

Eurofighter

REVIEW

- **Exporting Capability**
- **Programme Way Ahead**
- **ASTA goes Operational**

Ramping up operations at Neuburg/Donau

Mission-capable Preparations

 **Eurofighter Typhoon**

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Cover picture shows a Eurofighter Typhoon from Fighter Wing 74 on the flight line at Neuburg/Donau

Photograph: Patrick Hoeverler

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ASTA delivers operational training



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11(F) Sqn stands up as first multi-role squadron



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Aloysius Rauen
CEO Eurofighter GmbH



Dear Friends of Eurofighter Typhoon,

The first quarter of 2007 has been an astonishingly successful period for the Eurofighter Typhoon programme. Coming on the back of the first flight of a Block 5 aircraft at the end of 2006, the new year kicked off with Type Acceptance of the Block 5 standard and the delivery of SS011 to the Spanish Air Force.

The first three months of 2007 have also witnessed the test fleet break the 5,000th flying hour mark, the maiden flight of the first Eurofighter Typhoon bound for Austria, and the conducting of a successful Meteor test campaign in Spain.

These events have been equalled by the contractual agreement of some extremely critical issues. The most important was the contract for developing new capabilities beyond Tranche 1 which was signed at the end of March. This contract lays out the way forward in introducing the new functionalities that will enable the Air Forces to make the best use of the operational potential of Eurofighter Typhoon in order to meet their national requirements and their obligations towards NATO.

An emerging success story can be found in the logistic support and training area. The Aircrew Synthetic Training Aids (ASTA) team has made considerable progress and this effort was recognised by the Nations through the signature of the PC7 document for the realignment of the ASTA programme with the full backing of the Nations.

In logistics support, an agreement has been reached on the PC5, PC6 and CP196 documents after very constructive discussions between industry and the customer. The achievements of the Neuburg workshop have been carried through 2007 with a very successful follow-on event in Munich. The four Partner Nations, NETMA and the industrial consortium are fully dedicated to shape the support area to the Air Forces' needs. More availability at less cost is the objective as eight units across Europe are taking Eurofighter Typhoon to new operational levels.

2007 will see the delivery of the first export aircraft to the Austria. The Partner Air Forces will also be grabbing the headlines as the operational capabilities of the weapon system are confirmed. As always, Eurofighter REVIEW will have all the news!!

Enjoy the issue!

Your sincerely,

Aloysius Rauen
CEO Eurofighter GmbH



Eurofighter GmbH CEO and the NETMA GM agree new aircraft capabilities

Green Light for New Eurofighter Typhoon Capabilities Contracted Aircraft Enhancements

On 29 March, the contract for clearing the roadmap for the integration of new weapon system functionalities based on the requirements of the four Partner Air Forces was signed between the General Manager of the NATO Eurofighter and Tornado Management Agency (NETMA) and Eurofighter GmbH Chief Executive Officer, Aloysius Rauen. This contract extends the capabilities of Eurofighter Typhoon beyond those already delivered with Tranche 1 based on the Main Development Contract.

Speaking about the contract, officially entitled "First Batch of Enhancements for the Eurofighter", Aloysius Rauen commented: "The contract covers the so-called Phase 1 Enhancement for Tranche 2 Eurofighter Typhoon aircraft. It will mainly focus on air-to-surface capabilities and communication improvements. It will further position Eurofighter Typhoon at the forefront of multi-role/swing-role fighter aircraft and underline the market leader position of the weapon system with unmatched capabilities."

The Phase 1 Enhancement will include the integration of new weapons such as Paveway IV and the Enhanced GBU-16 alongside work to integrate a Laser Designator Pod (LDP) into Tranche 2 aircraft of

all four Partner Nations. The Human Machine Interface (HMI) will receive upgrades boosting the swing-role performance and minimising the pilot's workload in complex air warfare scenarios. Further extension of the Multifunctional Information and Distribution System (MIDS) performance is a substantial contribution to this objective.

The new contract is also the enabler for the separately contracted full digital integration of the new IRIS-T air-to-air missile, in service with Germany, Italy and Spain. Aloysius Rauen added: "The new functionalities are welcomed by the four Partner Air Forces as they enable them to further extend the operational tasks of Eurofighter Typhoon. Industry will therefore put every effort into meeting the required specifications and schedules to provide first line performance to the airmen of the Partner Nations."

Eurofighter Typhoon of Tranche 2 will receive additional functionalities in the Phase 2 Enhancement. The Eurofighter consortium plans to start work on the respective proposal in the second half of 2007, mainly focusing on the integration of new weapons including the standoff weapons Storm Shadow and Taurus.

Eurofighter Typhoon moves closer to the Austrian Air Force

Exporting Unrivalled Capability

Since deliveries of Eurofighter Typhoon to the four Partner Nations began following Type Acceptance in June 2003, the core programme has been steadily gathering pace. The milestone of 100 deliveries was achieved in October 2006, the Tranche 2 Supplement 3 contract was agreed at the end of 2004 and, in between, all manner of capability enhancements have been demonstrated by the test fleet. But, in the export arena, despite being hailed as "market leader" for the next five years by US analysts Forecast International based on a 638 aircraft order book plus the Government to Government collaboration on Eurofighter Typhoon for the Royal Saudi Arabian Air Force and growing worldwide interest, tangible evidence of progress was scarce. As of 21 March 2007, that has all changed.

The first Eurofighter Typhoon weapon system destined for an Export Nation took off for its first flight at EADS Military Air System's Manching facility, Germany. AS001, the first of 18 aircraft to be delivered by the Eurofighter consortium to the Austrian Air Force, completed its approximately one hour maiden flight at the hands of experienced EADS test pilot, Chris Worning. On landing, test pilot Worning commented: "The aircraft handled impeccably as expected. The industrial consortium



Final production is ongoing for the Austrian aircraft

behind this next generation aircraft have already delivered unrivalled capability to the Partner Air Forces, and now Austria will begin to realise the force-multiplying benefits of this world-class weapon system."

During the flight, the aircraft was taken through a series of basic handling manoeuvres before touching down just after midday at the test facility in Manching.

Speaking about the event, Eurofighter GmbH CEO, Aloysius Rau, commented: "The flight of AS001 as the first Austrian Eurofighter Typhoon and the first export Eurofighter Typhoon, is a major milestone

in the programme. This achievement is the result of a successful cooperation of all Partner companies and suppliers, and demonstrates the ability of this international partnership to deliver to contract specification in Export."

AS001 represents the last build standard of Tranche 1. As Austria is supported in the acceptance process by the German Ministry of Defence, the Austrian aircraft are temporarily adorned with German national markings and registration numbers over the original Austrian Air Force designation (98+40 instead of 7L+WA).

The second aircraft for Austria, AS002, was rolled out only a few days prior to AS001 getting airborne and is now undergoing final checks before engine runs and the addition of Air Force colour schemes to the aircraft.

The training simulator has been installed at Zeltweg, the Main Operating Base



AS001 in the paintshop prior to roll-out

(MOB) of the Austrian Air Force Eurofighter Typhoons, and first flights in the simulator have been achieved. This training device is currently undergoing an upgrade to the software, allowing for a greater capability in aircrew training.

Phillip Lee



Take-off for the first Export Eurofighter Typhoon

Top: AS001 completes its maiden flight
Above: Roll-out of the first Austrian Eurofighter Typhoon complete with Air Force markings

Developing future capabilities for Eurofighter Typhoon

Delivering in Flight Test

IPA4 at Morón, Spain, preparing for GBU-10 release

The first quarter of 2007 has seen both the industrial consortium and the customer demonstrate the ever-increasing capabilities of Eurofighter Typhoon. A week of trials running across February and March witnessed the Royal Air Force conduct a series of Advanced Short-Range Air-to-Air Missile (ASRAAM) firings aimed at bringing the aircraft closer to assuming Quick Reaction Alert (QRA) responsibilities for the United Kingdom, scheduled for mid-2007. The ASRAAM firing was the first to be conducted by a front-line Royal Air Force Eurofighter Typhoon.

Four sorties, flown over the Aberporth weapons range in Cardigan Bay, Wales, saw a total of four ASRAAM missiles successfully launched from 3(F) Squadron Eurofighter Typhoons. Operating out of RAF Coningsby, the aircraft tracked and fired against flare packs being towed by Mirach target drones.

Wing Commander Lol Bennett, Officer Commanding 3(F) Squadron, commented that: "The first front-line firings of ASRAAM represent a significant milestone in the Typhoon force's progress towards operational deployment."

Over in Spain, the flight test team at EADS CASA in mid-February reported a programme-first release of a GBU-10 air-to-surface weapon. Piloted by Alfonso de Castro,



IPA4 will carry out two Meteor campaigns

two "cold" tests were carried out with Instrumented Production Aircraft Four (IPA4), to allow for final checks of the release criteria, before going for the "hot" run and store release from the right-hand centre-wing pylon. No snags were reported by the onboard instrumentation.

IPA4 was again on hand to deliver a further programme milestone when Captain



Carlos Esteban Pinilla, Eurofighter Typhoon test pilot at EADS CASA, took to the skies over Morón to complete the 5,000th flight hour on behalf of the entire test fleet. The milestone-achieving flight saw IPA4 undertake environmental data gathering with a Meteor air-to-air missile.

The integration of advanced weapons is set to become a major task as the focus of the test fleet evolves. By the end of April 2007, work on a planned two evaluation campaigns will have been conducted with the new European Long Range Air-To-Air Missile, Meteor, following the release of funding from the customer.

