) Squadron had been brought into service in partnership with industry under the ‘Case White’ programme, an initiative that proved to be a resounding success, highlighted by the fact that every target was achieved and in some cases exceeded, culminating in the on-schedule delivery to RAF Coningsby.

Also in this month, the programme announced that all four partner Air Forces were operating Batch 2 single-seat aircraft, following deliveries to the German Air Force and the Royal Air Force, and the deployment of SS002 to Grosseto, Italy.
EADS CASA deliver the 100th Right Hand Wing

EADS CASA ensured that the production programme made headlines when they delivered the 100th series production Right Hand Wing, assigned to Eurofighter G007, to the German final assembly facility at Manching.

In the Export market, despite proving its capabilities to be above and beyond those of the rival aircraft, Eurofighter Typhoon was eliminated from the Singapore Fighter Competition. Singaporean officials acknowledged the capability supremacy, but added that the core programme schedule did not match the time schedules of the Singapore Air Force.

June

A Summer tour and the Programme hits 50

The coming of the Summer months signalled the start of a busy exhibitions calendar. First up was the 46th International Paris Airshow at Le Bourget. A programme milestone was achieved in the aerial display when, for the first time, Captain Matteo Maurizio, of the Italian Air Force, piloted an Air Force single-seat operational aircraft in front of the watching crowds. The event also provided a platform for industry and customer to showcase the partnership ethic running through the programme, and to brief other interested nations on the advantages of becoming involved in the collaborative project.

During the show week, the Norwegian Government announced that it would increase its funding in Eurofighter Industrial participation, citing the benefits brought by such a partnership as being that the access to the technological know-how will enhance the capabilities of their armed forces in the long run.

May

A positive start and testing begins on FOC

With the discussions still raging over the Singapore decision, and the Eurofighter procurement again subject to debate in the Austrian Parliament, the programme came out fighting with achievements across the board. Initial operations out of RAF Coningsby had begun positively, and deliveries to the Air Forces were progressing at a steady rate.

The testing of updates to the avionics package of the aircraft with FOC standard, in particular to the radar, the DASS and the sensor fusion, started and overall the pilot feedback was positive.

The Summer’s second major aerospace event was Airpower 2005, at Zeltweg, Austria. Eurofighter and EADS supported in full, with the German Air Force providing two aircraft from JG 73 “Steinhoff”, Laage. This was the first event, since the contract with Austria was agreed, during which the public and Air Force personnel could familiarise themselves with what will be the future air defence weapon system of the Bundesheer.

Also in June, the programme soared through the 50 barrier in terms of aircraft delivered to the customer. The simultaneous acceptance of aircraft by Germany and Spain took the number of aircraft owned by the customer to 51 at the end of the first half of the year. Eurojet, the consortium overseeing the production of the EJ200 engine, recorded a significant milestone of their own when they delivered the 250th engine to the nations.

July

A second RAF move and IPA4 takes the heat

The busy Summer showed no sign of letting up as the programme moved into July. At the beginning of the month, 29 (R) Squadron of the Royal Air Force, joined 17 (R) Squadron, at RAF Coningsby as they made the move from RAF Systems’ Warton facility.
August


The achievements of the Flight Test team drew the programme throughout August, with significant developments in key areas. First, Development Aircraft 1 carried out the successful first flight of an upgraded software package (phase 4). This success was matched by D31 a few days later when the aircraft completed a campaign of Flutter Test flights. The campaign included flights at the extremities of the flight envelope, with external loads, and highlights the aircraft’s durability in the extremes of flight.

Towards the end of August, testing was completed on Aoutopilot flight with the twin-seat IPA3. The flight computers took control of the aircraft and reacted to the differences in loads and handled the air-craft accordingly. The month closed with successes in the carefree handling flight testing, in which the Eurofighter Typhoon was subjected to Gross Maneuvering Levels i.e. the pilot jerked the stick to elicit aircraft responses instead of easing the aircraft into flight manoeuvres, and Eurofighter again proved its handling capabilities in coming through these tests with ease.

