EUROFIGHTER

WORLD

PROGRAMME NEWS & FEATURES • JUNE 2013

- RED FLAG SUCCESS
- ASTA - THE TRAINING MATRIX
- TYPHOON HAS IT - BY A NOSE

THE EUROFIGHTER TYPHOON OF 2045

Eurofighter Typhoon

06
Air Shows 2013:
Paris, Le Bourget
Aero India,
IDEX, Lima

10
Red Flag, Alaska

Eurofighter World is published by
Eurofighter Jagdflugzeug GmbH,
PR & Communications
Am Söldnermoos 17, 85399 Hallbergmoos
Tel: +49 (0) 811-80 1587
communications@eurofighter.com

Editorial Team
Theodor Benien
Simon Shrouder
Martina Schmidmeir
Chloe Bielby

Contributers
Alenia Aermacchi
BAE Systems
Cassidian Deutschland
EUROJET Turbo GmbH
Stefan Mohler, German Air Force
Royal Air Force
Jamie Hunter
Tim Robinson

Photography
Eurofighter GmbH
Eurofighter Partner Companies
Geoffrey Lee, Planefocus
Dietmar Fenners, Cassidian
MOD/Crown Copyright 2012
Katsuhiko TOKUNAGA/DACT
Jamie Hunter
Gaz West

Design & Production
images.art.design. Werbeagentur GmbH
www.iad-design.de

Printed by
ESTA Druck GmbH
www.esta-druck.de

Eurofighter World on the Internet
www.eurofighter.com
Follow us on:

If you would like to request additional copies of
Eurofighter World, please contact the
PR & Communications Department at Eurofighter GmbH
communications@eurofighter.com

CONTENTS

Title:
German Air Force Eurofighter Typhoon from JG 74 Neuburg

Photo: Goeffrey Lee

EDITORIAL

Welcome to Eurofighter WORLD!

Our hope is, in this magazine, you will find much to interest you. The idea behind this publication is to give you a glimpse of what's going on in the world of Eurofighter, what the major developments are – and, importantly, where we are heading for in the future. These are exciting times for us – there is a real feeling that some of the key deliverables that underpin the maturation of the Eurofighter Typhoon are now being realised – and the excitement within the programme is palpable.

Of course, it's one thing us saying that but it's another when some of the most respected military aviation journalists in the world are echoing those thoughts – and that's why you will find two major guest-spot features by leading aviation journalists – one offering a view on recent exercise deployments, including Red Flag in Nevada, and the other giving a broader overview of our programme and how he sees it evolving. Please give them both a good read – and our thanks to both Jamie Hunter and Tim Robinson for agreeing to let us carry their stories in this issue.

Eurofighter is continuing to make its presence felt on the world's aviation stage and 2013 looks like building on the success we saw in 2012 - in particular the confirmation of an order for 12 aircraft from the Sultanate of Oman in December.

As you can read in this issue, we were pleased to be able to showcase our capabilities at Aero India 2013 where we remain an interested party in developments there. We were delighted to be well received in the United Arab Emirates (UAE) and Malaysia where our senior people and government representatives met with top customer delegations from both countries for what proved to be very encouraging talks. While we can't comment on the likely outcome of those talks, we can say that there is widespread recognition of the value of having access to shared capability within the Gulf Coalition Countries – the GCC.

We will also address a couple of major milestones for the Eurofighter programme – for instance, the 10th anniversary of the IWSSC Service Centre and the delivery of the 100th Eurofighter Typhoon to the Luftwaffe.

Finally, let us turn to the one thing that, above all else, makes the Eurofighter Programme what it is – our employees. One of those was Bernhard Zellner, who tragically died suddenly and unexpectedly in April this year at the age of just 49. It is a reminder to us all of how fragile life can be – and how we must treasure each day we are given. Our thoughts and prayers are with Bernhard's family and all those who knew him.

Enjoy this issue of Eurofighter WORLD and thank you for taking an interest in us.

We appreciate it.

Alberto Gutierrez
CEO Eurofighter

Enzo Casolini
Former CEO Eurofighter GmbH

CHANGES IN EUROFIGHTER'S TOP MANAGEMENT

NEW CEO AND NEW CHAIRMAN OF THE SUPERVISORY BOARD

The shareholder representatives of the Eurofighter consortium have appointed **Alberto Gutierrez** as the Chief Executive Officer (CEO) of Eurofighter Jagdflugzeug GmbH and **Maurizio De Mitri**, who is currently Senior Vice President Military Aircraft Sector at Alenia Aermacchi, as the Chairman of the Supervisory Board with effect from 1 June 2013.

Alberto Gutierrez will succeed Enzo Casolini who has led the European consortium since 1 May 2009. According to the rotation principle, Mr. De Mitri will follow Berndt Wünsche who has been Chairman of the Supervisory Board and who remains Senior Member of the Supervisory Board in his function as Head of Combat Air Systems at Cassidian.

Commenting on his appointment, Alberto Gutierrez said: "This new job is a great challenge for me at the peak in my career. My key priorities will focus on competitiveness, campaigns and capabilities in order to make Eurofighter Typhoon even more successful in the world market. Starting from a European partnership, we need to move Eurofighter Typhoon forward into a more global partnership and invite new customer nations to join this leading-edge programme. Eurofighter Typhoon is widely acknowledged as an effective, proven and trusted weapon system. I am confident that we will win more customers in the next few years."

And Enzo Casolini said: "I am now finishing my duty at the helm of Eurofighter GmbH. During the four years that I have been with the programme, I had the pleasure of working with some of the most talented and dedicated individuals you could wish to meet. In saying goodbye, I am now handing the reigns over to the new Chief Executive Officer, Alberto Gutierrez. Alberto brings with him both a huge amount of experience and the sort of energy and enthusiasm that can only come with a real passion for his job. I know he will be a great success and I wish him well."

ARRIVEDERCI ENZO ....

This summer, after having said farewell to its outgoing CEO, Enzo Casolini, Eurofighter WORLD welcomes on board its new CEO, Alberto Gutierrez. To mark this occasion, we took the opportunity to talk with both top managers about their careers, their hopes and their thoughts about the future of the Eurofighter Programme. Both have huge experiences in the aerospace industry, and both have strong and passionate views about the future of Europe's largest defence programme.

ENZO CASOLINI

EFW: Enzo, looking back at four years of being the Eurofighter CEO, what have been the highlights and major milestones for you?

Enzo: There have been many highlights over the last four years and I am proud as well as satisfied that I could contribute at least a little bit to achieve them. As the most important three milestones I would like to mention the following: firstly, the signature of the Tranche 3 A contract in July 2009, secondly, the Programme Slowdown Agreement signed by Eurofighter GmbH and NETMA in July 2011 which secures the continuity of our production lines in Europe until 2017 and thirdly, the contract signature with The Sultanate of Oman for 12 aircraft in December 2012. These milestones helped us enormously to keep the programme alive and ongoing for the next five years. We must continue to work very hard together with our Eurofighter Partner Companies to gain new customers and ensure that our orderbook will further grow over the next few years.

EFW: What have been the most important experiences for you during these years?

Enzo: To be very honest, I made a lot of positive experiences but also some painful experiences during my time as the Eurofighter CEO. You will certainly understand that I prefer to talk about the positive ones. Let me mention two major ones. I will never forget the Farnborough Air Show in 2012 when the UK Prime Minister paid a visit to the Eurofighter Pavilion. David Cameron came to see us and talked with potential customers in our Exhibition Pavilion providing a strong political support for our export campaigns. His personal commitment was direct, honest and straightforward and we need to be grateful for this. It should remind all of us that political support is key for our campaigns and that we can only be successful if the Governments in Europe provide this kind of support.

In addition, I believe that the cooperation between industry and customers is more intense, more fruitful and better than a few years ago. One example: we recently celebrated the tenth anniversary of the IWSSC, the International Weapon Systems Support Centre. The way this organisation has matured is a reflection of the way in which the larger organisation of Eurofighter itself has developed. Our customers and our prospective customers now recognise that when they join us, they get the power and know-how of a significantly sized pool of expertise. This is now becoming another key differentiator and seeing that differentiator grow satisfies me a lot.

EFW: What would you like to say to your successor?

Enzo: Alberto comes to Eurofighter at an exciting and challenging time for the programme. He is experienced enough to know that he is entering a highly competitive environment, but also that he has some incredibly talented people behind him and an aeroplane that is reaching a level of maturity that puts it in a very strong position when competing for sales. He knows, as I know, that our offering will just get better and better over the next years as new upgrades and new capabilities come on stream. He also knows that we can build still further on that potential and everyone in the Eurofighter community needs to be fully committed to increase customer satisfaction.

EFW: What are your plans for the future following your retirement as CEO?

Enzo: I am not the sort of person who can remain inactive for any length of time and there are a number of interests I would like to pursue. I will remain connected in one way or another with the aerospace industry, but there are some things I have been wanting to do for some time. One of these is to spend some time at the University of Rome, where I can get deeper into my hobby of studying Roman and Greek history. It's a fascinating subject that can teach all of us a lot – even today!

BIENVENIDO ALBERTO !

Alberto Gutierrez
CEO Eurofighter Jagdflugzeug GmbH

ALBERTO GUTIERREZ

EFW: Alberto, what was your reaction when you heard that you had been nominated as the new CEO of Eurofighter?

Alberto: I was genuinely thrilled. It is a fantastic time to be coming into this multinational programme. As someone who has watched the progress of Eurofighter for many years, I can see how this programme is maturing more and more. Our existing customers recognise that and our potential customers can also see the promises we offer based on solid achievements. That's a great place to be trading from. Enzo is handing me over the keys at a very important moment in the evolution of the Programme. I am fully aware of that and I know that some of the key capabilities we will be offering will mean so much to our customers. In my opinion, Eurofighter will be unmatched in terms of an all-round package for many years to come.

EFW: What will be your priorities and targets during 2013?

Alberto: Right now, if you look at the key development milestones of the Programme, there are a number of major enhancements that are coming on stream – both onto the new Tranche 3 aircraft, but also onto earlier Tranches already on active deployment. My main focus will be to work with our Eurofighter Partner Companies (EPCs) and NETMA to ensure these new capabilities both match and exceed expectations and are delivered cost-effectively in a timely fashion to our customers. Eurofighter right now is an enormously capable aircraft and will move forward. I have no doubt at all that it is going to be even more of a force to be reckoned with. One of my top priorities will be to ensure that we deliver on that promise. Other priorities will be on competitiveness, campaigns and capabilities with the clear aim to make Eurofighter Typhoon even more successful in the world market.