The purpose of the two campaigns in Spain and Italy is to gather environmental data for the final design of the missile. Five flights with IPA4 of EADS CASA began on 15 March in Morón, Spain, using the so-called Meteor Environmental Data Gathering Test Vehicle and Ground Handling Training Missiles and ended on 20 March. The aim was to fly Meteor on the front and rear fuselage stations in order to collect data on how the missile responds in the vibration and load environments. The final flight of the first campaign was flown with four Paveway II and two AIM-9L Sidewinder missiles in addition to the four Meteors.

The objective of the second campaign is also environmental data gathering but, for the first time, Meteor will fly on the outboard pylons of Eurofighter Typhoon.

The focus of these flights is to explore missile reactions to flutter and vibration.

This second Meteor testing campaign is a risk reduction initiative for the projected integration of Meteor onto Eurofighter Typhoon. After completion of these series of tests, Meteor will have flown on all applicable stations having first flown on the aircraft in late 2005.

The tasks of the test fleet will also look to introduce new software to improve the capability of sub-systems thus increasing



First RAF ASRAAM release from a frontline Eurofighter Typhoon

the overall weapon system performance. The work on the Main Development Contract may be ending this year, but the four Nation team involved in test and evaluation are striving to introduce into service the capabilities that will maintain Eurofighter Typhoon's position as the most advanced swing-role aircraft available.

Phillip Lee

The campaign trail hits Bangalore

Aero India 2007

With the Indian authorities poised to release a Request for Proposal (RFP) for 126 Multi-Role Combat Aircraft, Aero India 2007 provided the Eurofighter consortium with the unique opportunity to keep the focus of professional visitors on the outstanding capabilities of Eurofighter Typhoon. With a wealth of key decision-makers in attendance, including influential figures from the India Air Force, the procurement organisations and from the national aerospace industry, the timing of the Eurofighter consortium's first showing at the Bangalore-based exhibition couldn't have been better.

Indian Air Force Chief, Air Marshal Tyagi received a detailed briefing



Right: Air Marshal Nagalia, Deputy Chief of Staff

Below: Indian Minister of Defence, Shri A. K. Antony, visits Eurofighter Typhoon in Bangalore



Air Marshal Major takes in the Eurofighter Cockpit Demonstrator

Although no Eurofighter Typhoon aircraft were available due to preparations for NATO assignments and daily operations, the programme presentation still featured plenty of attractions for the Indian hosts. The Eurofighter business stand carried India-specific campaign messages with a clear focus on industrial partnership. This cooperative spirit was emphasised across a variety of platforms, not least with the strong showing from key people from the Eurofighter community including, from industry, Aloysius Rauhen, CEO Eurofighter GmbH, Mike Rouse,



Group Marketing Director BAE Systems, Johann Heitzmann, CEO EADS Military Air Systems, and Hartmut Tenter, Managing Director Eurojet GmbH. Representation from the Partner Nations was also evident, with Alan Garwood, Head of the United Kingdom's Defence Export Services Organisation (DESO) of the Ministry of Defence, General Klaus Peter Stieglitz, Chief of the German Air Force, and Dr. Klaus von Sperber, Director General German Ministry of Defence, all throwing their full support behind the campaign efforts in Bangalore. Additionally, they all joined forces for a press conference which attracted the prominent international and Indian media and led to widespread media coverage.

The group effort and team ethic was further highlighted with the additions to the

stand of the EJ200 engine and the CAESAR e-scan radar models, on display alongside the permanent fixture of the Eurofighter Cockpit Demonstrator. Each feature was supported by technical and marketing experts from the relevant partner of Eurojet and Selex.

The exhibition itself ran from 07-11 February and, over the course of the five days, the Eurofighter team received all the key delegations. The Indian Minister of Defence, Shri A. K. Antony and his Director of General Acquisition, Shri S. Banerjee, got a close-up view of Eurofighter Typhoon's capabilities on the Cockpit Demonstrator during their guided visit. Air Force representation was also in attendance, with Air Marshal S. P. Tyagi, Chief of Staff of the Indian Air Force and a member of the Indian customer community who has flown in Eurofighter Typhoon, taking the opportunity to be briefed on aircraft capabilities.



Rao Interjit Singh, Minister of State and Defence

As the fighter replacement competition moves into its final stages, the Eurofighter consortium will, over the coming months, seek to maintain the excellent contacts that were established in Bangalore, through presentations and attendance at key India conferences. The belief across the programme community is that Eurofighter Typhoon is the 'best fit' in terms of complying with the requirements and specifications of the Indian Air Force. Furthermore, with the consortium boasting concrete political support for India and important historical connections with the Indian customer, the campaign efforts are firmly focussed on delivering unrivalled value in India.

Phillip Lee

New organisational structure for the Programme

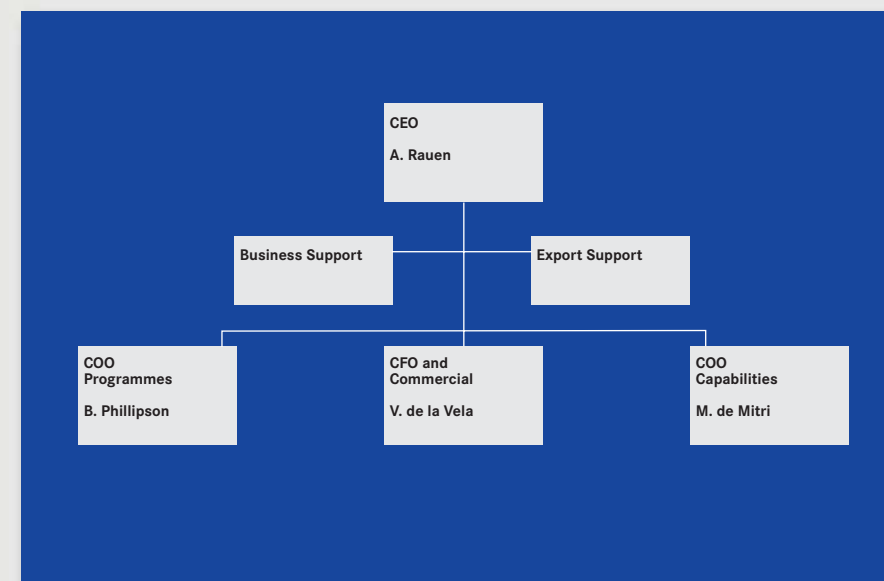
Sleek and Efficient

For several years, the Partner Nations and the industrial consortium behind the Eurofighter Typhoon programme have called for a re-alignment of both the management structure and of the programme itself. At the start of 2003, the Eurofighter shareholders Alenia Aeronautica, BAE Systems, EADS Germany and EADS CASA acted to strengthen the role of Eurofighter GmbH as prime contractor in a truly collaborative programme business. A basic element for this approach was the initiative of the shareholders to carefully transform the role of the Eurofighter Partner Companies into one of major sub-contractors, accountable to Eurofighter GmbH on performance, schedule adherence and quality issues. This scheme was rolled out in May 2004 with a new management in Eurofighter GmbH with more responsibilities.

The four Partner Nations welcomed the move, but emphasised that this step, from their perspective, could only be the first of many in terms of progressing to an efficient management structure. Their intention was to speed up the work of the industrial consortium, but also to reduce the cost of in-service support while aligning the in-service philosophy with reality, as the original concept had been conceived in the early 1990s. This was based on the fact that the available budgets in the Nations were under heavy scrutiny and, at the same time, performance enhancements were on the wish list of the Air Forces. The integration of a Laser Designator Pod in Block 5 aircraft of the Royal Air Force was one outstanding example. They therefore demanded the further empowerment of Eurofighter GmbH.

The intention of the Partner Nations and the interests of the shareholder companies culminated in the Future Protocols Document, signed by the so-called "Typhoon Tiger Team" in July 2006 at the Farnborough International airshow. This team was formed by the National Armament Directors and the Chief Executive Officers of the shareholder companies.

The message of the Typhoon Tiger Team was very clear: Commence the work



New top level organisational structure at Eurofighter GmbH

immediately, with first results to be visible beginning 2007. The industrial partners worked towards this goal, presenting a proposal for the new programme management structure and methods for further empowering Eurofighter GmbH on time. The Typhoon Tiger Team accepted the proposal and confirmed the implementation of the new structure for 01 May 2007.

The basic principle of how Eurofighter GmbH, in its role as contract owner, will manage the programme business in future is by paying the Eurofighter Partner Companies based on delivery of performance according to their sub-contract obligations. As a fundamental prerequisite for this approach, a mechanism for risk-sharing among the Shareholders has been agreed for all areas including Development, Production and In Service Support.

The new company structure follows these objectives, and is based on three principle functions: contract acquisition, contract negotiation and contract delivery.

From the beginning of May 2007, the new Board of Management (BoM) will consist of:

- Aloysius Rauhen, Chief Executive Officer (CEO)
- Brian Phillipson, Chief Operating Officer (COO) Programmes
- Maurizio de Mitri, Chief Operating Officer (COO) Capabilities
- Victor de la Vela, Chief Financial Officer (CFO) also responsible for Commercial

The Board of Management will shrink from ten to four members, while the Heads of the Business Support and Export Support departments will participate in Management meetings, but will not hold full membership authority.

With these changes, the route to more efficiency is laid before the programme, to the benefit of the customer and the product.