September

A Turkish delight

An extremely busy September in Flight Test is highlighted with the completion of several key tasks, including various air-to-air refuelling tests, carefree handling manoeuvres, and AIM-9L missile firings. The exhibition circuit moved up a gear with two airshows linked closely with campaign efforts. The first stop was Tanagra Air Base, Greece, for the Archangel 2005 air show, with campaign leader EADS, supported by Eurofighter, putting on a considerable exhibition presence. The export focus then shifted to Ankara, Turkey, where Eurofighter made its first-ever appearance in Turkey as part of the IDEF 2005 International Defence Fair. The Turkish Air Force had sent two aircraft and Captain Marko again flew a breath taking display. This provided opportunity for the Eurofighter Partner Nations to highlight the strength of the industrial and governmental cooperation in the programme, and a visit plus a joint declaration from the Defence Ministries of Germany, Italy, Spain and the United Kingdom, emphasised the potential benefits of Turkey’s participation in the project.

October

Italy top 1,000 and Eurofighter makes a Vienna fly-pass

Following the load of JG73 at Laage, the second proposed Eurofighter unit in the Luftwaffe took the first steps towards conversion following the handover of the ASTA training building in Neuburg. From this year, all JG74 pilots will undergo Eurofighter Typhoon training on the simulators installed at Neuburg.

As part of the celebrations marking the 50th Anniversary of the Austrian Armed Forces, a four-ship Eurofighter Typhoon formation made a fly-past over Heldenberg, Vienna, highlighting the four Nation partnership while giving the Austrian public the opportunity to see, what will be their newest air defence system, in action. In Flight Test, the team enjoyed further successes in missile firings, in addition to the first flight of upgraded avionics software. As October drew to a close, the Italian Air Force marked their first 1,000 operational flying hours with a small ceremony in Grosseto, and a VIP flight for Defence Minister, Antonio Martino who, on landing, declared: “Flying this aircraft is like a drug!”

November

Danish and Middle-Eastern prospects

As the end of the year approached, several important numerical milestones were achieved by the programme. The Italian Air Force surpassed the 1,000 in-flight hours, while the combined flying hours for the entire in-service fleet surged past the 5,000 hour mark.

December

The sweet smell of success

As Advent started the countdown to Christ-mas, it was the Air Forces who made the headlines on behalf of the programme. The German Air Force, along with the Italian and Spanish Air Forces, took delivery of the first series production EFES T Air-to-Air missile, with a high-profile ceremony conducted at Jagdgeschwader 73, in Rostock-Laage. Not to be outdone, the Royal Air Force conducted first flight trials with the MBDA Meteor missile. 17 Squadron, based at RAF Coningsby, carried out the tests with two GHTMs (ground handling training missiles) which are representative in terms of mass,

And, as the month came to a close, the German Defence Minister, Dr. Peter Struck, paid a visit to the EADS Manching facility, to highlight the cooperation between the German Air Force and Industry.

The exhibition circuit resumed when aerospace manufacturers from around the world descended on RAF Fairford, UK, for the Royal International Air Tattoo 2005. Typhoon captured the headlines as the weekend’s star performer! Also in July, Greece, having initiated a contract for 60 aircraft before the Olympic Games, acquired 30 F-16s as an interim solution to maintain their fleet against attrition. EADS, the majority shareholder in the Eurofighter programme and campaign leader in Athens, strongly stated that this procurement is not against the Eurofighter programme.

EADS when Test Pilot Chris Warming flew Major General Klaus L. Axelsen, Chief of the Royal Danish Air Force Air Materiel Command. After the flight, which lasted little over an hour, Major General Axelsen showed his enthusiasm and claimed “you should be proud of this very capable aircraft.”

The final major event of 2005 took the Eurofighter team to the United Arab Emirates for the Dubai 2005 Airshow. Although there was no Eurofighter Typhoon in the flying display, the presence was strong enough to attract a wealth of delegates and VIP visitors.

BAE Systems also announced that the assembly of the first production standard Tranche 2 aircraft had commenced, and that a further seven were to begin by the end of the year. The celebrations from the missile achievements had barely died down when the United Kingdom Government announced the sale of Eurofighter Typhoon to the Kingdom of Saudi Arabia. Under the agreed terms, Typhoon will replace Tornado Air Defence Variant and other aircraft currently in service with the Saudi Arabian Air Force.