EFW: Can you tell us a little bit about your career experiences before you took up this position?

Alberto: I guess you can say that aerospace is in my blood. I began my professional career in 1985 at the CASA plant in Getafe. I then held a number of positions as a programmes and productions manager before becoming Eurofighter Production Director from 2000 to 2004. While in that position I had responsibility for the supply chain of the Eurofighter right wing, the final assembly in Getafe and the delivery of combat aircraft to the Spanish Air Force. This was a great experience! I later became Head of Military Production at Manching, Augsburg, Lemwerder and Getafe and in 2007 I became Head of the Global Supply Chain and Industrial Operations at the Military Transport Aircraft division of Airbus. More recently I was Head of Operations at Airbus Military in Madrid where my responsibilities covered the production of the A400M military transport aircraft, the A330 tanker, the C295 and CN235 and P3 antisubmarine aircraft. It has been quite a journey and it helps me to face the challenges of my new job!

EFW: How would you evaluate the overall performance of the Eurofighter Typhoon since its entry into service?

Alberto: Anyone who looks at the reliability record of the Eurofighter Typhoon will see a story that has just got better and better. What makes it stand out is the agility and performance of the aircraft and the flexibility of its systems and hardpoints for stores. Again and again during exercises and in deployment, Eurofighter Typhoon has proven itself more than up to the job. What excites me is the growth potential the aircraft still has. It has now reached a level of maturity that gives it real potency and we are going to see much more evidence of this in the coming few years.

EFW: Where do you see the biggest challenges for Eurofighter Typhoon in the next 10 years?

Alberto: It would be foolish of me to say I know already all the challenges. However, I believe that it will be important to build flexibility into the Programme to cater for changing customer requirements. The world remains a volatile place with new threats and challenges emerging across the globe in an often erratic pattern. Having a platform that can adapt and gear up to these threats gives us a real competitive advantage. Whatever else happens, I am sure the next 10 years will throw up some surprises!

IN MEMORIAM

Bernhard Zellner

Chief Operating Officer Capabilities

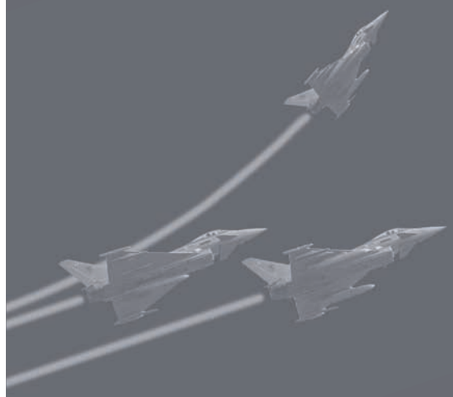
Eurofighter WORLD is sad to have to report the sudden passing of Bernhard Zellner a Member of the Board of Management of Eurofighter Jagdflugzeug GmbH.

Bernhard, aged just 49, died suddenly on Sunday 28th, April 2013. He leaves a wife and two young children.

Enzo Casolini, Chief Executive Officer at Eurofighter at the time of Bernhard's death, said:

"It was with very great sorrow that I learned of the sudden passing of Bernhard. Everyone within Eurofighter was shocked and saddened to hear of this tragic news.

"Bernhard was a very valued, bright and professional colleague who did an outstanding job as Chief Operating Officer (COO) responsible for Capabilities. Our hearts and minds are with his wife and children, relatives, friends and loved ones."



LE BOURGET 2013
SHOWCASING PRIORITIES

It's an important year for the **Paris Air Show** – the 50th Salon International de l'Aeronautique et de l'Espace – so, as Eurofighter WORLD went to press, some significant anniversary celebrations were expected.

For Eurofighter, taking a stand and a chalet at the Show, as well as bringing in pilots, engineers and showcasing the latest technologies now coming through on the Programme – the emphasis will be sharing with the world the daily commitment of Eurofighter to its expanding customer bases and the operations they undertake.

With 20 operational units deploying the Eurofighter Typhoon between six major customers and a seventh signed up, the Eurofighter Team will be underlining the fact that, day and night, around the world Eurofighter Typhoon aircraft and their crews are protecting nations in operations, on deployment and on Quick Reaction Alert.

As ever, there will be a series of significant visitors to the Eurofighter pavilion during the show and, as well as having the famous E-Cube display and a full-sized Eurofighter replica at Paris, delegates will be able to tour a static aircraft in the company of some of the world's most experienced pilots.

Theo Benien, Vice President of PR & Communications for Eurofighter, said: "We have had an extremely busy and productive year so far taking the Eurofighter story to India, Malaysia, the United Arab Emirates, Canada and now Paris – and there is still much more to come. On every visit, the feedback we are getting is extremely positive. Customers are looking for a reliable cost-effective platform with real capability and a potential for growth. That's exactly what we offer. We are in a good place."

In 2011 over 2,000 exhibitors came to the Paris event from 45 countries and a total of 350,000 visitors came to the Show – this year, the 50th Anniversary year of the event – a new set of numbers will tell a different story.

Eurofighter Typhoon at Le Bourget

POSITIONING MESSAGES
THE 'E-CUBE' WAY

Aero India 2013 at the Yelahanka Air Base in Bangalore this year saw the debut of a new kind of marketing tool for Eurofighter this year – 'The E-Cube'.

Showcasing capability isn't always about display flying at the venue – it's also about ensuring those interested can see evidence of the aircraft on operational deployment – or can take a more detailed and repeatable look at elements of capability.

At Bangalore, for Eurofighter, the new 56 square metre 'E-Cube' exhibition facility allowed everyone to see just what the Eurofighter Typhoon was all about – with crystal clarity. Four giant LED screens each 7.5 metres long and 2 metres deep offered a 360 degree view of Eurofighter Typhoon as never seen before and specially commissioned 48 minute cinemascope presentation ensured that all the key messages could hit home.

It's a concept that both caught the imagination and inspired others to follow as Joe Parker, Export Director for Eurofighter GmbH, explained: "The E-Cube underlined the Eurofighter strategy of still maintaining a presence in India while the Indian MoD is negotiating with a French competitor who they selected as the preferred bidder for the MMRCA competition in early 2012.

"The E-Cube attracted a lot of interest from visitors, including visitors from the Indian MoD, the Indian Air Force, Stephane Beemelmans, the State Secretary at the German Ministry of Defence and the Right Honourable Philip Dunne MP, the UK's Parliamentary Under Secretary of State for Defence Equipment, Support and Technology."

Sighted as it was between the EADS and BAE Systems stands, the location of the E-Cube offered plum positioning for Eurofighter's key messages bringing home the fact that:

- Eurofighter Typhoon's industrial community and Governments fully respect India's process for the MMRCA
- We are confident we can meet India's requirements and would be pleased to work with Indian industrial partners
- Our presence at Aero India demonstrated the importance we attach to the Show.

MALAYSIAN MAGIC –
TYPHOON SHOWSTOPPER...

Anyone who attended this year's **Langkawi International Maritime & Aerospace (LIMA) Exhibition** in Malaysia cannot fail to have taken away a strong impression of the Eurofighter Typhoon's performance prowess in the air.

If passionate commentary wins points, then Langkawi's commentator Thayala "Kunte" Varman deserves top marks. "Eurofighter Typhooooooon!!!!!" as he hailed it, certainly got everyone's attention in the air – but just as important were the meetings and briefings taking place closer to earth as delegation after delegation came to hear about the latest developments and capabilities being offered on a platform that is rapidly gaining major respect among the world's leading air power decision-makers.

The Royal Malaysian Air Force operates a diverse range of aircraft and are known to be keen to replace their MiG-29 fleet with an initial batch of 18 Multi-Role Combat Aircraft with a potential option for a further 18. Eurofighter, through the lead Eurofighter Partner Company, BAE Systems, is in discussions with Malaysia – discussions which were underpinned by significant Government support at LIMA and which it is hoped will lead to a Request for Proposal before year-end.

Can the Eurofighter Typhoon meet Malaysia's requirements? One man able to answer this question better than most is BAE Systems' Managing Director of Combat Air, Mark Kane. He said: "I am absolutely convinced that Eurofighter Typhoon will meet the requirements and expectations of the Royal Malaysian Air Force (RMAF). It is proven in operations and on international deployments and is designed for growth with an ongoing capability insertion plan."

To underline the point he said: "Eurofighter Typhoon fully demonstrated its multi-role capability and interoperability in numerous operations such as the Libya conflict.

And we are also working on enhancement programmes which will further increase its air-to-air and air-to-ground capabilities, and part of this programme is the introduction of the new next generation AESA radar (E-Scan radar) which we will see flying on an Instrumented Production Aircraft 5 (IPA 5) in 2014."

For any competitor to succeed in Malaysia they need to show they can offer a genuine partnership approach with real scope for meaningful industrial participation.

Kane says: "We can offer Malaysian industry access to more than 400 aerospace and defence companies as well as suppliers. If Malaysia decides in favour of the procurement of the Eurofighter Typhoon, it could elevate its national industry to a new level in the global aerospace, defence-related sectors. The transfer of cutting-edge technologies would create new industrial capabilities and sustain high-quality jobs. In addition to this, education and training initiatives could develop and sustain a skilled workforce and realize valuable intellectual capital in Malaysia."

He adds: "The UK Government is also fully committed to support our campaign and Malaysia would be warmly welcomed into the Eurofighter Typhoon family should Malaysia select our aircraft for its future MRCA. We have ensured that the Eurofighter Typhoon proposal, and the associated industrial proposals that come with it, address all five priorities for cooperation outlined in the Prime Ministers' joint statement of July 2011. A strong UK-Malaysia bilateral relationship including FPDA will be the basis for future cooperation. And as a member of the Eurofighter Typhoon family, Malaysia would have influence over and benefit from the aircraft's future development.

So....does Eurofighter Typhoon really have the track record to give Malaysia the confidence to invest in the platform. It will be their choice, of course, but Kane has no hesitation when it comes to Typhoon's track record:

"Since entry into service in 2004, we have delivered more than 370 Eurofighter Typhoons to six nations: the United Kingdom, Germany, Italy, Spain, Austria and Saudi Arabia. In December 2012, Oman became the seventh customer and ordered a total of twelve aircraft. Eurofighter Typhoon is in service at 20 operational units and up to now, the whole fleet has completed more than 186,000 flying hours worldwide.

"Eurofighter Typhoon is considered as the most advanced new generation multi-role/swing-role combat aircraft currently available on the world market.

"Seven nations (Germany, the United Kingdom, Italy, Spain, Austria, Saudi Arabia and Oman) have already ordered Eurofighter Typhoon and with more than 700 aircraft under contract and over 570 on order, it is currently the largest military procurement programme in Europe.