Wolfdietrich Hoeveler

“Twice the availability at half the cost”

Programme Direction - Formulating the way ahead



The Eurofighter programme requires a rethink on traditional practices. In an interview with Brian Phillipson, Chief Operating Officer (Programmes) at Eurofighter GmbH, he explains his

vision on the way ahead, and how the programme is being reshaped to better cope with current and future demands.

With the new Eurofighter GmbH management structure now ahead of us, what are the long term opportunities and perspectives that you envisage for the programme management on both the industry and the customer side?

From my point of view, programmes are living things and you always need to adjust and evolve the organisation to match the programme's current status. Over the last year or two, the programme has been going through a huge change, and a lot of the contracted activities going on at present are very different from a few years ago. That means there is a need to adjust the organisation to face up to current demand and new challenges. That's why changes have been made in Eurofighter's organisation and management. More specifically, some of the objects of the changes are to better equip industry to be able to deal with the complexity of the programme today and tomorrow.

Can you describe some of the key challenges facing the programme?

The key challenges are dealing with the complexity of the programme and better balancing the various and evolving demands on us, as industry. In particular, we started in the late 1980's fundamentally as a development programme and have more recently moved into a manufacturing phase. However, today, In-Service issues are becoming increasingly more dominant within the

programme. There are a number of pressing questions that we are in the process of answering. How do we improve affordability of the whole Eurofighter programme for our customers, which includes the operating and supporting of the in-service aircraft whilst continuing key development and production activities? How do we successfully progress towards the authorisation of Tranche 3 and future export orders? These are the big challenges ahead of us today.

So far, we have followed parallel processes in development, production and in-service support. As we look into future development, what will be the changes after the main development work ends?

There are a fundamental set of changes that industry is now facing, but a couple of comments first. The Main Development Contract (MDC) has, to a large extent, carried much of the infrastructure we've needed on the programme for the last 18 years or so. One consequence was that when Nations wanted some new capability, it was pretty easy to add it into an ongoing development programme.

In the next 12 months, work covered under that Development Contract will be coming to an end. Therefore, one of the issues we have to deal with, is to agree with the Nations on what basis they want to go forward in terms of engineering and support infrastructure. What we are seeing now is a period of much greater uncertainty in the Nations' requirements for changes to the aeroplane. Whilst minor changes are likely to be fairly frequent and may well be required at fairly short-notice covering changes in weapons, communications and system integration, the chances are that we won't see a lot of changes in the aerodynamics or structure of the aeroplane. So as we come to the end of the original Development Contract, Industry and the Nations have to take decisions about what areas we need to maintain to provide support for the longer term, and in what areas we can afford to reduce capabilities to save costs.

Another set of changes, which is perhaps more important, is improving the integration of the programme. When the Nations

launched the current set of contracts, for example in support, they were quite keen to specify what they wanted and to specify it separately from what was going on in development and production. Inevitably, that meant that the contracts started to encounter difficulties in maintaining step with each other. We have contracts in the support area, for example, which require us to undertake activities which are no longer sensible given where the development pro-



Weapon System Support is a key future challenge

gramme has now gone. Having to realign all those contracts at the moment is a bit of a problem for industry and for the Nations.

For the future, better alignment across these issues is necessary. If the Nations would like to develop a particular new capability, we also need to decide what that entails, not just in line build, but in embodiment across the fleet of 150 or more aeroplanes and in support. In the past, the Nations had wanted to specify all this separately. Now, both parties agree that it must be specified in a more integrated and cost effective fashion. Many of the current contracts come to an end over the next 12 to 18 months which gives us a good opportunity to develop and introduce a new contractual basis for the future of the programme.

The Air Forces have increasingly taken direct ownership of the programme and it is for industry to agree with them how best to support it. Recently a workshop with the Nations was held at Neuburg to define the way forward. What were the results of this workshop?

Neuburg was a very significant event for the Nations and Partner Companies, as well as for NETMA and Eurofighter. The reason for choosing this location was that we needed to think and do things rather differently. Instead of meeting at NETMA or at Eurofighter in Hallbergmoos, we actually went to a Luftwaffe base in Southern Germany and used their facilities to hold our meeting. Being surrounded by Air Force personnel and the noise of aeroplanes was exactly the right environment to think about the issues that we all needed to deal with. In the light of an active in-service fleet, what we wanted to do was to face up to some of the demands for change on the programme.

Some of the issues were relatively simple things. The Air Forces have been operating the aeroplane now for more than three years. Some of them have 30 or more aeroplanes in service and are flying them very hard, whereas others have smaller fleets and are operating them very differently. All are gaining slightly different experiences, and more could be done in terms of sharing those experiences. Whilst at Neuburg, the question was asked: how can we get better at having each of the four Nations pool their knowledge, their issues and their problems, so that we can better answer them? In the early days of the programme, mechanisms were identified for doing that, but some of those mechanisms haven't been fully implemented. Some of them maybe we didn't quite get right, so now industry and the customer need to look at how it can be done better.

Are you referring to the International Weapon System Support System (IWSSS)?

Exactly. The IWSSS is designed well and is the right solution, but what has not happened thus far is properly energising the links through to the Air Forces and giving

them the understanding about how it all works. So what we have had to do is to fix that problem. We have not changed the concept of the IWSSS, but have highlighted the need for the Air Forces to be more prominent and proactive in sharing their knowledge and experiences and their problems.

From another extreme, we looked much harder at fundamentals about how we manage the integration of support and embodiment with development.

What does Neuburg mean for how we will contract and manage differently in the future?

It was quite significant that the workshop, backed at a very senior level by Governments and Industry, brought together representatives from the four Nations and NETMA, the four Partner Companies and Eurofighter GmbH. It was a community which was very heavily influenced by the need to think about support of the operational aeroplane, but with adequate representation from the development and procurement side.

Following on from the Neuburg three-day workshop is a series of programmes of work looking in more detail at how the necessary changes can be defined and then implemented on the programme. We have already had some benefit out of these work programmes that wouldn't have been solved if Neuburg hadn't taken place. For example, one of the fastest things that we rectified was to identify that when the Air Forces had a problem with a replaceable piece of equipment on an aircraft, where it was covered by the Industrial Exchange and Repair Service, the Air Force didn't have the means to simply fit a replacement equipment. This simple change would have allowed them to assess if the problem was with the equipment or perhaps something different. Oddly, the terms in the contract meant they couldn't do that without declaring the removed item defective and sending it back to industry, even though in many cases it was actually serviceable. I think it took about five days to solve this issue, modify the contract and give the Air Forces the means to pull the equipment out, re-

Experience-Sharing amongst the Partner Air Forces is critical to understanding how best to offer support

place it with another one and check for themselves whether it was good or bad without having to return the item to the Industry. In addition, within weeks we were also able to arrange international meetings between Air Force first line engineering staff to accelerate the process of learning from one another's National Air Force experiences.

We also have much longer term activities which may take 18 months or so to deliver benefits, but we've now got the core team in place who were at Neuburg, including support from Nations and Partner Companies as well as NETMA and Eurofighter. This is a large 'engine for change' on the programme.

One other significance about Neuburg is that there were a couple of themes that were really basic for us throughout - affordability and availability, and we coined a phrase that said what we wanted was "Twice the Availability at Half the Cost". That was the sort of target that we were going for and we have already made considerable progress towards that.

At this stage in the programme, it is important to look at what has been set up for



Contract realignment now means that the Air Force ground crews have the ability to check equipments on-base

development and to see how it can be adjusted for the in-service phase. The two areas of providing more availability to the Air Force in-service fleets, and taking customer programme cost out, in total terms, are exactly the things that need to be done and that's the way we set the direction for Neuburg and beyond. I must emphasise here that this is not just about industry costs, it is about the customers' total cost of

procuring and maintaining the in-service capabilities that they require the Eurofighter programme to deliver, for many years to come.

Are there more Neuburg-style workshops planned to measure what has been discussed against a set structure?

Although the original Neuburg event was billed as a one-off, NETMA and ourselves always knew that it was likely to be the start of a process. As a result, we are now looking at three-monthly review conferences where the international community is

The Tranche 2 aeroplanes, which are currently entering Final Assembly and which will start to be delivered next year, generate a second standard because, between Tranche 1 and Tranche 2, there have been a number of changes. So, there are now two baseline standards which will be operated across the fleet. That's really the right starting point for what we then need to do. The Air Forces would like to be able to have a consistent standard in-service. They may have a Tranche 1 and a Tranche 2 standard, but they want to operate a whole squadron or wing to a single standard, and not go through bits and pieces of upgrading.

not the in-service issues, driving the programme.

With the Air Forces now operating their aircraft there are a lot more opportunities for international cooperation, keeping the spirit of partnership alive in the programme. Neuburg, you've mentioned, was one example. Where could this lead to?

That point is one of a number of issues which drove the work through Neuburg and beyond. One of the things that we were sensing was that the Air Forces were developing some frustration with the international aspects of the programme. As a national Air Force, you're quite a long way away from the so called "bureaucracies" of NETMA and Eurofighter.

If an aircraft develops a problem, all you care about is getting your problem fixed. It was quite difficult for the Air Forces to work out how they could influence the programme to deal with their problems. What tended to happen is they developed working relationships with their own national industries as it seemed to be a lot easier to ring up the national Partner Company and say, "I've got this problem - fix it for me!" Sometimes, this led to them relying on only national procedures to try to solve their problems, and it frequently meant they did not readily access the real centres of industrial expertise or ensure that their experiences were being made available for the wider benefit of the programme.