The last major technical event of the year was NETMA clearing the Full Operational Capability avionics functionality, including the new Helmet, off the rigs into Flight Test.

The sweet smell of success, and aerodynamics, of the operational weapons. This flight demonstrated that Eurofighter Typhoon has the ability to carry all air-to-air weapons assigned to it in the Air Defence role. The celebrations from the missile achievements had barely died down when the United Kingdom Government announced the sale of Eurofighter Typhoon to the Kingdom of Saudi Arabia. Under the agreed terms, Typhoon will replace Tornado Air Defence Variant and other aircraft currently in service with the Saudi Arabian Air Force.

The last major technical event of the year was NETMA clearing the Full Operational Capability avionics functionality, including the new Helmet, off the rigs into Flight Test. The final headline of 2005 was generated by Eurojet, and their announcement of a 300 million Euro contract signature with NETMA, for in-service support up to 2009.

From this year, all JG74 pilots will undergo Eurofighter Typhoon training on the simulators installed at Neuburg.

The VIP flight of the month belonged to Major General Klaus L. Axelsen, Chief of the Royal Danish Air Force Air Materiel Command. After the flight, which lasted little over an hour, Major General Axelsen showed his enthusiasm and claimed “you should be proud of this very capable aircraft.”

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NETMA cleared the Full Operational Capability avionics functionality, including the new Helmet, off the rigs into Flight Test.
Analysis of the combat aircraft market, added to feedback from existing customers, confirms the belief that Eurofighter Typhoon is a highly attractive solution for Nations worldwide who are in the market for a Next Generation Fighter aircraft. Eurofighter Typhoon is the credible European alternative, already in service with four major European Air Forces, and contracted to deliver to a fifth (Austria) from 2007. The announcement in December last year of the Government understanding between the United Kingdom and Saudi Arabia for the sale of Typhoon only serves to underline the growing presence and authority of the weapon system in the combat aircraft arena.

**Greece**

Greece’s economy had to take on the burden of having hosted the 2004 Olympic Games, followed a year later by the decision to procure 30 F-16 fighters from the United States as an interim solution to overcome a shortfall in the Hellenic Air Force inventory. Eurofighter Partner and Campaign Leader, EADS, made clear for the consortium that this procurement is definitely not against Eurofighter Typhoon as the need for a next generation aircraft is still evident, and that Eurofighter Typhoon is well placed in terms of capability, and also in terms of the industrial and political benefits that the Eurofighter programme delivers. A Request for Proposal (RFP) is expected from Greece during 2006.

**Austria**

The Austrian Government decided in favour of Eurofighter Typhoon due to the aircraft meeting their “second to none” requirement. Contracted in August 2003, the Austria programme is well on schedule with the major components of AS501, the first aircraft for the Bundesheer, already in advanced stages of build. Deliveries are scheduled to begin in 2007.

**Norway**

Although a member of the JSF development programme, with funding levels of 35 million Euros for their industrial participation in the programme, the Norwegian Government are recognising the advantages that a Eurofighter partnership brings. An RFI has been issued by Norway, and the Eurofighter Typhoon marketing and sales effort is being led by EADS, who are working closely with the Norwegian officials in order to respond to the RFI before the end of March. A replacement decision is forecasted for 2009, with an in-service date expected to be around 2016.

**Denmark**

Very similar to Norway in its procurement strategy, coupled with the fact that they also hold membership to the JSF programme, the approach from Eurofighter Export in this campaign mirrors the Norwegian strategy. EADS are the lead Partner, cooperating closely with the Danish Officials, and all the significant competition checkpoints are forecasted to be similar to those of Norway. The RFI was issued at the end of 2005, with a decision expected 2009, and in-service requirements for 2016.

**Turkey**

The IDEF Defence Exhibition at Ankara in 2005 allowed the Eurofighter Partners to showcase the benefits of Turkish industrial participation in the programme. Declared an official Campaign in 2006, the Alevia Armament-led consortium is promoting the Eurofighter Typhoon for the planned modernisation of the Turkish Air Force. The Request for Information (RFI) has already been received and responded to, with the Eurofighter Export team now awaiting the Request for Proposal from Turkey, expected by the end of 2006.