"This aircraft is still young, but effective, proven and trusted with a service life of more than 30 years ahead. The feedback of pilots all over the world is very positive. They praise its agility, adaptability and extremely powerful engines."

DID YOU KNOW?

- A significant number of suppliers to the Eurofighter programme have a footprint in Malaysia
- Collectively they have spent £815m GBP in the last five years with further orders expected to total £1.45billion GBP
- BAE Systems has a long-standing relationship with the country having supplied military equipment for the land, sea and air sectors
- The BAE Systems relationship includes the supply of parts from Malaysia for its Hawk Advanced Jet Trainer – the default trainer for the Eurofighter Typhoon

A POWERFUL STATEMENT AT IDEX 2013...

The UK Defence Minister Philip Dunne, Minister for Defence Equipment, Support and Technology (Centre), and Eurofighter CEO Enzo Casolini (Rear) were welcomed by pilots from The Kingdom of Saudi Arabia and the UK Royal Air Force onto the Eurofighter stand.

It takes careful planning to make the right kind of statement at an international defence exhibition – and this year at IDEX in Abu Dhabi that's exactly what produced the right kind of result for Eurofighter.

The International Defence Exhibition & Conference (IDEX) is the largest joint defence exhibition in the Middle East. The biennial event is run under the patronage of His Highness Sheikh Khalifa Bin Zayed Al Nahyan, the President of the United Arab Emirates and Supreme Commander of the UAE's Armed Forces. The event is an important showcase in a region of the world that has genuine requirements for defence capability and related technologies.

Step forward Eurofighter GmbH and the Eurofighter Partner Companies who wowed IDEX with a powerful and carefully co-ordinated campaign to ensure that everyone in the UAE who attended the Exhibition got the best possible briefing and left the event with a lasting impression of the potency and capability of the multi-role fast-jet fighter.

'We started our work with a co-ordination briefing at Ferrari World,' said Joe Parker, Export Director for Eurofighter GmbH. 'It was a fantastic and inspiring venue to begin the process of accelerating interest in Typhoon and ensuring that throughout the five days of the Exhibition we were all fully motivated to perform.'

The United Arab Emirates is known to have a requirement for up to 60 aircraft to replace its fleet of Mirage aircraft from 2017/18 onwards. With Eurofighter coming to the UAE on the back of a confirmed order for 12 Typhoons and eight Hawk Advanced Jet Trainers from the Sultanate of Oman through its partner company BAE Systems it's hardly surprising that interest in the Eurofighter at IDEX was high.

'Throughout the event we, and BAE Systems the lead partner for the UAE, received a series of delegations. There were also steady queues of people waiting to get a good look at the Full Sized Replica of Typhoon which enjoyed a prime location at the entrance to the showhalls,' said Joe.

None of this, of course, would be relevant if there were not a serious interest in the Eurofighter Typhoon from the UAE, but all the evidence points to the fact that the aircraft is a serious contender in a closely fought race.

As Enzo Casolini, Eurofighter's Chief Executive, said: 'We believe that our approach through the UK government is a realistic approach and we hope it can come to a positive conclusion. Making a deal with Eurofighter means you would have the benefit of three corporate companies which are the biggest in Europe. It is a huge opportunity for industrial participation.'

It was a point both well made and well received at IDEX. The campaign activities are well on track.

... AND MAKING THE NEWS

Hot news at IDEX was the announcement at the press briefings that the UAE could soon be making Eurofighter Typhoon components.

Enzo Casolini, the Chief Executive of Eurofighter GmbH, confirmed at the press briefings that Tawazun Precision Industries has been listed as an accredited supplier and has already made a major structural component for the aircraft which has been through what are known as 'first article inspections.'

The news made many headlines in the UAE media given its significance in this closely fought race for what could be a major aircraft order. Mark Parkinson, the business development manager for BAE Systems, the lead partner company for the UAE campaign said: 'The piece that TPI have manufactured is a major structural component in the aircraft, a V-frame used at the rear of the aircraft near the

engine.' He also confirmed that it was what is known as a high-tolerance part adding that the first one made was put on display at IDEX.

Andy Wilson, BAE Systems' industrial partnership and offset director, also confirmed that the company was in further talks around the development of titanium firewalls at TPI factories. He explained that these firewalls are used to prevent the engine blast fire from spreading into the fuselage of the aircraft. Hot news indeed!

TRANCHE 3 TYPHOON GOES ON TEST

■ **Assembly of the first Tranche 3 Typhoon,** destined for delivery to the Royal Air Force, has now been completed together with initial testing.

The aircraft, British single seat no 116, has now entered electromagnetic testing.

A range of Typhoon systems such as the armament, fuel and flight controls could be susceptible to radio frequency transmissions such as ground radars or TV and radio transmission masts. To ensure the aircraft will operate correctly and safely in flight when exposed to these threats, the aircraft is undergoing Electromagnetic Compatibility (EMC) testing through a technique known as Direct Current Injection. This means the aircraft is injected with simulated threat signals directly into specially designed points on the nose, tail and wing tips.

EMC testing will last around eight weeks, after which the aircraft will undergo avionics testing before progressing to engine ground runs.

Under the Tranche 3A contract signed in 2009, a total of 112 aircraft have been ordered for the four European partner nations of Germany, Italy, Spain and the UK, with 40 aircraft bound for the Royal Air Force.

Deliveries of Tranche 3 Typhoons are expected to start later this year.

AMATEUR PHOTOGRAPHY COMPETITION 2013

YOU COULD BE OUR "PHOTOGRAPHER OF THE YEAR"

This sunset image of a Eurofighter Typhoon returning to its base at RAF Coningsby from a training sortie won amateur photographer Gaz West international acclaim and the title of 2012 Eurofighter Amateur Photographer of the Year.

Now this year's competition is open for entry – and it could be your turn to win the title: '2013 Eurofighter Amateur Photographer of the Year'.

The Competition, run by Eurofighter PR and Communications, always attracts a high level of interest with images of the Eurofighter Typhoon coming in from a worldwide collection of keen and skilled amateur photographers.

This year's Competition officially opened in May and will run until 31st October 2013, the deadline for the acceptance of the last entries. Lead judge, and an acknowledged expert of Typhoon photography, will be Geoffrey Lee of Plane Focus. He says: "This is the perfect platform to prove that amateur photography can indeed be extraordinary."

Geoff points to Gaz's image above which made the front cover of the 2013 Eurofighter calendar as a stunning example of an atmospheric photograph.

The calendar was released internationally and has received incredible feedback, proving that you don't have to be a professional photographer to take professional images of Typhoon.

WINNER TO BE ANNOUNCED DURING THE DUBAI AIR SHOW 2013

This year's winner will be announced during the Dubai Air Show in November 2013. The judging panel, which will include last year's winner, will meet at Eurofighter Hallbergmoos to choose the winning photograph.

The winner will receive a guided tour of the Eurofighter at Manching in Germany from a Eurofighter Test Pilot and have their image featured in the 2014 Eurofighter Calendar.

The judging panel for the competition will be Geoffrey Lee from Planefocus Ltd – Eurofighter's leading Typhoon photographer; Andreas Westphal – Managing Director of images.art.design.; Theodor Benien, Head of PR & Communications for Eurofighter GmbH and Gaz West. Original images of Typhoon will be accepted from any amateur photographer in accordance with the terms and conditions which can be found on the Eurofighter website: www.eurofighter.com

Please send all entries either via email to us here at Eurofighter WORLD at communications@eurofighter.com or in the post to:

Eurofighter Jagdflugzeug GmbH
PR & Communications
Am Söldnermoos 17
85399 Hallbergmoos
Germany

UK TYPHOONS TESTED ON RED FLAG

Report and photos for Eurofighter WORLD by Guest Photo-Journalist : **Jamie Hunter**

Out in force and preparing for take-off - Eurofighter Typhoon makes its mark at Red Flag.

In the UK, the Royal Air Force's fast jet force has undergone a dramatic transformation over the last decade since Operation 'Telic' of 2003 – the second Gulf War. It has rationalised down to two types; the Eurofighter Typhoon and the Tornado GR4.

Gone are the Jaguar, Harrier and Tornado F3 fleets, with this too the mass of a sizeable front-line squadron strength. From next year the RAF is likely to be composed of just seven frontline fast-jet units.

Consequently, the Service is looking to wring as much capability and usefulness as possible out of its fighters. Versatility, lean engineering procedures, minimal operating costs, and maximum output are all essentials.

The RAF and RN are already heavily engaged with moulding a future transition from the Tornado GR4 to the F-35B Joint Strike Fighter at the end of this decade. However, a bow in overall force structure is almost inevitable if the ageing GR4s are to exit stage right in 2019 as planned – few expect a meaningful F-35 capability by that time.

Much of the slack will have to be absorbed by an already heavily tasked Typhoon Force.

The RAF is working towards a five squadron operational Typhoon strength, two units at RAF Coningsby and three at RAF Lossiemouth, by 2015. By this time, all Tranche 2 airframes will have been delivered and the RAF will be well into deliveries of Tranche 3 aircraft.

type's combat debut over Libya in Operation Ellamy in 2011, due to the complexity of the 'Red Flag' task.

The overall plot will likely see Tranche 1 airframes, which are now seen as 'legacy' platforms, being retired from that time onwards. Although, with two-seat aircraft front-loaded into the Tranche 1 allocation, synthetic pilot training will have to match the drawdown of these airframes. At the end of the decade we will probably see the RAF operating 107 Tranche 2/3 Typhoons.

BUILDING CAPABILITY

Along with building the mass of the Typhoon Force, capability is crucial to maintaining effectiveness with far fewer Force Elements At Readiness (FEAR).

For Typhoon this means a meaningful multi-role capability – a narrowly focussed single role asset will struggle for justification in the future RAF.

Exercise 'Red Flag 13-3', held at Nellis AFB, Nevada, for three weeks from 25 February to 15 March was designed as a huge test for the Typhoon Force. It kick started a busy year for the RAF Typhoons with other detachments to Oman for 'Magic Carpet', Malaysia for ''Bersama Shield' 2013, and the UAE for ATLC all planned.

'Red Flag' represented arguably the biggest operational flying test to date for the RAF Typhoons, and probably even surpassed the type's combat debut over Libya in Operation Ellamy in 2011, due to the complexity of the 'Red Flag' task.

The Typhoons arrived at Nellis at the start of February, having spent two weeks at Joint Base Langley-Eustis working with the F-22A Raptors of the 27th FS on Exercise 'Western Zephyr'. For the Typhoon personnel the focus was working alongside the US Air Force and US Navy to prove interoperability, develop and validate tactics and hone capabilities.