The reality is that that's the wrong approach, because all four Nations will probably end up with the same problem eventually, and all four need it solving. If temporary fixes are inserted on a national basis, it might solve your problem today, however, it could mean that the money is spent four or even eight times. The reason is that by the time national modifications have been introduced, they then have to be re-engineered and made internationally available, and the money could then have been spent twice over in each Nation.

I think there is some recognition by the Air Forces that the only way forward is for them to intensify working relationships and to try to identify what the strategic roadmap is for their aeroplanes. They can then use the international machinery to give them rapid and cost effective responses.

The Nations do have different requirements, and that means, for example, they have different priorities on how they introduce capabilities into service. Inevitably, we then have different demands from the Nations and we have to be able to deal with that through the international programme and give them solutions quickly. If we do not, poor solutions will make configuration

control very difficult and industry and the Nations will spend money many times over and that will actually slow the programme down. Let's get the machinery of the programme responsive, effective, and focussed on delivering what the Air Forces want. If this can be achieved, and they can be coached on how to work the international programme effectively, then they won't need to do anything different.

The aircraft will be in service for at least 30 years, so we need to look rather strategically at future capabilities. Tranche 3 negotiations have started. Will they be a bit more efficient than Tranche 2?

2004 and 2005 were a difficult couple of years in that there were some fairly big issues to be dealt with by the Nations. Authorisation of Tranche 2 came later than planned. The consequence was that we ended up spending money and were not getting back benefits, and we have to avoid that on Tranche 3. We hope that the Tranche 3 contract will be agreed in the next couple of years, and there's a lot of activity now, with NETMA and the Nations, working towards that goal.

A second comment is that we've also had difficulties over the last couple of years on sorting out what the next phase of development activity on the aeroplane will be. We've had lots of labels - EOC (enhanced operational capability), FCP (future capability) we have achieved contract signature on the next development phase, officially entitled "First Batch of Enhancements for the Eurofighter."

During the last few months, in agreeing the scope of the first batch of enhancements we've got through the difficult debate over where we go next with the aeroplane. Those debates were difficult for a number of reasons. For one, they were the first really big developments that came after the Main Development Contract, which raised questions about what infrastructure industry needed to maintain and how it should be funded, given that the vehicle of the Main Development Contract was coming to a conclusion.

The second major issue has been how we prioritise the varying needs of the Nations i.e. prioritising a national implementation over a fleet-wide implementation and not

causing disadvantages to some Nations while meeting the legitimate needs of others. Working out the logistics of this was a new experience, or at least one that we haven't encountered on the programme for some time.

Looking past the end of the Main Development Contract, the first phase of enhancements represent the Tranche 2 forward development programme for the next five to six years. I believe we have all learned from the mistakes on launch of Tranche 2, and everybody seems keen to avoid them on Tranche 3. The highest priority always was, and still is, to spend the money on the capability of our product and not on bureaucracy or, for example, the inefficiencies which can result from inconsistent build rates.

The Nations are beginning to share their strategic views about where they want to take the aeroplanes over the next 20 years or so. What do you foresee in terms of capability enhancements during this period?

In the 2012 timeframe, we will see more capability on the aeroplane, more than we have currently contracted. For example, with the Future Capability Programme, we are matching the hardware changes that took place in Tranche 2 with the recent software upgrades and introducing a lot of new capabilities at the same time.

Come 2012, there's a whole batch of additional weapons which we still want to see cleared onto the aeroplane, and that's really the next stage of contracting for further development. In particular, in reference to the big stand-off weapons, Taurus and Storm Shadow, which some of our Nations currently operate from other aircraft platforms. Eventually they will want Eurofighter Typhoon to take on that role.

Another example is the new European Beyond Visual Range Air Defence missile, the METEOR, which is currently still in development. As that development completes, the Nations will want us to clear it into service on Eurofighter Typhoon.

We're actually right in the middle of discussions with the Nations about what else they might want in those timeframes and what else they might want in Tranche 3. At the moment, the Nations seem very happy with the aeroplane and they are looking for relatively small changes and new weapons.

However, there are areas where I think the Nations probably will sign up to for further changes over the next year or so. One example is the Radar. We actually have an incredibly capable radar on Eurofighter Typhoon. We opted for mechanically-scanned arrays because the early generations of electronically-scanned arrays really couldn't produce the power and flexibility that we've got with our mechanically-scanned array. But that's changing. We're now beginning to see second and third generation electronically-scanned arrays which are at least as good as, and better than, the mechanically-scanned array. Euroradar is already flying the CAESAR, which is an electronically-scanned array. We expect these kinds of enhancements to be going onto the aeroplane in Tranche 3. Whether we will also introduce other change proposals that we have been studying in industry, such as conformal tanks, will be decided in talks with Nations over the coming months.

Over the next 12 months, we plan to agree with the Nations a longer-term strategic roadmap which, although not set in concrete, will be the planning basis against which we can then take detailed decisions year-by-year. It will also characterise any changes we make to the Tranche 3 aeroplane.

Personally, I expect the Tranche 3 aeroplanes will look remarkably like Tranche 2. We seem to have got it pretty right in Tranche 2.

Interview by Phillip Lee



Integration of new weapons, for example Meteor, is part of future enhancement packages

brought back together, but, in-between, single working groups, made up of people from the conference and supplemented by others, are working to deliver on the detail. We and NETMA are currently meeting about once a month with the team leaders to maintain progress and momentum.

Fleet upgrade is a current hot topic. Obviously new standards and new capabilities have to be introduced. What is the way forward to an efficient and affordable upgrade?

When production commenced, there was still a huge amount of development work going on, and progressively the results were introduced into the build line in production 'blocks'. Therefore, the aeroplanes which were initially delivered into service are at a number of different standards. One of the key fleet wide activities we are currently undertaking is to bring them all up to one common standard, under a programme known as Retrofit R2. A number of aircraft will be coming back out of the factories in the next few weeks having completed R2, and this will be the start of the complete Tranche 1 fleet being available at basically the same standard - a key requirement that greatly helps to drive effectiveness and efficiencies into the fleet.

Therefore, once new features for the aeroplane become available, we're now looking at how to package them up, so we can allow the Air Forces to roll them out and embody them across their fleets in conjunction with routine maintenance, and typically on something like a two-year upgrade cycle.

If there's something a customer wants to deal with more urgently, perhaps due to new operational needs, we will also have to deal with that particular requirement more urgently. However, as more and more aeroplanes enter service at an ever increasing number of bases, the logistics management of the standards of the aeroplane increases in complexity. The Air Forces have to control it as it can't be controlled by the industry, but we have to help make it as simple and as manageable for them as possible.

They also want to minimise downtime and aim to include all upgrades within the maintenance windows. What we're moving to is an Air Force driven embodiment programme, which will typically be an upgrade approximately every two years. This strategy will then be driven back into development and support, so that Industry can work towards the Air Force's needs for when they embody changes to their aeroplanes. This is a major change from the last few years where it was development, and



The Nations are beginning to share the strategic views on where to go with Eurofighter Typhoon



The future of Training... Now!

ASTA goes Operational

To be able to pilot the world's most advanced swing-role weapon system requires an unrivalled training capability. The Partner Air Forces of Germany, Italy, Spain and the United Kingdom are now plugged-in to an operational training programme that goes way beyond all of its predecessors. The Aircrew Synthetic Training Aids (ASTA) programme is now online.

Eurofighter GmbH, as Prime Contractor, is responsible for both Programme Management and delivery of training and training systems in support of the Eurofighter Typhoon weapon system. As such, a training and simulation partnership consortium has been established based on the lead partner companies of the Eurofighter programme, Alenia Aeronautica, BAE Systems, EADS CASA and EADS in Germany. The fifth partner in the ASTA consortium is Eurofighter Simulation Systems GmbH (ESS), who itself draws on industrial expertise in simulation technology from its shareholders CAE-D, Galileo, Indra, RDE and Thales.

Following the delivery and acceptance of the Early

Cockpit Trainer (ECT) in March 2006 the ASTA programme has continued at pace with Full Mission Simulators (FMS) being delivered, installed and accepted by Nations. To date, eight ASTA simulators have been delivered and are in operation. In May, a further training device will be handed over to the Austrian Air Force, the first export customer, at their Eurofighter Typhoon Main Operating Base at Zeltweg.

The Devices

The ASTA programme forms the core training capability for all four Eurofighter Typhoon Partner Air Forces. The training package consists of two types of simulator: Cockpit Trainer / Interactive Pilot Station (CT/IPS) and Full Mission Simulator (FMS). These are supported by Database Generation, Lesson Planner / Scenario Generator and Debriefing Systems. Both device types replicate cockpit layout and fidelity.

The Cockpit Trainer comprises a five channel visual system and, in comparison to the Full Mission Simulator, a simple Instructor Station (IS). It is dedicated mainly to procedural and emergency training and preparation for flight in the Full Mission Simulator. Additionally, it can be utilised as an Interactive Pilot Station (IPS) to participate in networked missions, either as a supporting Eurofighter Typhoon or as an Alternate Aircraft (AAC).

The Full Mission Simulator offers a 13 channel visual system plus the provision of a six channel target projection system, giving an unparalleled 360° visual field of view in a fully immersive environment. It will also be equipped with a motion cueing system and the full-flight gear of the pilot including the helmet-mounted displays of the Eurofighter Typhoon.

The current simulator functionalities are prioritised in order to deliver the Operational Conversion Unit (OCU) training syllabus. This includes Conversion to Type and Air-to-Air Training with the aim of providing a limited combat-ready qualification for the student.