**Further Market Opportunities**

Running parallel to official Campaigns, Eurofighter Export are continually analysing the market for future fighter replacement competitions and opportunities. The European Nations of Switzerland, the Netherlands, Belgium and Portugal, have been identified as future prospects, and in the Far East, delegates from Eurofighter have been received by Japanese Officials in order to better understand the national aircraft requirement. Eurofighter Typhoon, through its Swing Role capability, and its Industrial Participation packages, is well placed to serve the requirements of the most demanding Air Forces, today and well into the 21st Century.

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638 aircraft under contract makes Eurofighter Typhoon the best-selling next generation combat aircraft in the world.
Indra is the leading Spanish information technologies company, recording revenues of more than 1 billion Euro, and is one of the five largest companies in Spain. Based in Madrid, the company operates in more than 50 countries and currently has around 10,000 employees. Indra is a member of the consortium responsible for the DASS programme. That company is INDRA.

The company’s business is divided into three main areas: Information Technologies (IT), Simulation and Automatic Test Systems (SIM/ATS) and Defence Electronics. INDRA’s avionics involvement:

- **On-board Communications**
  - MIDS Interface Unit (MUI)
  - Communication Audio Management Unit (CAMU)
  - VHF / UHF Transceiver (RADS9)

- **Utilities System**
  - Front Computer (FC)
  - Secondary Power Supply (SFS)

- **Data Register and Presentation**
  - Maintenance Data Panel (MDP)

- **Weapons Control System**
  - Wing Pylon Station Unit (WPSU)
  - Fuselage Station Unit (FSU)
  - Integrated Tip Station Unit (ITSU)
  - New Enhanced Safety Critical Armament Control (NESCOC)

- **Flight Control System**
  - Laser Inertial Navigation System (LINS)
  - Flight Control Computer (FCC)
  - Flight Control System (FCS)

- **Engines Control**
  - Digital Engine Control and Monitoring Unit (DECMU)

- **Sensors**
  - Defensive Aids Sub-System (DASS)
  - RADAR (Captor)

- **Future Enhancements**
  - Laser Designating Pod (LDP)

The DASS is designed to ensure the aircraft will survive the full range of threats to enable mission success. It is an integral part of the aircraft’s fighting equipment that provides comprehensive protection through the Electronic Support Measures (ESM) together with the Missile Approach Warner (MAW), which work in harmony with other on-board sensing systems to give timely warning and identification of threats. The Electronic Countermeasures (ECM) system automatically activates the most suitable on-board or off-board countermeasures (inc. towed decoys) to the threat.

The system ensures maximum effectiveness in all scenarios by allowing total programmability of mission data.

Indra participates in all the key stages of the DASS programme. In development, preliminary qualification has been completed allowing for the delivery of the first systems to the customer.

- Significant investment has been made in the development of production facilities, and the manufacturing of 121 ESM-ECM and MAW systems for the DASS for the four Partner Nations has begun. Indra participates in the supply of equipments which amounts to approximately 16.5% of the total.

As a result of this policy, Indra is ready to face up the future technological challenges of the Eurofighter Programme, through the growth of the different roles of the aircraft or through the enhancement of the different systems in order to maximise the equipment performances. The future integration of a targeting laser designating pod or the possible application of the digital reception capabilities for the DASS system are good examples.

**FUTURE CAPABILITIES**

The provision of the company’s own solutions, which bring significant competitive advantages for each customer, requires a major investment on innovation in all business areas. For that reason, Indra demonstrates an outsourcing of 35 million euros and 30% of the company’s revenues.

Silvia Valdesueiro Perez
During 2005, the Eurojet partnership continued to provide support to the Eurofighter Flight Test programme in challenging test areas. Engine clearance was given for the full pull-up firing envelope while Spanish Partner, IPT, worked alongside EADS CASA during the demanding cold weather trials in Vidsel, Northern Sweden. In-Service Support procedures have been fully implemented throughout the year, building on the experience of the first three years of In-Service Operation. The customer and industry organisation are working in integrated teams in order to ensure effective support of the fleet. The EJ200 sets the standard with its exceptional performance. Europe’s latest generation, advanced military turbofan engine has been designed to fulfill the most demanding expectations of both pilots and ground crews, setting the trend for the future of the programme and for potential export.