The RAF detachment was led by No XI Squadron and RAF Coningsby station commander Gp Capt Johnny Stringer, with the time at Nellis being the RAF Typhoon's debut in 'Red Flag' – and notable as being a higher security level event open only to invited nations.

Gp Capt Stringer said: 'Clearly 'Western Zephyr' followed by 'Red Flag' provided an excellent opportunity to integrate [the] Typhoon with the F-22 [Raptor]. We needed to pick up on those standards that have already been developed by the US Air Force to see and test that we can play [the] Typhoon into those as well, and that it is a seamless mix.

He added: ''Red Flag' is important because it allows us to test the aircraft in a really challenging environment in every way. It provides a very good health-check for the force, because we are deploying a front-line squadron and four Qualified Weapons Instructor (QWI) students. We have a lot of both experienced and junior guys, plus it serves as a valuable vector check for what we are doing with the aircraft. ['Red Flag' is about] making life incredibly difficult for you. If you're still able to function here rather than in a benign set of conditions where most things are going for you, then I think that is probably more of an acid test of where an aircraft is. How we develop, educate and train our future QWIs is fundamental to tactical success in the future.'

AIR-TO-AIR

Along with the partner Eurofighter nations, the RAF is steadily rolling out enhancements to its aircraft. The nine Tranche 1 Block 5 Typhoons that deployed to 'Red Flag' were upgraded to the latest standard with Drop 2 software, the latest R2Q standard radar capability and use of the new Helmet Equipment Assembly (HEA). The Drop 2 upgrade process changed some of the air-to-surface weaponeering with increased HOTAS functionality for the Litening targeting pod.

Pilot Flt Lt Mark Long elaborated on the radar refinements. 'I'm really impressed by R2Q – it's a killing radar. You can rely that its going to host the AMRAAM until terminal guidance and that the information it's feeding the ASRAAM is accurate, which is exactly what we need.'

Long continued: 'Coming out here and working with fifth-generation fighters [the F-22], we need to realise what our place is in the fight. We have the ability to shoot far, fly fast and [cause attrition to] the leading edge. I would say [the] Typhoon's main advantage is its performance.

'If we are holding a CAP position we can stay on station a long time, but if we are using our long-range shot, the ability to go high and fast, it comes with a fuel penalty. But that fuel penalty is more than outweighed by the effectiveness of those long-range shots.

"We've had some shots taken at Mach 1.6, at 45,000ft, and the aggressors have been surprised by the kinematics we can give the missile. We've been killing out quite a few people. There have definitely been raised eyebrows in the [post-mission] shot evaluation when you're calling a very long-range shot and then calling a kill on it.'

MULTI-ROLE

'Red Flag' not only afforded the Typhoons the ability to showcase their air-to-air prowess, but also tapped into the renewed swing-role emphasis for the RAF post-Operation 'Ellamy' over Libya in 2011.

'We have pushed on an AI (Air Interdiction) footing', Long continued. 'So we'll have preplanned targets which are always right in the middle of the MEZ (Missile Engagement Zone). We'll push and quote a load of four EPW2s (Enhanced Paveway 2), four AMRAAMs and two ASRAAMs on the swing-role missions. A lot of the sorties are swing-role; once we've prosecuted the target we are up on fuel and we've got four AMRAAMs on board so we're back into second phase of an air-to-air fight. I've penetrated the MEZ, dropped using the Litening pod to designate the target, then swung back to CAP and held down a regeneration airfield for another 15 minutes, then gone home.

'The process of transiting into a MEZ where you're going to get lit up on your DASS (Defensive Aids Sub-System), defending, dropping, and then going back to fight against a PL-12 missile threat [simulation] is a level that we don't regularly train to.'

The Typhoon DASS and the aircraft's Mission Data was a major contributor to the jet's success on 'Red Flag'. The RAF has placed huge emphasis on developing Typhoon's mission data – populating the aircraft DASS and radar with vital information to enable peak performance in high threat scenarios.

Flt Lt Long continued. Mission Data 'has enabled us to improve how our aircraft is going to combat the threats – you can get it refined in a couple of hours as well. That's something the Raptors were very impressed with – the turn-around of our mission data. If you put it into context, you can have real-world threats – something that will pop up that hasn't been spotted by intelligence – and you can re-write your mission data to help protect you against that threat.'

Gp Capt Stringer gave more details. 'I think our defensive aids suite in the round, and particularly actually the fact that we as the Royal Air Force have been able to take that mission data, best assess how it can be improved, in the light of the operating in this case training, but high-end training context, and then tweak it, will really help to improve its performance.'

'Operational Test and Evaluation is vital. You can come up with any number of capabilities in the abstract, but if you don't actually go out and test them in context they are potentially hollow. So, getting your test and evaluation right is a fundamental end to end capability. So the Highrider series of exercises, plus those trials that have been done back in the UK give us confidence, and also highlight where we might need to apply additional effort in certain ways with the aircraft.'

STAYING IN THE FIGHT

For Gp Capt Stringer, the capabilities demonstrated by the RAF at 'Red Flag' were clear evidence of how, despite a shrinking front-line fighter force, the service has been able to keep up with the latest advances.

'I left the Typhoon Force in about October 2009, and came back about three years later.

Mission accomplished - now for the debrief...

Just seeing the change in the aircraft in that time has just been deeply satisfying. 'Red Flag' gives us confidence that the capability development that is in train, and that which we know is coming down the tracks in the next few years, is putting us in the right place.

'This [exercise] has shown that the jet has the performance that we always knew it had. It's got pace, it can achieve some really quite impressive altitudes out here. Put those two together and it puts extra capability into the air-to-air missiles that you are carrying.

'On the air-to-ground side the jet has an impressive payload, the current targeting pod is very good, and yet we also know that there are potential development opportunities there as well, such that in the air-to-surface role as well as the air-to-air all you can see is a continuing and indeed an enhanced success story.'

Lined up and ready to go at Nellis...

6 SQUADRON TAKE PAVEWAY TO

TYPHOON MULTI-ROLE SUCCESS

In the United Kingdom the Royal Air Force have continued to develop the multi-role capability of Typhoon by dropping inert Paveway II bombs for the first time from the Tranche 2 version of the combat aircraft.

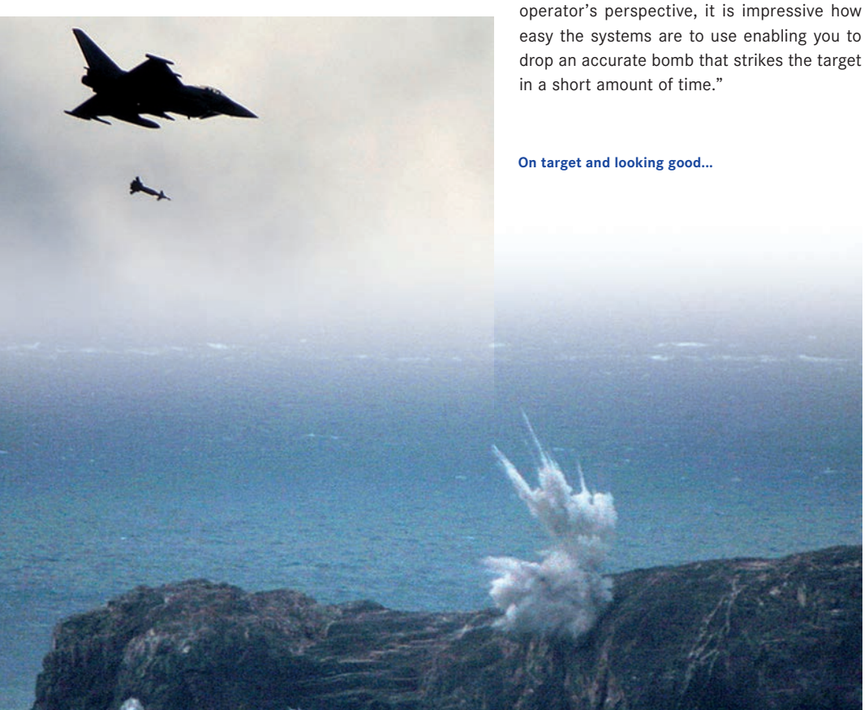
Pilots from 6 Squadron, based at RAF Leuchars, embarked on a series of training sorties over Cape Wrath Range in March to deliver the air-to-surface capability as part of 'Combat Ready' training work up sorties. It was the first time that 6 Sqn had dropped a bomb since it was re-formed at RAF Leuchars in 2010 as a frontline Typhoon Squadron.

Officer Commanding 6 Squadron, Wing Commander Mike Baulkwill said: "The successful delivery of Paveway II from a Tranche 2 Typhoon is another step forward in the development of the platform's multi-role combat capability. The last time 6 Squadron as a whole conducted end-to-end air-to-surface weapons training would have been when the Squadron was flying Jaguars, a fitting return to bombing for the "Flying Can-Openers". Given the previous air defence role of the Station, I also suspect that it has been a long time since a Leuchars-based squadron has delivered a bomb"

The Paveway II bombing runs have been flown as part of an Operational Training Week that provides an opportunity for pilots to consolidate different phases of their multi-role training and for the Squadron as a whole to conduct readiness activity for contingent operations.

Flight Lieutenant Oli Fleming, who as an Ex Tornado GR4 pilot has operational air-to-ground experience, was the first 6 Squadron pilot to drop a Paveway II. He commented:

"Dropping weapons from a Tranche 2 Typhoon is a good step forward for the Force providing a multi-role capability. From an operator's perspective, it is impressive how easy the systems are to use enabling you to drop an accurate bomb that strikes the target in a short amount of time."



On target and looking good...

RAF Regiment Forward Air Controllers (FACs) from the RAF Honington Air Land Integration Cell (ALIC) supported the exercise by providing laser designation and target 'talk-ons' ensuring that the inert Paveway II weapons successfully struck their targets

The exercise formed part of ALIC FAC training for Afghanistan.

ALI Cell Deputy Squadron Commander, Flight Lieutenant Quinn said:

"The opportunity to train with RAF Typhoons and achieve weapon releases within the UK is an important step forward for us. We have been able to not only train our personnel for Operation Herrick but also train for future contingency operations with this excellent multi-role platform."

DID YOU KNOW?

■ **Royal Air Force (RAF) Leuchars** in Fife is primarily responsible for maintaining Quick Reaction Alert (Interceptor) North, providing crews and aircraft at high states of readiness 24 hours a day, 365 days a year, to police UK airspace and to intercept unidentified aircraft.