Specific areas of training include multi device networked missions, Basic Aircraft Handling, Emergency Procedures, Instrument Flight Rules, Night Flying, Close Formation and Air-to-Air Refuelling.

For Air-to-Air mission training, the Radar, employment of primary Air-to-Air weapons (AMRAAM, ASRAAM, AIM-9L) in both Within Visual Range and Beyond Visual Range scenarios are utilised. This is against a variety of computer-generated interactive models.

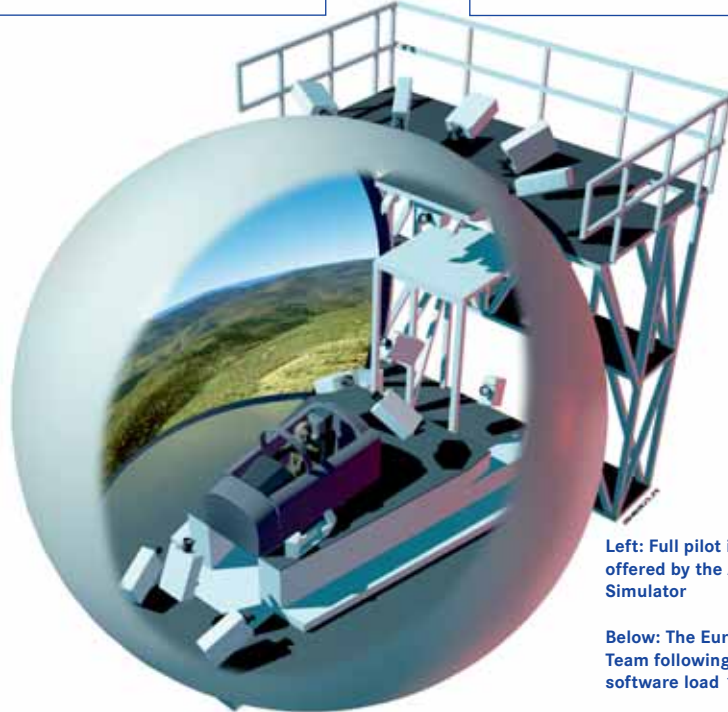
Training Capability

Jose-Antonio Gutierrez a Spanish pilot with 20 years experience of flying fast jets, now Head of the Operational Factors team within the integration facility, stated that:

"The Partner Nations expect ASTA to allow an off-take of up to 30% of flight hours in the real aircraft by simulator sorties. In order to realise this challenging objective, special attention is given to achieving very high fidelity simulations in avionics, sensors and weapons, providing a new level of tactical training. ASTA has been designed to provide full pilot immersion into the simulator sortie. In other words, the pilots feel as if at the controls of the real Eurofighter Typhoon. Under these conditions, training goes beyond procedural skills, and falls in the region of sound decision-making, based on situational awareness, inherent to tactical missions".

Beyond the capabilities of lower order simulators, the ASTA system will offer

training in complex tactical scenarios in fully networked environments. Multiple Cockpit Trainer and Full Mission Simulator devices can be linked to allow the pilots to train in multi-ship environments in both friend and foe mode. Additionally, computer-generated forces of various aircraft types give definition to extremely complex tactical training scenarios including Multifunctional Information and Distribution System (MIDS) communications. The feature of electronic warfare simulation complements the other components and allows for realistic training in the deployment of countermeasures. This simulator fidelity also provides the ability to train combat-ready skills, including tactical leadership training in complex scenarios and mission rehearsal.



Left: Full pilot immersion is offered by the ASTA Full Mission Simulator

Below: The Eurofighter ASTA Team following acceptance of software load 1.0



To achieve the objective of a realistic training mission, both aircraft systems and environment simulation must be taken into account. Therefore, the ASTA devices are designed as hybrid simulator systems with very high-fidelity aircraft and sensor simulations, as well as original re-hosted aircraft software. A complex simulation of the natural and tactical environment is implemented to ensure a similar behaviour of the ASTA devices in comparison to the real world.

In order to cover training of the full mission cycle, from preparation to debriefing, the pilot can prepare their simulator mission parameters using the real aircraft's mission planning system and download critical mission data via the same portable data storage.

A dedicated team of personnel at each airbase provide full time manning in order to give support to, and obtain the maximum benefit from, the ASTA training devices. This team work to ensure optimum operation and maintenance, database generation, scenario preparation and training continuity within ASTA. The operational experience with respect to availability of the devices so far is first-rate at above 95% with over 1,400 hours of training performed by the German Air Force alone.

Now and the Future

The first ASTA devices have been in service for over 12 months with successful training being delivered at the German Air Force Operational Conversion Unit in Laage since March 2006.

Lieutenant Colonel Brandis, responsible for training pilots of Fighter Wing 73 "Steinhoff" at Laage, stated that:

"The ASTA is being used successfully for training and the devices will form the backbone of Eurofighter Typhoon pilot training for many years to come. The increase in functionality and associated performance enhancements has enabled the German Air Force to expand the extent to which the devices are utilised. Further planned developments in functionality will provide the Air Forces with a training capability second to none".

On 15 March 2007, the first "flight" of the Eurofighter Typhoon on the Full Mission Simulator loaded with an Austria-specific national database was performed. This is considered a major achievement and a pre-requisite to the formal acceptance of the Austrian ASTA device planned for May 2007.

The delivery of software load 1.1 in April 2007 enables the Operational Conversion Units of the four Partner Air Forces to execute an extended training syllabus. This

The ASTA cockpit trainer can be used for networked missions with other ASTA devices



software standard will form the basis for Eurofighter Typhoon pilot training across Europe for the next 12 months, with the final ASTA Tranche 1 software load to become available in 2008.

The second Tranche of ASTA devices, covering the production of devices for additional Main Operating Bases, is currently being negotiated with contract award targeted for October 2007.

For further enquiries please contact :

Andrew Leighton,
ASTA Project Leader - Eurofighter GmbH

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Current ASTA Locations

UK:	Coningsby	2 FMS & 1 CT/IPS
GE:	Laage	1 FMS & 1 CT/IPS
IT:	Grosseto*	2 FMS & 1 CT/IPS
SP:	Moron	1 FMS & 1 CT/IPS
AU:	Zeltweg	1 FMS

*CT/IPS installed at Ronchi facility.





Ramping up operations at Neuburg/Donau

Mission-capable Preparations

It has been nine months since the first four Eurofighter Typhoons touched down at Neuburg/Donau, home to Fighter Wing 74 of the German Air Force. Even before the aircraft arrived, major redevelopment work had begun at the base two years in advance in order to boost the on-ground capabilities to match those of the new-generation weapon system that will operate from there. With this regeneration work ongoing, and as more aircraft report to Neuburg/Donau for operational duties, Eurofighter REVIEW paid a visit to Fighter Wing 74 for this special report: Welcome to "Eurofighter City"!

Neuburg/Donau is the smallest NATO-operational airbase in Europe. Although said with tongue firmly in cheek, the comment "wherever you stand you can see the fence" is not a million miles from the truth. The size, or lack of it, itself represents a major logistical challenge for the base planners because, in order to upgrade the facilities, they first had to create space through demolition, all the while ensuring that the base remained fully functional and capable of meeting NATO requirements on Quick Reaction Alert (QRA) duties. As explained by Station Commander, Colonel Uwe Klein, the working conditions are tough. "It's a triple

challenge. It's a challenge to have a construction site on the smallest NATO base in Europe; it's a challenge to continue operating what is, in essence, a second-generation aircraft in the F-4 "Phantom" while simultaneously bringing Eurofighter Typhoon to a state of combat-readiness; and the major challenge is coordinating all this with the minimum disruption to operations as is possible."

When the sheer scale of the required redevelopment was realised, there were suggestions of relocating Quick Reaction Alert responsibilities out of Neuburg/Donau until such time as the rebuilding work was complete. Thankfully, for the staff stationed there, the decision was made to continue operations as normal while making the extra effort to compensate for any disturbances caused by the construction. According to Lieutenant Colonel Pascal May, everyone involved is pulling in the same direction. "Operations at Neuburg/Donau work fine. Maintaining the operational state of the base, which comprises some 1,200 force personnel and 400 civilians, with the introduction of Eurofighter Typhoon has had a tremendous impact on base itself and also on the surrounding area. Everyone operates with the thought of 'how can I work harder to accommodate the arrival of Eurofighter Typhoon?'" Some of the money poured into Neuburg/Donau naturally filters through to the local communities. The Army base near the town closed in 1999, but the morale around Neuburg was lifted once it was known that Eurofighter Typhoon would be coming and therefore ensuring the continuation of the Squadron. "Where possible, we try to include the community

in a few events during the year and, such has been the success, we now have an unofficial fan club of aircraft enthusiasts who eagerly turn up to watch the comings and goings of daily operations" said Lieutenant Colonel May.

At its peak, the regeneration of the base will see as many as 35 separate construction sites. Roughly 100 million Euro is to be invested in the new infrastructure providing the aircrews and ground personnel with state-of-the-art facilities. The Squadron building, scheduled for completion before the end of the year, will be the Centre of Wing Operations and, as the F-4 "Phantom" will only begin the phase-out procedure from January 2008, the operations of both the F-4 and Eurofighter Typhoon squadrons will be directed from the same facility, the first German Air Force base to employ this way of working. The F-4 "Phantom" aircraft and their crews are to be relocated to Wittmund, Northwest Germany, which will be the only base still operating the type once the final F-4 leaves Neuburg.