Throughout 2005, Eurojet Turbo GmbH, the leading European military aerospace engine consortium and its shareholders Avio (Italy), ITP (Spain), MTU Aero Engines (Germany) and Rolls-Royce (UK), have proven the concept in operational flying and had registered almost 15,000 Engine Flying Hours (EFH) with Series Production and Instrumented Production Aircraft by the end of 2005. For Tranche 2, a total number of 519 EJ200s are under contract, ensuring production until 2012, to be followed by another 519 engines for Tranche 3, bringing up the total order book to over 1400.

A new engine technology standard will be introduced to the Tranche 2 EJ200. They will be equipped with a completely integrated single Digital Engine Control and Monitoring Unit (DECMU) instead of the two units currently used. This new unit is smaller in size and offers more flexibility, and will prove to be more cost-effective than the two predecessor systems.

Katarina Elbogen

Pilots love the EJ200

"EJ200 engines are far more powerful than any previous power plant of their size, and provide the Eurofighter Typhoon with a very high thrust-to-weight ratio, which in turn translates into an unmatched agility and performance throughout the flight envelope, including for example a breathtaking short take-off run, or the ability to sustain supersonic flight in dry power."

TeoJ. José Mª Juanas García, Jefe Grupo 11, Moron, Spain

"I have flown the aircraft throughout the whole flight envelope from minimum speed up to Mach 2 and from 0 to 55,000 feet. This is the most exceptional engine I have ever flown, with a lot of thrust. The engine matches with the aircraft carefree handling characteristics."

Maurizio Cheli, Chief Test Pilot, Alenia Aeronautica, Torino, Italy

"The EJ200 has breathtaking performance and is extremely easy to handle over the entire flight envelope. Particularly impressive is the engine performance and handling at high altitude and high speed where modern beyond-visual-range combat takes place."

Chris Worning, Eurofighter Project Pilot, EADS Military Air Systems, Manching, Germany

"With over three years testing experience on the Eurofighter Typhoon, I am awe-struck with the massive contribution the EJ200 engine has given to the world beating performance of this aircraft. Total carefree handling of the engine throughout the flight envelope generates a confidence that some other combat aircraft can only admire from a distance. In sum, fast or slow, high level or low level, day or night we have our trust in what the EJ200 can deliver now and in the future."

Mark Bowman, Typhoon Project Test Pilot, BAE Systems, Warton, UK
Eurofighter Typhoon moves to the front line

Armed and Dangerous

The start of 2006 heralds a new phase in the life of the Eurofighter Typhoon since, having attained firing certification for the majority of weapons required in its primary air defence role, the aircraft progresses to full operational service. The Italian Air Force have assigned two single-seat Typhoon aircraft to be held in constant operational readiness to “scramble” when the order is given. Based at Grosseto, Northern Italy, the aircraft are under the control of Surveillance of Aerial Spazio (SSSA), the organisation responsible for monitoring and defending Italian air space.

Eurofighter Typhoon has demonstrated its ability to carry the full air-to-air weapons suite following the first flights with two Meteor GHTMs (ground handling training missiles). This success comes after earlier accomplishments in ASRAAM and ASRAAM firings, AIM-9L launches, and the clearance to fire the IRIS-T short range, air-to-air guided missile. December saw the delivery to the German Air Force with the Italian and Spanish Air Forces of the first series production IRIS-T missile, in a small ceremony conducted at Jagdgeschwader 73, Jostnick-Laugn鏽.

To mark the aircraft’s ascension to the front line, Eurofighter Review takes a look at the air-to-air weapons that will protect European airspace for the next 40 years.

**Meteor**

Under development by a European Partnership lead by MBDA, and including NSMDE and Saab Bofors Dynamics, Meteor was ordered by the United Kingdom Ministry of Defence and five other European Nations, including Eurofighter partners Germany, Italy, and Spain, to meet their future Air-to-Air requirements.