■ **No 6 Squadron** officially stood up at RAF Leuchars in September 2010 as the third frontline RAF Typhoon Squadron and the first to be based in Scotland. The Squadron took over responsibility for providing the northern element of the Quick Reaction Alert force in March 2011, providing aircraft and crews on high alert to scramble and intercept unidentified aircraft approaching UK airspace. 6 Sqn is now the lead Tranche 2 Multi-Role Combat Squadron.

■ **Typhoon provides** the RAF with a multi-role combat aircraft, capable of being deployed in the full spectrum of air operations, from air policing, to peace support, through to high intensity conflict. It is currently employed on permanent ops in the Falkland Islands, UK Quick Reaction Alert North and UK Quick Reaction Alert South.

■ The original version of the **Paveway II laser-guided bomb** entered service with the RAF in the 1970s and is composed of a standard UK 450kg bomb with a computer control group fitted to the nose, supporting a laser seeker head and steerable fins. A tail unit is fitted with fins that deploy after launch from the aircraft. Laser designation of targets can be provided by the Litening III targeting pod, or from troops on the ground using a laser target designator. Paveway II equips Tornado GR4 and Typhoon aircraft. The bomb's guidance package takes over on release from the aircraft and steers the bomb on to the source of reflected laser energy. The bomb can be dropped from low or medium level. Typhoon's first operational use of Paveway II was in the Libya air campaign in 2011.

CELEBRATION AT CASSIDIAN'S SITE IN MANCHING

LUFTWAFFE ACCEPTS 100TH EUROFIGHTER

Front left to right:
Wing Commander Fighter Wing 74 "Steinhoff", Col Andreas Pfeiffer; Wing Commander Fighter Wing 73 "Steinhoff", Col Bernhard Teicke; Wing Commander Fighter Bomber Wing 31 "Boelcke", Col Andreas Hoppe; Chief of German Air Force, LtGen. Karl Müllner; Head of Combat Air Systems/Cassidian, Berndt Wünsche; CEO Cassidian, Bernhard Gerwert; Director Air Department Armament Procurement Agency (BAAINBw), Helmut Richter.

Berndt Wünsche is Head of Combat Air Systems at Cassidian. On February 28th 2013 he proudly stood alongside senior members of the Luftwaffe as the German Air Force accepted its 100th Eurofighter. It was an event at which the General Lieutenant Karl Müllner, Chief of Staff of the German Air Force, said: "Due to its interoperability, modularity and growth potential, the multi-role weapon system, ***Eurofighter, is today, and will remain in future, the backbone of the German Air Force's combat aircraft fleet,*** particularly in light of the new orientation of our armed forces."

For Berndt Wünsche the VIP event was a red letter day in the life of an incredible aircraft which has been winning plaudits around the world and which he himself believes will have amazing future.

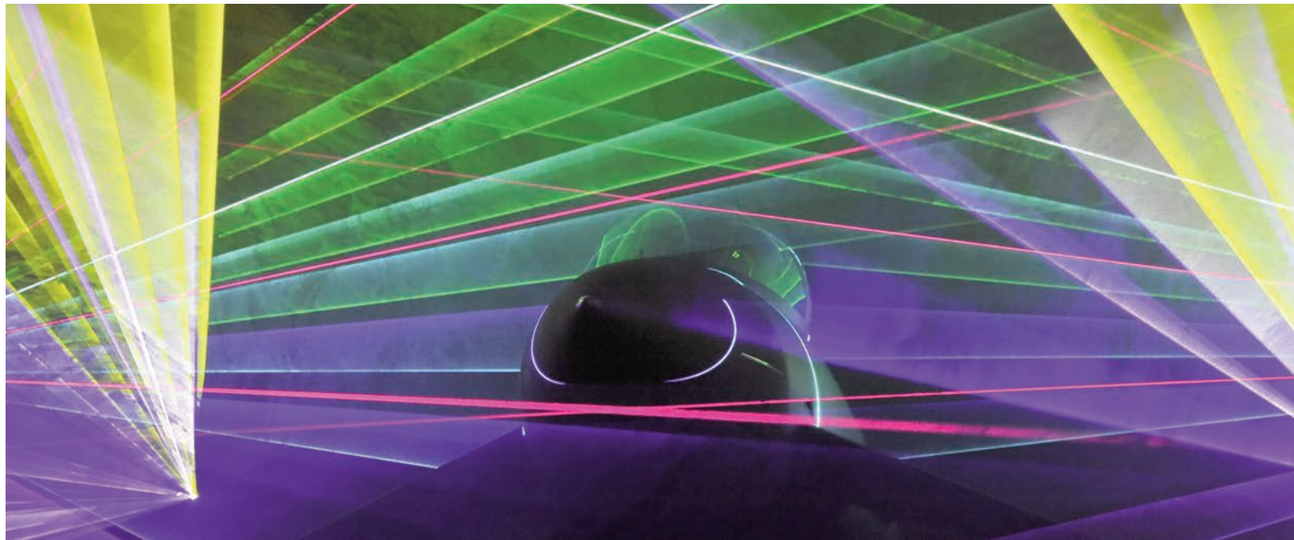
The event in Manching, southern Germany, attracted a strong delegation of VIPs with many members of the armed forces attending as well as senior delegates from Industry. What marked it out was not just the stunning appearance of the 100th German Luftwaffe Eurofighter itself, but the futuristic lightshow that supported it. That lightshow presented the Eurofighter Typhoon's history with the Luftwaffe in 3d imagery above the heads of delegates – and it was symbolic of the sort of technology that the aircraft itself is likely to have in years to come.

Berndt Wünsche told Eurofighter WORLD: "Eurofighter is combining supreme flight performance with Multi/Swing role capabilities as no other aircraft available on the market. These capabilities are allowing our customers to cover an extremely broad range of missions simultaneously and effectively. In the future I see many more exciting developments to come, a number of which we are bringing into reality as I speak."

Citing important capability enhancements, including the development and integration of the E-Scan radar and the integration of the beyond visual range Meteor missile, Berndt said that the partners are now also working on further enhancements to the Eurofighter's acclaimed Defensive Aids Sub Systems helping to further consolidate its growing reputation as one of most effectively protected fast-jet fighters in the world.

Berndt also added that "an export capabilities programme was launched jointly by all Eurofighter partner companies to implement capabilities required for potential export customers. It prepares the fighter for further operational scenarios including combat against targets at long distance and the use of anti-ship and anti-radar missiles."

But looking further ahead, as others have done in this issue of Eurofighter WORLD, Berndt sees a time when Eurofighter will be interoperable with unmanned air vehicles in a variety of different mission scenarios where a mix of manned and unmanned assets may be deployed. He said: ***"We are already focusing on the development of Eurofighter's interoperability with other weapon systems and command and control facilities. The nature of how fast jets with capabilities like the Eurofighter are used is changing.*** In the very near future satellite and data link communication functionality will enable communication with headquarters and other weapon systems over great distances beyond line-of-sight. Eurofighter is well positioned for such capability insertion and the commensurate increase in potency that comes with it."



TENTH ANNIVERSARY FOR EUROFIGHTER SUPPORT CENTRE

Reaching out...the IWSSC illustrates powerfully just what can be done through the hands of friendship.

A unique support centre set up to offer an unrivalled service package for the Eurofighter Typhoon marked its 10th anniversary this spring.

The International Weapon System Support Centre (IWSSC), based at Hallbergmoos/Munich opened for business in March 2003 shortly before Eurofighter Typhoon entered into service.

The Centre provides and undertakes technical In-Service Support for all Eurofighter Typhoon Weapon System products. Its commissioning marked the first formal operational step in establishing what has now become widely recognised as world-class support for Typhoon and the customer-base it services.

Key to its success has been the development of a close working relationship between these customers and the industrial base that supports them. A face-to-face approach to problem solving, strong links with national support centres for Eurofighter, and the use of 'common tools' to create synergies and facilitate information sharing have all helped make the IWSSC a potent and efficient support organisation.

Today, through this teamwork, the Centre helps support the effective operation of over 370 aircraft spread across six nations with about 186,000 flying hours between them. And a seventh nation, Oman, will soon be joining them.

Enzo Casolini, Chief Executive Officer of Eurofighter Jagdflugzeug GmbH, described the anniversary as "an important milestone for the Eurofighter community." He added: "It represents the maturation of a powerful service organisation underpinning a highly effective weapons system. Together with its deep and unique service offering Eurofighter is now rapidly gaining acclaim and recognition around the world. Customers who join the Eurofighter community recognise that they are not just buying a weapon system, they are also gaining access to a huge amount of know-how and shared capability."

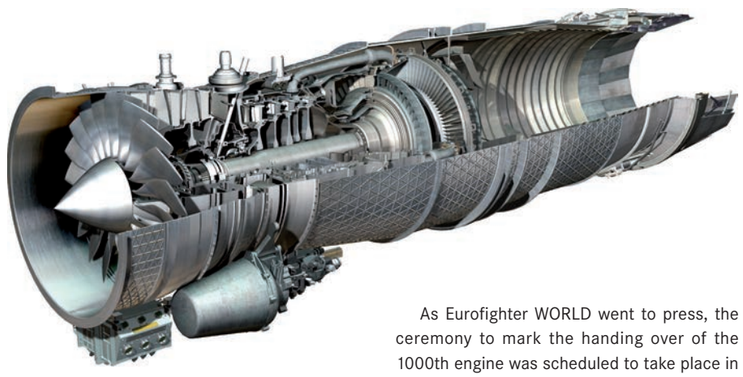
Hagen Petzke, Deputy General Manager of NETMA, commented: "The cooperation between the Air Forces, the agency and industry in the IWSSC are vital to sustain the "Eurofighter/Typhoon" weapon system. The prerequisite to achieve this are the people, who work there. They have done a great job over the past 10 years and made the IWSSC what it is today – an impressive success story."

Luis Rodriguez Salinder, who manages the IWSSC, summed up what the organisation offers to customers by saying: "We now have an organisation that allows the speedy flow of information between all appropriate parties. It means we can react quickly as a team to issues and challenges and share best practise efficiently. The focus for the next ten years is likely to be widened from the support of development and production towards much more fleet maintenance support and fleet development work. It's an exciting time for the IWSSC justas it is an exciting time for Eurofighter."

IWSSC Members and Guests at the official 10th Anniversary celebration event in Hallbergmoos, Germany

EUROJET DELIVERS 1000TH EJ200

■ **EUROJET Turbo GmbH,** the management company behind the EJ200 engine project, celebrated the delivery of its 1000th EJ200 production engine on the 4th June in Berlin. The landmark engine was assembled at ITP's facility in Madrid, Spain and delivered to the Spanish Air Force on the 23rd May, 2013 to power the Eurofighter Typhoon fleet.