Other ongoing or planned building projects include the modernisation of the on-base emergency services and the construction of a new highly-sophisticated control tower. However, the introduction of Eurofighter Typhoon has resulted in work that, until flying operations with the new weapon system began, hadn't been considered as necessary. For example, the height of the mounds of protective earth surrounding the "last chance position", the section of the flight apron where the fully-armed aircraft undergo final checks before take-off clearance, had to be increased to cope with the size difference between the F-4 "Phantom" and Eurofighter Typhoon, referring to the difference in height at which the weapons are carried onboard the two aircraft. The "last chance position" is a standard Air Force requirement and the original barriers offered the adjacent buildings no protection from potentially misfired weapons carried by Eurofighter Typhoon as they were initially installed to only contain the threat posed by missiles onboard the smaller F-4 "Phantom".

The evolving infrastructure, however, is only half of the overall picture. Neuburg/Donau is still, as highlighted, a fully operational military base with NATO responsibilities. The timetable for Eurofighter Typhoon to assume Quick Reaction Alert duties from the F-4 "Phantom" begins in January 2008, and all flying sorties are working towards adhering to this schedule. "The aim is to operate four flying periods per day" explains Colonel Klein. "At the moment, we

are flying just two, with a maximum aircraft turnaround time of two hours. We are building up flight experience with the weapon system. From next year, Fighter Wing 74 will go operational, and it's important for me that we go about the preparations in the right manner, bringing the aircraft up to a combat-ready standard, with the support of industry, so that we are able to achieve the 15-minute NATO requirement for Quick Reaction Alert."

Through the International Weapon System Support System (IWSSS), industrial support is provided by the EADS Military Air Systems teams at Manching. Located just 25 kilometres from Neuburg, Colonel Klein calls the accessibility to industrial expertise "a definite advantage", while he is quick to emphasise the importance of "keeping the dialogue going" in order to solve the initial entry into service difficulties.

The German Air Force High Command have stated that the Eurofighter Typhoon is the only MIDS-capable aircraft in their inventory. At Neuburg/Donau, work is being done in order to gain experience in network-centric operations. Several exercises with multi-aircraft fleets have already been authorised by the senior figures in the Air Force, with several more to follow and, according to Colonel Klein, the German military is very much supportive of the promotion of a network-centric way of thinking. "The experience in the Air Force is, at the moment, not so high, but we are working hard to explore the datalink capabilities that an elitist MIDS team can give us now.

It is the direction that the German Armed Forces want to take and we in the Air Force want to be at the forefront with Eurofighter Typhoon. I truly believe we are, but there's still work to be done."

For future deployment operations, NATO will be turning to Fighter Wing 74 for up to six aircraft to participate in ready-to-deploy forces. "We are constantly working towards the goal of being able to dedicate forces to NATO" explains Colonel Klein "but we will not be ready to go into deployment in 2008". The timescale before a full deployment from Neuburg/Donau can be realised is two to three years, time in which Colonel Klein and his crews will seek to harness the current and emerging capabilities of the weapon system. "Having the Defensive Aids Sub-System (DASS) and the MIDS running, and the impending arrival of Block 5 aircraft are all extremely important for Neuburg/Donau."

Progress is being made. Visibly, the base is being reshaped to be able to meet the future demands that will be placed on it. Operationally, Fighter Wing 74 are flying hard to ready Eurofighter Typhoon for its future defence and combat duties. "Eurofighter City", as it has become known on-base, is taking shape. As Colonel Klein emphasises: "We are all going forward together. It's working, and it's going to be very good. Nothing happens overnight, it will take a few more years, which is not uncommon for complex systems such as Eurofighter Typhoon. We are only at the beginning."

From the classroom to the skies

Conversion to Type

For the pilots of Fighter Wing 74, converting to the next-generation Eurofighter Typhoon from the early-generation F-4 "Phantom" is a quantum leap in terms of learning requirements. So much so, in fact, that once a pilot has successfully converted to Eurofighter Typhoon, he is unauthorised to switch back to flying the F-4 "Phantom". Only Colonel Klein, as Station Commander over the two types at Neuburg/Donau, is afforded such a privilege. On the topic of training, Major Berthold Eibisch and Major Jürgen Schönhöfer cover the requirements.

All conversion training is conducted at Laage under the tutelage of Fighter Wing 73 "Steinhoff". The initial course runs for six months. "We did academic training for approximately five weeks, followed by about two weeks of simulator training" explained Major Eibisch. "On the simulators, you are taken through the cockpit layout and the functionality of each of the switches and instruments. Ground handling makes up the final stage before you're given the first flight in the twin seat Eurofighter Typhoon."

As noted above, there is a world of difference between the mechanical machine of the F-4 "Phantom" and the computer-guided Eurofighter Typhoon. Commenting on this issue, Major Eibisch simply replies: "The first flight in Eurofighter Typhoon was the

continued next page

Eurofighter Typhoon will go on to QRA at Neuburg/Donau from January 2008



At peak, 35 separate construction sites will be working to redevelop the Air Base



realisation of why I joined the Air Force! The F-4 cockpit is very crowded, due to the addition of new equipment over the years, combined with a limited view. The Eurofighter Typhoon cockpit is very ergonomically built, from the Head-up Display (HUD) to the outside view. For an F-4 flier, it's the perfect cockpit environment."

With the Aircrew Synthetic Training Aids (ASTA) programme now online and consistently delivering hardware and software to the Partner Air Forces, the training devices will play an important role in maintaining weapon system knowledge during the break between flying courses. "I've worked on all the simulators at Laage" explains Major Jürgen Schönhöfer. "Here at Neuburg/Donau, we have an Interim Training Device (ITD), which we are using only until the ASTA building and facilities are complete, and it helps to get in some ITD flying time before my next course starts in May." As the ASTA programme expands in capacity, Fighter Wing 74 will take delivery of a Full Mission Simulator (FMS) and a Eurofighter Cockpit Trainer (ECT) which, once operational, will allow the Neuburg/Donau crews to network with their counterparts at Laage for combined exercise training.

As Eurofighter Typhoon is designed to operate at the extremes of the flight envelope, the pilots themselves must also be conditioned to cope with the stresses of weapon system operation at nine 'g'. The majority of F-4 "Phantom" pilots will already have experienced six or seven times the force of gravity, but Eurofighter Typhoon pilots are expected to absorb much more. "The aim of the 'g' training is to hit nine 'g' and sustain it for 15 seconds. Then you are qualified"



The anti-'g' suit is essential for high 'g' operations

says Major Schönhöfer. Each pilot is placed into a rotating device which generates extreme centrifugal forces equivalent to the 'g' pressures experienced in flight. The quick onset rate, up to six 'g' per second, provides the ultimate test in terms of pilot endurance, but the pilots are aided in the trials through learning to work with the anti-'g' suits, either the Aircrew Equipment Assembly (AEA) or the Libelle, both of which are designed to protect against loss of consciousness. "Up to now, I have only worked with the AEA. As the 'g' levels increase, the suit inflates to squeeze your legs, then your back and stomach, and then puts pressure into your breathing" explains Major Schönhöfer. "Building up this pressure helps prevent the blood going into your legs and maintains your conscious state."

But does it hurt? "Everybody has different symptoms – pins and needles, discomfort in the arms or neck, but normally we have two or three days of 'g' training which is enough time to find a technique which suits you. But 'g' doesn't hurt" he adds, "you just black out!"

Since qualifying as a single-seat pilot and as a pilot instructor, Major Eibisch is heavily involved in the mission rehearsal flying out of Neuburg/Donau. With Quick Reaction Alert duties on the horizon, he is increasingly working towards improving the tactical capabilities of the squadron in a variety of threatening situations. Major Eibisch explains: "In today's mission, we will be flying 2v1 short-range set-ups. The bandit will be trying to attack us in a very short-range environment and the two-

Weapon system maintenance at Neuburg/Donau

Engineering Solutions

ship will be defending."

The introduction of Eurofighter Typhoon into Fighter Wing 74 has also meant a radical procedural shake-up for the ground personnel charged with maintaining the aircraft to a mission-ready standard. Until the last F-4 "Phantom" departs for Wittmund, and with both aircraft types placing separate and differing demands on the engineers, the teams are under pressure to overcome this logistical challenge. But overcoming it they are.

"It's a huge change from the F-4 "Phantom" to the Eurofighter Typhoon, especially with the high levels of computerisation"

we can put each aircraft on their 'parking spaces', and it has worked out" claims Technical Sergeant Schmauser. "Also, the improvements to the shelters have opened up more possibilities to complete a lot of the work in there."

The new facility will signal the start of an exciting new phase for the maintenance crews, even if a sentimental value is attached to the older working area. Technical Sergeant Schmauser reflects on this, saying: "I've grown up with this hall. It's where I've seen fighter aircraft for the first time. But now I've been to Laage, where one hall con-



When complete, the new maintenance hall will be able to house up to 12 aircraft

explains Technical Sergeant Michael Schmauser. "Working with the new aircraft is all about gaining experience, and looking to improve procedures for the future."

A huge amount of time and money has been invested in not only readjusting the existing maintenance hall and the Hardened Air Shelters (HAS) in anticipation of the arrival of Eurofighter Typhoon, but also in the construction of a brand new facility which, when complete, will be able to house double the amount of aircraft as the current hall. At the moment, all aircraft servicing on both types is conducted in the original readjusted buildings and, with a bit of initiative, the engineering teams are managing the logistics of maintaining two aircraft types in a hall that is formatted to fit Eurofighter Typhoon. "There is no obstruction as we've set the hall in such a way that

maintains 12 - 14 aircraft, it's interesting and I wonder how it will work in there. We will have the possibility to fully use the resources of the aircraft and its material, while working in the same house will facilitate the communication and logistics between the two groups."