A highly flexible air-to-air weapon system, Meteor provides a comprehensive operational capability in the most complex combat scenarios. The missile is allocated targets from the launch aircraft radar, and can engage air targets autonomously by using its active radar seeker by day or night, and in all weather, or in dense electronic warfare environments.

**ASRAAM**

The Advanced Short-Range Air-to-Air Missile (ASRAAM) is a next generation air-to-air missile developed and produced by European Missile giant MBDA, a fully integrated European company owned by Finmeccanica, BAE Systems, and EADS.

ASRAAM has been designed to be compatible with all aircraft capable of launching Sidewinder or AMRAAM, is in service with the Royal Air Force, and has been deployed operationally. Eurofighter Typhoon has achieved firing certification with ASRAAM.

**AIM-9L Sidewinder**

The AIM-9 Sidewinder is a supersonic, heat-seeking, air-to-air missile, with a high explosives warhead and an active infrared guidance system. Developed by the US Navy, and later adapted for Air Force use, the missile’s main components are an infrared homing guidance section, which enables the missile to target engine exhausts on enemy aircraft, an active optical target detector, a high-explosive warhead, and a rocket motor.

**AMRAAM**

With the incorporation of the latest digital technology, miniaturized solid-state electronics, and up to date active radar guidance, the most recent versions of the Raytheon Advanced Medium Range Air-to-Air Missile (AMRAAM) packs unprecedented performance with high dependability into a lightweight package. AMRAAM provides operational flexibility and multi-shot capability, and can be launched day or night, in all weather. Its autonomous guidance capability gives the pilot critical range preserving launch and leaves a pilot, allowing for immediate

**IRIS-T**

IRIS-T Development was carried out by Germany, Italy, Sweden and Spain, with overall programme management under the responsibility of Diels BGT Defence. Missile deliveries to the programme partners started in 2005. Compared to its predecessor generation of short range air-to-air missiles, the IRIS-T offers thrust vector control, imaging IR-seeker with much wider acquisition range, considerably improved resistance to countermeasures (IRCM and DRCM), lock-on after launch and a 360 degree around engagement capability.

The infrared seeker developed by Diels BGT Defence provides extremely high resolution, target discrimination and flare suppression – even if confronted with the latest countermeasures. Diameter, length, mass and centre-of-gravity position have deliberately been chosen such that they meet the requirement for compatibility with its previous analogue Sidewinder predecessor.

The missile-launcher interface, too, has been designed so as to be compatible with both the previous analogue Sidewinder interface and the digital interfaces of modern fighter aircraft. Operational service with the Eurofighter Typhoon squadrons of the German, Italian and Spanish Air Forces has now begun.

**AMRAAM**

First flight with METEOR proved Eurofighter Typhoon’s ability to carry all designated weapons for Air Defence

ASRAAM firing certification has been achieved by Eurofighter Typhoon

Air Superiority configuration including AIM-9L Sidewinder

The RAP have conducted AMRAAM firing trials

Phillip Lee
Eurofighter Typhoon Enters Final Stages of Flight Test

In February, the Eurofighter Flight Test Team put Instrumented Production Aircraft Three (IPA3) through several underwing heavy load tests, with four Paveway II bombs, three external fuel tanks, and a complement of air-to-air missiles.

These tests come as Eurofighter Typhoon opens the final chapter of the Main Development Contract. The testing of the air-to-air carefree handling Flight Control Software (FCS) is almost finished, while the remaining clearances for the Phase 4 FCS will be finalised over the Summer. The final stage of testing will be the validation of the Phase 5 air-to-ground FCS. The software, written by a Joint Team headed by EADS Military Air Systems in Germany, will undergo rigorous testing in all four Partner Nations and will involve six aircraft from the Flight Test fleet.

On conclusion, the final clearances for the Full Operational Capability will be expected in 2007, followed by the availability of the Phase 5 software to Block 5 aircraft. The first Block 5 Eurofighter Typhoon is already in final assembly in Germany, with deliveries of this standard of aircraft to begin in early 2007.

Eurofighter Typhoon IPA3 in under wing load tests as aircraft development enters the final stages.

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DA1 Lands for the Last Time

2005 Programme Review

Eurofighter Typhoon Moves to the Front Line