The EJ200 engine has amassed an impressive 390,000+ engine flying hours in 11 years of operation. The engine represents outstanding and innovative technology which continually demonstrates exceptional performance in the Eurofighter Typhoon. The flight programme covers an envelope up to 55,000 feet at speeds between 100 knots and 2.0 Mach/750 knots. Equally significant is the achievement of the first standard flight engine to demonstrate sustained "super-cruise" – the ability of the aircraft to cruise at supersonic speed without deploying engine reheat.

As Eurofighter WORLD went to press, the ceremony to mark the handing over of the 1000th engine was scheduled to take place in Berlin with senior government delegates from both the UK and Germany on hand to mark the occasion.

The EJ200 has won universal praise from Eurofighter pilots for its responsiveness, power and consistency and is one of the key elements which helps ensure the aircraft can deliver massive kinetic effect when deploying advanced weaponry – even at altitude.

WHAT YOU NEED TO KNOW:

■ With full internal fuel and weapons load, Eurofighter Typhoon has an extremely short take-off roll with the EJ200 engines producing a combined thrust of 40,000lbs - or almost 20 tons, which is more than many medium size airliners need to get airborne.

■ The EJ200 is a two-spool turbofan with modular construction for ease of maintenance and support. The broad blades of its wide-cord fan and the bladed discs (blisks) in its compressor stages are light and aerodynamically efficient, and possess a high level of resistance to foreign object damage. The fan has no inlet guide vanes, which reduces mass and complexity and improves bird strike capability without compromising operability.

■ Both the high-pressure compressor (five stages) and low-pressure compressors (three stages) are driven by single stage advanced air-cooled turbines, featuring the latest single crystal blade technology.

■ Brush seals are widely used instead of labyrinth seals in the air system throughout the engine. The annular combustor, which incorporates air spray fuel injectors, has been designed for low smoke and emission characteristics.

■ The reheat system features radial hot stream burners, independent cold stream burning and a hydraulically operated convergent/divergent nozzle. All accessories, including the full authority digital engine control unit, are self-contained and engine mounted. An auxiliary gearbox on the underside of the engine provides drive for the accessories.

Exercise Red Flag 2013 at Nellis Air Force Base – Eurofighter Typhoon demonstrates real interoperability

BLOWING HOT OR COLD –
WITH EUROFIGHTER TYPHOON IT REALLY DOESN'T MATTER

Managing the political tensions that surround the resources of what appears to be an increasingly fragile planet means being ready to cope with trouble wherever and whenever it may arise – and that includes having an effective and capable deterrent to prevent that trouble developing in the first place.
Governments have known this for years – as have the defence ministries that serve them. It's vital therefore that an investment in a multi-role/swing role fast-jet fighter, for example, is only made if the procurer can be sure that the selected platform can do the business whatever the challenge.
With Canada currently looking at how it wants to plan its future in this respect, and others in hotter climes actively doing the same, Eurofighter World recently took time out to talk to the people who know better than anyone just how important effective all-round performance in any weather is – the pilots.

LIEUTENANT COLONEL STEPHAN MOHLER GERMAN AIR FORCE
INTERVIEW

Eurofighter Typhoon Instructor Lieutenant Colonel Stephan Mohler of the Jagdgeschwader 73 "Steinhoff" in Laage has over 1,100 Typhoon flying hours under his belt and knows the aircraft as well as anyone could.

He recently took time out to talk to Eurofighter WORLD about the performance of Typhoon and why it has become a firm favourite among fast-jet pilots and students. Lt. Col. Mohler also explained how the aircraft performs in a wide variety of climatic conditions – and what that means to the pilot.

How does Eurofighter Typhoon perform in cold weather?

Engine performance of any aircraft always improves in cold weather and, in that respect Typhoon is as good as any other. As with any fast-jet fighter icing in the air can be an issue as they don't have the de-icing gear that civilian aircraft carry, but, in fact, Typhoon's performance drop-off in these conditions is not as great as some of its rivals – so in that respect it is good.

Is there anything else that's an issue in cold weather?

Well yes, there are some aircraft that have issues around the engine intakes when icing becomes a factor and this can be difficult as you can have chunks of ice going into the engines. Typhoon is cleared to operate in almost all meteorological conditions, giving it the flexibility required for air combat.

In the early trials in Sweden they would sit the aircraft out in minus 40 degrees Celsius for a full day before starting it up and everything worked. On the other side of the coin I have been flying over Sardinia when it was plus 40 and have been perfectly comfortable with no issues.

Overall though, in cold weather Typhoon performs well, everything works as it should and the weather doesn't affect the performance of the weapons systems which is important.

What about the cockpit environment?

Compared to some, say French aircraft, it is really spacious and even compared to an aircraft that you might expect to be very comfortable like a F-16 is it very good as you are in a more comfortable position and the seat has an optimized recline. The air conditioning works really well and the only time temperature becomes an issue is when you are walking out to the aircraft. I have done 10 hour stints in a Eurofighter Typhoon on a number of occasions, for example on the way to India or Alaska, with no real problems. It's a good place to be.

What about the reliability of the aeroplane?

Like any aircraft the reliability has improved over time. It is now a very reliable aircraft and the sortie rates during peacetime operations and over Libya for example have been exceptionally good at over 90 per cent. The basic airframe is excellent and the weapons systems are also very good.

I would have no issue going to war in this aeroplane and would have every confidence in both the airframe and the weapons systems.

As an instructor what's it like to work with and for the students?

Students really like this aircraft. Sometimes there is a bit of bar banter before they come about this or that – or they say it is a plastic aeroplane – but once they have flown in it it is a different story. They all come back smiling.

Our training is really thorough and the students will typically do 40 to 50 sorties before they go to their squadrons. When they leave here they are fully formed and ready to go – we do every element of the training syllabus here and the results can be seen in the students that take the training. We also use the Aircrew Synthetic Training Aid (which you can read about elsewhere in this issue of Eurofighter WORLD) a lot more than some others do and this means we can give the students a fuller training experience and save the real flying for when it is really needed

What is it you like most about the Eurofighter Typhoon?

I guess if I had to sum it up I would say two things: firstly the engine performance which is fantastic, and secondly, the cockpit environment – it is a really good place in which to work and unlike some aircraft it has been designed ergonomically with the crew in mind from the outset.

So what about the future potential of the aircraft?

It's huge. We have a great basic airframe and when we get P1E standard we will have an aircraft that can do pretty much everything. Unlike some other aircraft I could name it has no real weight issue and was designed from the beginning with future growth in mind. I'm really excited about the future.

A DIFFERENT KIND OF
COLD WAR ...

A fighter aircraft is today one of the most flexible and powerful means to show presence and deterrence.

Their sensors make them ideally suited to detect, track and monitor penetrators over vast distances and, in most cases, their presence alone would force the penetrators – airborne as well as seaborne – to leave.

The fighter is also the quickest power projection means.

But the ideal "Arctic Fighter" requires more than the right sensors, navigation and weapon systems.

The best answer to these questions is the Eurofighter. Tested in Northern Sweden under actual Arctic conditions at temperatures below –30° Celsius, including full demonstration of its autonomous operational capability and low logistical footprint, the Eurofighter is ready to cope with the severe weather of the Arctic. The fighter is equipped with an Auto-Approach mode which allows the autopilot to fly an ILS approach in all conditions, and it has been tested to operate in the most extreme weather including flight in icing conditions.

The Eurofighter's advanced aerodynamics, flight control system and powerful EJ200 engines make short take-offs possible in all configurations. The Eurofighter has an advanced anti-skid braking system and a brake chute to allow short landings on slippery runways. In the most extreme case even landing on icy runways would be possible using its arrestor hook. Both the Norwegian and the Canadians have operationally used mobile arrestor cable systems on their tundra airfields. The nose wheel position behind the inlet, significantly reduces the FOD-hazard to the engines while the Eurofighter operates on the Arctic airfields.

The retractable in-flight refuelling probe makes possible refuelling from a large range of in-flight refuelling tankers equipped with the drogue basket system.

But the most obvious Eurofighter advantage is its two engines providing a significant flight safety bonus. In case of an engine failure – which statistically will happen – the Eurofighter will not crash, but safely recover to a base with the damaged engine.

No pilot wants to eject into the Arctic environment, knowing it is potentially lethal due to the cold, the weather, the wild life and the isolation. Being out of reach of helicopters and ships, it could take days to be evacuated.

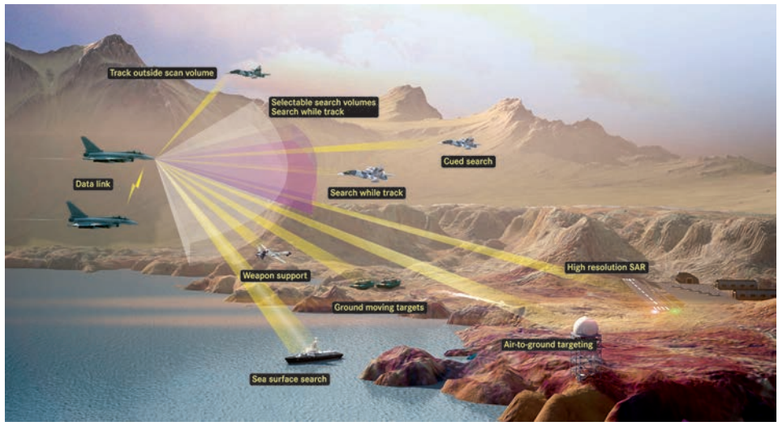
So in summary, the Eurofighter is not only affordable, combat ready and already superior in performance and fire power, but has the additional features that make it the perfect fighter in the unforgiving Arctic environment.

TYPHOON HAS IT – BY A NOSE!

When military historians look back at the performance and capability of the swing-role/multi-role fast jet fighter in the early part of the 21st Century, few working on the Eurofighter Typhoon Programme would be surprised if their conclusion was that Typhoon has the edge 'by a nose'.

The nose in question will incorporate the world's most advanced Active Electronically Scanned Array (AESA) Captor-E radar – a massively capable piece of kit – housed in the accommodating front-fuse of the Eurofighter and offering pilots new levels of precision attack, electronic counter-measure and information assimulation.

Whilst there has been much conjecture about the delivery and funding of this capability, within the Eurofighter community there is a calm determination and confidence around the programme with the focus very much on a planned and progressive sequence of events that will see the successful delivery of what will be the most advanced and sophisticated radar of its kind on the market.