It is early days for the Wing and they are not entirely without teething problems. Inadequate tooling is testing the resourcefulness of the engineers, but workarounds are being formed through innovation. "Sometimes we need to build special tools, which requires creativity" explains Technical Sergeant Schmauser. "This is an advantage for young soldiers as they have the opportunity to contribute. On the F-4 "Phantom", there is a limitation as there are few opportunities for new developments, but on the Eurofighter Typhoon, they have

Working with Eurofighter Typhoon is about gaining experience for the Fighter Wing 74 maintenance crews



the chance to contribute immensely. This is highly motivating and the visible evidence of positive change is extremely rewarding." The engineer was quick to add that these inventions are no cause for concern as, before use on the aircraft, they are required to be officially accepted and registered onto the tool lists.

All Eurofighter Typhoon ground crew training is carried out at the German Air Force Technical School at Kaufbeuren. Although the courses are conducted in German, all technical documentation and manuals are in English, often with abbreviations, which can raise moments of doubt within the servicing teams. "Every instruction is in English, but sometimes there can be ten abbreviations in succession, all just like the one before it, but they all mean something completely different" explains Technical Sergeant Schmauser. "But we become more and more experienced every day."

But support is on hand. All the engineers from Neuburg/Donau volunteered to take part in an experience-sharing trip to Laage, to talk to the service personnel of Fighter Wing 73 and establish effective communication across the Squadrons. "The support from Laage is working really well" says Technical Sergeant Schmauser, adding: "There are friendships emerging where we know we can pick up the telephone and solve problems immediately. This works perfectly."

Industrial support from EADS Military Air Systems is also a key factor in knowledge sharing. Engineering staff from Manching have regularly visited the Neuburg/Donau workshops to offer advice and tips in support of Fighter Wing 74. "They didn't keep anything secret" explains Technical Sergeant Schmauser. "They just said 'you need to know this, you need to check this and here's how it should work'."



Mission training is intensifying as QRA duties approach

RAF unveils first multi-role squadron

Preparing for Deployment

As Eurofighter Typhoon advances onto Quick Reaction Alert (QRA) duties across Europe, becoming the continent's premier air defence platform, the Royal Air Force are leading the programme into a combat era with the announcement that the aircraft is being readied for deployment to one of the world's most fierce war zones.

The Stand-Up Parade of 11(F) Squadron, on 30 March at RAF Coningsby, signals the start of the Air Force's efforts to harness the weapon system's air-to-ground capabilities. As the eighth Partner Air Force unit to take delivery of Eurofighter Typhoon, and the second operational squadron of the Royal Air Force following the 2006 formation of 3(F) Sqn, 11(F) Sqn are tasked with realising the aircraft's multi-role potential and bringing it up to a deployable level. Speaking at the ceremony, Wing Commander Gavin Parker stated: "We plan to have all pilots fully qualified in both air defence and air-to-ground roles by 01 July 2008.



We will be prepared and ready to deploy to Afghanistan next year. It has not been timetabled, but I expect that when we are prepared, we will go."

The acceleration towards multi-role operations follows the 2006 signature of the "Austere Capabilities" contract enabling the

integration of a laser designator pod onto Royal Air Force Eurofighter Typhoons. As this work continues on the side of the industrial consortium, the Royal Air Force has announced plans to begin its own air-to-ground weapons trials. These will commence with inert bomb drops at United Kingdom test facilities scheduled for before the end of the year, followed by a live firing deployment to ranges in the United States in 2008. 11(F) Sqn will be based at RAF Coningsby.

Top: 11(F) Sqn will work towards Multi-Role deployment

Far left: Eurofighter Typhoon in 11(F) Sqn markings

Left: 11(F) Sqn are beginning a new chapter with Eurofighter Typhoon



11(F) Squadron History



The Royal Air Force Number 11(F) Squadron was formed at Netheravon in February 1915 as the first Royal Flying Corps squadron specifically tasked with fighter duties, soon deploying to France, and then to Germany as part of the Royal Air Force of the Rhine.

Between the wars, 11(F) Sqn flew a variety of aircraft before departing the UK for India's North West Frontier in 1928, and did not return until it was reformed at RAF Leuchars in 1967.

In the intervening years, the unit served in India and briefly in Singapore. During the Second World War years, the squadron moved frequently, serving with distinction in Egypt, Greece, Crete, Palestine and Iraq, and then on to Ceylon to defend the island from Japanese Carrier forces. With the Japanese surrender, the squadron, now with Spitfires, moved to Malaya and then to Japan, as part of the Occupation Forces, where it remained until disbanding in 1948.

Later the same year, it reformed in Germany flying Mosquitoes, Vampires, Venoms, Meteor night fighters and Javelins un-

til 1966. Returning to the UK, 11(F) Squadron stood up at Leuchars in 1967 with Lightnings, becoming the last unit to fly these aircraft in 1988.

Tornado F3s followed at RAF Leeming, North Yorkshire, with the squadron deploying on operations to the Middle East and the Balkans until it was disbanded once more in 2005. Now the squadron is beginning a new chapter with the Eurofighter Typhoon.

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Swing-Role Type Acceptance for Eurofighter Typhoon

Building Blocks

Eurofighter Typhoon - a weapon system with an inherent built-in capacity for growth. In line with the principle of introducing step-increases to the aircraft's capabilities, the Eurofighter Consortium have delivered the first Block 5 standard Eurofighter Typhoon to a customer Nation following the arrival of SS011 into the ranks of the Spanish Air Force. This achievement follows international Type Acceptance of the Block 5 standard, granted on 15 February 2007.

Block 5 represents the highest capability standard to date, and will be the benchmark to which all earlier Eurofighter Typhoons are brought up to through the Retrofit R2 programme, currently ongoing across the four Partner Air Forces. In addition, the enhanced ground equipment for use with the new aircraft standard has been cleared for use, including a more capable version of the Ground Support System.

In terms of capabilities, the Block 5 package starts the evolution of Eurofighter Typhoon into the full swing-role aircraft it was designed to be. The features that will enhance air-to-surface operations include the software for carefree handling, Disorientation Recovery Facility (DRF) and autopilot

capabilities for air-to-surface configurations. As a result of the commencement of heavy loads testing across the programme in 2006, the Block 5 Eurofighter Typhoon will be equipped with the Paveway II and GBU-16 laser-guided bombs. External fuel tanks, for increased range, are certified for supersonic flight while "wet" air-to-air refuelling, with the unique fully-retractable refuelling probe, is cleared for all specified customer Tanker types, including "buddy-buddy" refuelling from a Tornado aircraft. Additionally, the Mauser cannon has received certification for air-to-ground operation.

The sensor fusion capability has been given a boost with software packages designed to increase the air-to-surface ability of the radar. Additionally, Block 5 provides the aircraft with the full Direct Voice Input (DVI) and defensive countermeasures including automatic Chaff and Flare dispensing as part of the Defensive Aids Sub-System (DASS).

Eurofighter Typhoon's features in its primary air-to-air role have been further enhanced with full carefree handling, and firing certification across the entire flight envelope for the cannon, AMRAAM, ASRAAM, IRIS-T and AIM-9L air-to-air missiles.



The fully-retractable refuelling probe is a unique feature of the aircraft



SS011 achieved first flight in December 2006 at Morón, Spain

The ever-increasing maturity of the weapon system is vitally important for the success in the export market. The Austrian Air Force, under the terms of their contract for the purchase of 18 aircraft, will take delivery of aircraft at the baseline standard of Block 5. Additionally, the promise of a swing-role capability has attracted a wealth of interest across the world, which has led the analysts at Forecast International to declare Eurofighter Typhoon as the market leader for the next five years.

Phillip Lee

SS011 was the first Block 5 Eurofighter Typhoon delivered to a Partner Air Force



EJ200 Engine – Aiming for the Future

Forward Thinking Technology

The EJ200 engine powering the Eurofighter Typhoon occupies an enviable position on the world stage. Not only is it the largest new generation military engine programme currently in production with more than 1,400 engines on order, but the engine itself delivers unprecedented levels of performance, reliability and operational life. The EJ200 is the benchmark military engine.



The EJ200 is the largest new generation engine programme

Such a position is not easily attained. The EJ200 is a successful product because of the joint competences of four leading aero-engine companies (Avio, ITP, MTU Aero Engines and Rolls-Royce) and key decisions made early in the programme i.e. the choice of engine cycle, the robust design philosophy, intelligent selection and application of emerging technologies. The goal was to develop an engine that not only satisfied highly demanding multi-mission requirements but one that would also significantly drive down life cycle costs compared to previous generation engines. The EJ200

delivers maximum performance with the simplest engine architecture (offering reliability and maintainability benefits), made possible only through the application of advanced technologies and innovative design. None of this would have been possible without investment in research and technology demonstration programmes, underpinning and reducing the risk in the development programme for the EJ200.

The technology already embodied in the EJ200 engine is highly advanced, with features such as 3D blading, compressor blisks, single crystal turbines, airspray

combustion, advanced cooling and sealing technologies, latest materials and manufacturing techniques. Successful integration of these technologies is another key factor in the success of the product.

What can EUROJET do to maintain the leadership of the EJ200 in the fighter engine market in the future?