Make no mistake, the Captor-M-Scan mechanically driven system fitted to Eurofighter currently, has already proved incredibly successful, but the E-Scan capability will equip Eurofighter's customers with a capability geared to tackle the most demanding environments and threats for years to come.

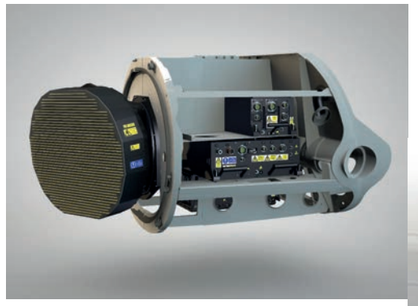
What makes E-Scan special in Eurofighter is both the wide field of regard and the size of radar array that can be fitted because of the relatively wide diameter of the nose section of the aircraft contributing to "First Look/First Shoot" capability. Indeed the planned capability with E-Scan extends beyond the radar and improves power, cooling, navigation, precision attack and communications that will be further enhanced.

This will build on a Meteor baseline to meet the demanding customer requirements with the increased bandwidth and electronic attack.

A bit of history now: Eurofighter and Euroradar, together with their industrial partners, started full scale development of the world's most advanced AESA radar (E-Scan) in July 2010. Under a specific Collaboration Agreement for this development and integration programme, significant investment has been made and critical design reviews are complete to support the first development system to be tested this year.

In fact, the Request for Proposal is a milestone on the way to have the E-Scan Radar flying on an Instrumented Production Aircraft 5 (IPA 5) in 2014 and later on a Tranche 3 (IPA8) platform in order to meet the requirements of both Core Nations and potential customers.

As you can read elsewhere in this issue of Eurofighter WORLD, Tranche 3 aircraft are now being manufactured with special fitments to accommodate the new radar as well a range of other enhancements which further deepen the capability of the aircraft and which compensate for the changes in weight distribution enabling Eurofighter to remain as agile as ever.



The radar has a wide field of regard which is 50% wider than traditional fixed plate AESA systems

Whilst on behalf of the four Core Nations in the Eurofighter programme, NETMA originally issued a Request for Proposal (RfP) to Eurofighter Jagdflugzeug GmbH for the development of an Active Electronically Scanned Array (AESA) Radar (E-Scan) in July 2012 and in November 2012, Eurofighter responded to NETMA, delivering the technical and financial offer – in January 2013 at the customer's request – an enhanced offer with increased Air-Surface and Electronic Attack capability was submitted and negotiations are underway to agree a contract this year. It's all part of normal development plans when adding such a complex and highly advanced capability to a fast jet fighter.

WHAT YOU SHOULD KNOW:

- Euroradar is a multi-national consortium lead by SELEX ES, a Finmeccanica Company, alongside Cassidian and Indra. Euroradar has delivered more than 300 Captor mechanically scanned radars into the Typhoon programme and this experience will ensure a timely and smooth transition to AESA.
- The AESA radar being developed by Euroradar for the Eurofighter Typhoon will benefit from the latest AESA technology in Eurofighter's sizeable Radome and will utilise a repositioner to provide an unmatched field of regard of 200 degrees, extending beyond the frontal hemisphere. The radar will also have significant growth potential to ensure customers' future operational requirements can continue to be fulfilled.
- E-Scan provides instantaneous radar beam positioning, without recourse to the traditional scan techniques employed by a mechanically scanned radar. This instantaneous positioning allows tracks to be formed much earlier and also concurrent air-to-air and air-to-ground modes used. The transmit/receive modules in the array are self contained which means that a transmitter unit is not required, thus giving a marked increase in reliability.

PARTNERSHIP THROUGH INDUSTRY –

THE EUROFIGHTER WAY...

To create, build and deliver one of the most advanced, complex and capable aircraft on the planet requires the collective and co-operative input of many brains and much experience.

Eurofighter Typhoon is the manifestation of one of the best examples of this in the world. Industrial partnership and collaboration across four international partner companies has resulted in the largest and most successful European defence programme to date. It's a programme that has already delivered over 370 aircraft to an ever-widening customer base with many more to come.

At the centre of this partnership and collaboration is a proven model of technology transfer and knowledge-base sharing. What's made it work is the will to do it and the rewards it can bring to each partner country and the customers who join the Eurofighter Typhoon community.

This summer, as Eurofighter WORLD goes to press, it does so on the back of a series of summit meetings and conferences where Eurofighter partners have openly discussed and delivered on a rolling plan of capability insertion and development for an aircraft recognised as 'young but mature' with a lifespan of operation around the world which will go well past 2030.

The seven-strong customer base and supporting industrial and supply base which underpins the Eurofighter community is a unique and potent construct and a powerful economic engine for the sustainment of jobs, know-how and competitive advantage. The value of the intellectual property shared within that community should not be underestimated.

So what are the foundations that make this construct successful?

Well first, it is built around the fundamental principle of partnership. In other words, a partnership centred around equal access for all partners to advanced European working practices, manufacturing techniques, technological advances, capability development and enhancements.

Secondly it is a partnership built on strength, not only of Europe's leading aerospace companies, but also the depth and breadth of a supply chain involving over 400 companies.

Finally, there is the issue of security. Any customer can take confidence from a supplier that is supported by seven nations and the three largest European aerospace and defence companies, which together provide security of supply.

And here's the thing. As an increasingly austere world looks to manufacturing and the value of intellectual property as a catalyst for change and recovery, Eurofighter offers the right ingredients to feed that need.

In fact Eurofighter's approach to industrial partnership offers the potential for the manufacture of up to 90 per cent of the Typhoon product. The implications of this for a new customer wanting to develop their own aerospace capabilities are not insignificant. For example, the production of high value airframe components, fully optimised for mass and strength, helps stimulate and pump-prime indigenous capability, so important to many when considering major procurement programmes.

Martin Elbourne, something of an evangelist when it comes to industrial partnership, has been working for Eurofighter for two years. Now an active campaigner on business development opportunities for Typhoon, he says: 'For me it is all about an unrivalled industrial partnership built on equality, strength and security, the benefits of which are currently being enjoyed by our existing customers. Based on this demonstrable track record, new customers can also capitalise on these benefits and gain access to advanced

technology from across the Eurofighter community be it platform related, or indeed related to the partners extensive product range which exists across the Air, Land, Maritime and Cyber Security sectors. In short we are talking about joining an unrivalled partnership which can provide an optimum platform for the development of an aerospace and defence capability.'

IF YOU THOUGHT THE MATRIX WAS GOOD – YOU SHOULD TAKE A LOOK AT 'ASTA'

Millions of people around the world will have marvelled at The Matrix when the Wachowski brothers film hit cinemas with its quirky mix of 'bullet-time' slow-mo's' and simulated reality. The film showed an interaction between technology and the real world that made for pure fantasy but which was compelling viewing.

In fact, in the world of the Eurofighter Typhoon, the relationship between reality and simulation has never been closer – and while it may not be at Matrix levels – it is causing something of a stir as pilots around the world get to grips with an awesome training capability which puts the Eurofighter offering right at the front of the pack.

'ASTA' stands for Aircrew Synthetic Training Aid. It's a system that underpins the Eurofighter Typhoon training programme and which offers pilots the opportunity to 'fly' in a wide range of environments and train for any number of different mission scenarios.

Five nations are already operating the full ASTA training experience to Typhoon pilots – Germany, the UK, Italy, Spain and Austria. More are likely to follow.

What makes ASTA special is depth and realism of simulation training on offer. Pilots benefit from extreme realism with a full cockpit, full immersion and even air breathing. It is the only system that offers a 360 degree dome linked into a multiplicity of high-grade projectors, including six target projectors as well as the ability to link in with other ASTA systems by LAN or WAN for the full battle scenario experience.

The high fidelity of the system accurately replicates real aircraft behaviour. Fundamentally though what it means is flying hours can be used more safely and efficiently, airframe life can be extended, and higher operational availability can be achieved as pilots benefit from what ASTA has to offer on the ground.

So, looking in more detail at the specifics that make ASTA special, what's the view of those who run and train with ASTA?

Eurofighter's Erik Heinzmann is the Operational Factors Senior Manager for ASTA. He says: "It is obvious that the needs for a training mission of a new, young pilot are different from those of a senior weapon-instructor who would primarily use it for evaluating tactics. Even though the aircraft is the same the pilot concentrates on completely different areas as does the instructor sitting at the console. Both are preparation for a real mission, which have to look like the real thing and offer typical features as expected by the instructor at the console.

"The mission of the young pilot might include some malfunctions of aircraft systems and maybe a rejoin on the lead aircraft together with an instrument approach in bad weather (typical student sortie), another mission might include a clever tactical move against a smart opponent, equipped with sophisticated EW gear and state of the art weapons.

"A pilot focuses on completely different areas during a bad weather approach when compared with a pilot employing his weapons under EW conditions and being targeted by the enemy at the same time. Ultimately, the databases of the simulation as well as the scenario generating system have to cater for both. The IOS (Instructor Operating Station) has to support precise execution of all required actions in a timely manner. The Debriefing Facility (DBF) must be capable of reviewing everything, even actions of the enemy, the environment or the pilot, even those which were not observed and/or highlighted during the mission."

Erik adds: "To give the pilot a real feeling of flying, he has to use his own flying gear, which includes helmet, Helmet Mounted Symbology System (HMSS) if installed in the aircraft, g-suit which will inflate under Gs, motion cueing and the Mission Data (MD), which have to be the same as in his aircraft.

"A pilot should not feel the difference prior to "step time" whether he is in the simulator or the aircraft. Once sitting in the simulator it has to feel like the aircraft. Hands On Throttle-And-Stick (HOTAS), buttons, switches, cockpit lights etc. have to not only look like the aircraft, but also feel like it too."

While Erik says cognitive abilities based on sensory stimuli such as sound, touch or smell can all be honed to perform better if the simulator is equipped and built with the right components he says the key component of the visual system is one of the most vital to get right.

"Not only does the human body rely up to 80% on this sensor, especially in flying, the sensor "eye" also covers a lot of tasks. So a Visual System with 360 degrees in azimuth, plus 90 degrees in positive elevation and downward look angles, as low in degrees as the pilot can see from his usual viewpoint is a big bonus if it can be deployed."

He says other visual considerations have to be made too. " On a clear sky day, how far can I see a certain aircraft, Surface-to-air missile (SAM) site looking down, looking at the horizon or the blue sky? What does a pilot see when the sun dazzles him, or a shadow is covering something? All this must be presentable, repeatable and debriefable in an FMS."