EUROJET is currently exploring possible enhancements and believes that there is a good opportunity for continuing investment in engine technology. The performance of a military aircraft engine remains a significant factor in overall operational effectiveness, availability and life cycle costs of the weapon system and continuous improvement must be a consideration in enhancing that weapon system. Of course, it is not just about thrust, which is instantly recognisable to any pilot, but also fuel burn (influencing reach, persistence, operational costs), all aspects of supportability and component life (availability and cost of ownership).

The introduction of the Digital Engine Control and Monitoring Unit (DECMU) into Tranche 2 engines represents the first step in product development from the baseline engine. Deliveries of this engine standard will start in the first half of 2007. EUROJET had successfully delivered all 363 Tranche 1 engines to schedule by the end of 2006.

For the future, as well as for existing EJ200 engines, there are opportunities for further, more significant changes to the engine design and technology, offering even greater benefits to the end user. Areas of enhancement being explored by EUROJET include Low Pressure / High Pressure Compressor aero improvements for increased efficiency and operational margins (giving reduced fuel burn and extended installed engine life), new hot end cooling concepts and materials for increased temperature

capability (giving performance and life improvements), further advances in control and health monitoring capabilities (offering operational benefits ranging from performance optimisation to prognostics) and advanced nozzle concepts targeting enhanced system flexibility.

It is clear though that new technology development will need to be backed up by a robust business case demonstrating that the benefits outweigh the development programme costs and that these concepts can be matured in time to meet programme requirements. The ability to retrofit new technologies to the Tranche 1 and Tranche 2 engines is an important factor.

Although the focus and drive for change will continue to be the core programme, careful attention must also be paid to the competitiveness of the EJ200 for export and new business opportunities. Other military engines in the fighter engine market will undergo upgrades and investments in new technology to ensure their market position. Therefore, it will require dedication and commitment from Industry and Governments and a close cooperation with the Eurofighter consortium to maintain the leading position of the EJ200 into the future.



Top: EJ200 engines in afterburner mode

Below: Maintaining the leading position of the EJ200 will require close cooperation with the customer

Hartmut Tenter, EUROJET Managing Director, stated: "It is important that the EJ200 engine delights our customers, not only today, but far into the future and this aspect requires continual review. European

industries have demonstrated that they can develop world-beating technology and generate win-win solutions for all parties".

EUROJET looks forward to working with the customer and the Eurofighter consortium to explore opportunities for further enhancements.

Mark S. Thomas / Katarina Elbogen





Edmund Stoiber in Munich firing exercises

Edmund Stoiber greets King Juan Carlos at EADS Manching

On 07 February, the red carpet was rolled out for the arrival of the most prominent of Spanish guests. Escorted by Dr. Edmund Stoiber, Prime Minister of Bavaria, and Dr. Manfred Bischoff, Chairman of EADS, His Majesty King Juan Carlos I paid a visit to the Eurofighter Typhoon final assembly facilities of EADS Military Air Systems in Manching.

Following a comprehensive briefing on EADS and the Manching activities, His Roy-

His Majesty Juan Carlos visits Manching

Eurofighter and the King

al Highness, himself an enthusiastic pilot, took the opportunity to get behind the controls of the Aircrew Synthetic Training Aids (ASTA) cockpit simulator, experiencing first-hand the methods employed to train the aircrews of the Partner Nations. The Royal Tour concluded with a visit to the Messerschmitt Hangar, allowing His Majesty a glance back into a bygone time of aviation with the historical aircraft that are on display there.

King Juan Carlos' appearance in front of the assembled German and Spanish media at Manching was part of a two-day engagement in Germany that also made stops in Berlin and Baden Baden. On his departure from Manching, Juan Carlos received a pilot's jacket from Dr. Bischoff and a Eurofighter Typhoon model, presented to him by a group of EADS trainees.

Eurofighter Typhoon flies the E-scan antenna

Future Radar Trials

Future capabilities is a current "hot topic" within the consortium and customer communities. The test fleet have made giant strides in demonstrating that Eurofighter Typhoon will be capable to meet head-on all

BWB through NETMA and, based on this contract, Eurofighter GmbH drove the international clearance process and resolved all life extension issues on certain components in DA5 together with EADS Military Air Systems. Support throughout the duration of the trials is to be provided by EADS and Eurojet.

The new antenna emphasises the push for continuous capability enhancement in the Eurofighter programme and could be available for Tranche 3 or as a retrofit in Tranche 2 aircraft. While maintaining the excellent performance features of the Captor radar, the new antenna provides a significant reduction in operating costs.



Trials with the E-Scan Radar will begin with DA5

predicted and emerging threats. In early April, Development Aircraft Five (DA5) was set to take off from EADS Military Air Systems' Manching facility, Germany, for the first of a scheduled three flights to gather data on multiple targets. The target aircraft were provided by the German Operational Test Centre WTD 61 at Manching. The accumulated data will be assessed and evaluated on ground rigs of the Euroradar consortium.

DA5 had previously been used for flight testing the Captor radar, and had already completed all of its assigned tasks according to the Main Development Contract. After a short period of negotiations, Eurofighter GmbH and the NATO Eurofighter Tornado Management Agency (NETMA) contractually agreed to use DA5 for this series of antenna flights. Funding was provided by the German Procurement Agency

DA1 makes its final journey

Museum Attraction



Development Aircraft One (DA1) last flew in December 2005. On 15 March 2007, the first prototype of the Eurofighter Typhoon programme made one last journey, albeit by road, from EADS Military Air Systems' Manching site to the Aerospace unit of Munich's Deutsches Museum in Oberschleibheim, Germany.

The transportation was organised by the Test Centre at Manching (WTD 61) and the Procurement Department of the German Ministry of Defence. The aircraft was transferred with use of a heavy-goods, wide-load transport.

The Eurofighter Typhoon will be placed next to the first fast jet of the German Air Force, the F-86 Sabre, which was operational during the 1950s, to be able to show the development in capability of military aircraft. It is also hoped that, at some point, a retired Tornado weapon system will join these on display in Oberschleibheim.

As well as the fast jets, the museum also plans to showcase the EJ200 and RB199 aircraft engines in close proximity to the DA1, in addition to the IRIS-T and Sidewinder short-range air-to-air missiles and the AMRAAM medium-range missile. Also, the Libelle pilot suit from the firm Autoflug, qualified for use with highly-agile aircraft in order to offset the effects of extreme 'g' pressures, is to be featured with the aircraft.

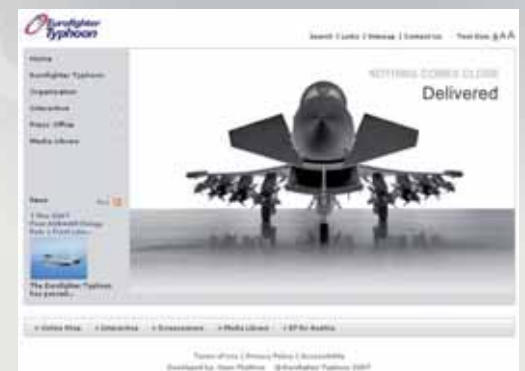
Online re-design for eurofighter.com

New-Look Website

In keeping with the 'white line' approach adopted by the current Eurofighter Typhoon publicity material, the www.eurofighter.com website has undergone a re-vamping of its own.

Designed and developed by Open Platform, an Edinburgh-based digital communications company, this new makeover for the website displays the most sweeping changes yet to the online face of the programme. Central to the new design, and the most striking adaptation, is the switch from blue to white to match other external presentations and branding. The website navigation has been considerably upgraded. A much slicker and more efficient format in negotiating through the menus and content pages has been introduced, founded on a "one-click" principle that aims to provide the visitor with their desired information more rapidly.

Aesthetics aside, the most daunting challenge that Open Platform faced was the complete rebuilding of the Media Library. As the most comprehensive catalogue of Eurofighter Typhoon imagery available on the world wide web, and with over 1.4million pictures downloaded since initial launch, it is vital that that the implemented changes not only maintain its own high standards but improve on them. The result is a step forward on the previous drop-down menus to a powerful and more favourable keyword search facility that stays very much within the one-click philosophy. Each image is also fitted with tags, a grouping of single words that help identify the content of the image and which work to complement the picture caption. The picture descriptions and corresponding tags work in tandem to enhance the potency of the search engine. Locating that specific Eurofighter Typhoon image has never been easier. Additionally, for those visitors wishing to know



The new website is a slick, clean design with improvements to the navigation and the media library



what everyone else is looking for, the 'most popular tags' function offers a fascinating insight into the favoured search criteria of Eurofighter Typhoon fanatics everywhere.

Speaking about the opportunity to redevelop the Eurofighter Typhoon website, Tony McKenzie, Managing Director at Open Platform, commented: "The team at Open Platform is delighted to be involved in the redesign and improvement programme for the Eurofighter Typhoon website.

I don't think any of us anticipated how popular both the website and the media library would become.

The new site is being developed to comply with web standards and a particular effort and focus is being placed on making the website more accessible to visually impaired users."

More new and exciting features and interactive elements are to be added to the Eurofighter Typhoon website over the coming months. Log on to keep up to date with all future enhancements!

Tony McKenzie, MD Open Platform



At the forefront of single seat testing and development, Instrumented Production Aircraft Four (IPA4) is pushed hard in striving towards certification for the next generation of weapon system capabilities.

The pictures here show IPA4 during GBU-10 air-to-surface weapon release trials in Morón, Spain. For more details on this and other test campaigns, turn to page five.