As if all this wasn't complicated enough, if a fast-jet simulator is really to offer a realistic and valuable experience then the opponent's performance levels and weapons capability also needs to be accurately replicated. The effect of speed and altitude on weapons and aircraft performance needs to be accurately replicated – if even just one of these elements doesn't work then the FMS training could be regarded as negative training and could do more damage then help.

Lastly, there is networking. If FMS are working together in different locations then it is essential that all the appropriate data in the same combat arena can be deployed to each FMS in real time without missing any data.

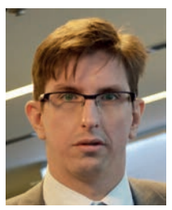
The ASTA facilities deployed for Eurofighter across the five nations do all of the above. As Lieutenant Colonel Stephan Mohler, one of Typhoon's most experience Flying Instructors recently said: "We cover every possible scenario in ASTA training with our students. It is a highly effective and cost effective way of ensuring focused and valuable training – and it means – coupled with the training the students do in the real aircraft, when they go to their Squadrons they are already experience in covering off all the key aspects needed."

ASTA is a unique and important training tool. It allows pilots to experience the most realistic training environment possible in an effective and cost-efficient way. It allows pilots to perform and rehearse missions that simply would not be possible in peacetime due to safety and peacetime restrictions; it enables pilots to work with real electronic warfare data and to practise shooting and training tactics with expensive weapons – without the associated costs.

It is an invaluable asset to the Eurofighter programme.

The Helmet Mounted Symbology System (HMSS) is a brand-new precision piece of kit, opening up a new era in pilot capability.

TYPHOON – THE BEST IS YET TO COME



A COMBINATION OF STRONG FUNDING, DEMANDING EXPORT CUSTOMERS AND HIGH-LEVEL POLITICAL BACKING MEANS EUROFIGHTER TYPHOON IS NOW SET TO UNLOCK ITS TRUE MULTI-ROLE POTENTIAL.

Tim Robinson is Editor of Aerospace International, the monthly magazine of the Royal Aeronautical Society. Here he reports as a Guest Author for Eurofighter WORLD.

In December 2012, BAE and Eurofighter celebrated a key win in Oman – with 12 Typhoons and an additional eight Hawk AJT trainers. It is one of a number of opportunities that are now coming good for an aircraft whose potency continues to grow as it matures.

While the mainstream media has often misunderstood Typhoon seeing it as a Cold War air defence fighter, the plan to increase its multi-role capabilities has always been there.

"What it's been designed for, first and foremost..." Says Bob Smith, Engineering Director, Combat Air, at BAE Systems, "is an air superiority fighter. It's highly agile, and has a big wing with 13 weapon stations. Those 13 stations create the ability to have quite a flexible 'swing-role' weapon load. You can have air-to-air or air-to-ground but the key capability is to have the mix – you can do them both in the same mission."

Ironically, given some perceptions, the complexity of Eurofighter's four partner nations and their related aerospace champions, BAE, EADS and Alenia, has produced some advantages.

It has provided guaranteed sales to four European air forces. It has meant that the programme has been insulated to some extent from politician's whims. And, and most importantly, the partners have the resources to self-fund improved capabilities.

While gaining consensus in some areas might have cost some time, the Eurofighter partners have kept the faith by funding key technologies and conducting R&D ready for the mood to change against a background of difficult global economic challenges.

Part of that 'mood change', at least in the UK, can be attributed to the intention of British Governments to rebalance the economy away from the finance and services sector and boost manufacturing. The UK Prime Minister, David Cameron, has pledged that development of Eurofighter capabilities will be prioritised.

It is also part of the MoD's ten-year equipment spending plan to 2022. Support for Typhoon development, in the face of difficult economic times, is also now coming from outside the traditional European Eurofighter partner nations and from export customers.

They can see the chance to not only boost their air forces with a more capable version of the fighter, but also to invest in and share technology that will feed into their own aerospace industries. For instance, in 2012 Saudi Arabia took on a bigger role on the programme, with a seat on NETMA (NATO Eurofighter and Tornado Management Agency) and increased power in deciding development priorities. This has already borne fruit.

It's a win-win situation. Eurofighter customers get a more capable fighter, new foreign partners get technology transfer and set the pace, and the Eurofighter consortium itself gets a more exportable product to build extra sales. It also allows all parties to share costs across the customer base.

These developments represent a significant sea-change in defence procurement. Previously UK-funded military aerospace projects had entered service with Britain's armed services, to then be available for export. Moving into the future, export customer-funded technology and integration, will now trickle back to HM armed forces.

Whilst this may be a reversal of what was once the status quo, one constant factor that will remain is that 'as used by the RAF' will always be a valuable cachet and seal of quality.

The final factor influencing this acceleration in Typhoon development is an awareness that, after ten years of COIN and the war of terror, future conflicts are likely to be completely different than the permissive air environments of the past decade.

The ground-centric emphasis of the past decade is now being replaced with a renewed interest in the sea and air environments – perhaps best exemplified by the US 'pivot' to Asia-Pacific. And while the UAS sector continues to expand, there are questions over how suited many of the current platforms would be to any country or opponent with even a basic air defence or fighter capability.

Indeed, while the past decade has seen only one clean sheet western fighter design emerge in the form of the F-35, the reference combat aircraft that the Typhoon was designed to beat, the Su-27 (and its derivatives) has now been joined by new potential threat aircraft in the form of the PAK-FA, J-20 and J-31.

But there is also another aspect in that the success of stealth or low-observable platforms since the F-117's combat debut has spurred anti-stealth radar and detection technology by both friendly and not-so friendly powers. Bi-static passive detection methods threaten to erode the edge of stealth aircraft and their unique advantage.

Put simply, while any new fighter now will be designed with LO features built-in, the coming proliferation of anti-stealth technology will reduce the gap between a stealth aircraft and a non-stealth aircraft with a good jammer and EW systems.

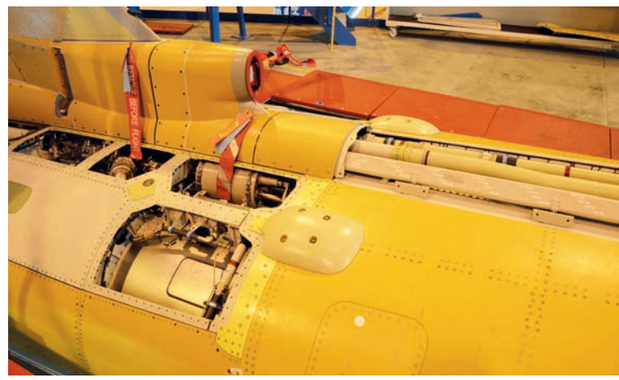
This means Typhoon, with its advanced DASS (Defensive Aid Sub System), towed decoys and supersonic manoeuvrability will remain effective even into the post-stealth era.

Eurofighter progress has sometimes been subtle – but it has been there. Part of the difficulty in assessing that progress is the fact that the Eurofighter is very much an avionics and software-led fighter – with little to show on the outside. The other has been the 'catch all' terminology of the three 'Tranches', separate umbrella agreements between the partner nations and the Eurofighter consortium.

Says Bob Smith: "Where we are today is on the first batch of enhancements that give greater capability in the air-to-surface role." He says: "For this batch of enhancements to Tranche 2 we are doing them in two phases, Phase A (P1EA) and Phase B (P1EB). Phase A is finished and we have delivered all the evidence for clearance to service to the four launch nations. When the UK has gone through its release to service process, this new capability will be put on to UK aircraft. That will give 'swing-role' capability with additional improvements to the man-machine interface."

This will enable pilots to simultaneously and consecutively employ both A-A and A-G weapons. The updates also include integration of Paveway IV and EGBU16 laser and GPS guided bombs, as well as the (HMSS Helmet Mounted Symbology System) now being opened up for air-to-surface use – an update that will give the Typhoon pilot the ability to simply glance at ground targets to slew the targeting pod on them and designate them. Says Smith: "The helmet is a brand-new precision piece of kit, opening up a new era in pilot capability."

Other near-term enhancements, according to Smith, include the Iris-T A-A missile integration having some digital updates, upgrades to the DASS and also the multifunction information distribution systems (MIDS). Additionally, the Typhoon is set to receive improvements to the attack and navigation computer redundancy, along with upgraded IFF.



Top: Eurofighter Typhoon in action during Operation Ellamy
Below: A Tranche 3 fuselage takes shape...

Differences between Tranche 1 and 2 have now been rationalised with an upgrade package to Tranche 1 aircraft called Drop 2 which is now set to be rolled out by the RAF to its entire T1 fleet. The upgrade package covers enhancements to a wide range of avionic systems including displays, attack and navigation, DASS and communication.

The first RAF Typhoons to receive this package have been the fighters participating in this year's Red Flag exercises at Nellis, with the rest of front-line squadrons to follow. Additionally, other Eurofighter nations are also looking with interest at upgrading their Tranche 1 fighters with this Drop 2 package.

Enhancement package 2, says Smith, is currently being 'debated now' and there is a focus on Storm Shadow and Meteor BVRAAM, along with MIDS upgrades, enhanced on-board data recording and upgrades to ASRAAM.

One concrete example of the next stage of Eurofighter development is already here in the form of the Tranche 3A Typhoon currently at Warton (see photo on previous page) and destined for the RAF. Only two small bumps on the rear of the fuselage are a giveaway that this is not your normal Eurofighter. These are rear mounting attachments for conformal fuel tanks (CFTs).

The Tranche 3, has increased fuel capacity and there are also new fuel dump nozzles under each wing. Key fuselage frames are also strengthened for the extra weight of the 4,500lb CFTs. There are also further changes under the skin. The nose of the fighter, for example, has been beefed up to take the 100kg extra weight of the E-Scan AESA radar, which could enter service in 2017. Additionally, the high-speed data transfer capacity has also been increased on the Tranche 3A to take advantage of these new sensors.

These key changes are further evidence of a 'future proofed' aircraft ready to accept a significant leap in its capabilities. With Meteor and Storm Shadow next on the agenda for integration (Meteor was fired from a Typhoon in late 2012), future weapons could also include the UK's stand-off precision SPEAR. Smith says that the Typhoon's AESA radar integration is likely to be phased in over two or three steps, with a baseline radar which will be followed by a more sophisticated follow-on version.

THE SUPER TYPHOON OF 2045

Bob Smith says the aircraft has "probably another 30-40 years" of service life ahead of it. Indeed, given the current trend of military aircraft, that may be a conservative estimate. So, what might any hypothetical 'Super Typhoon' of 2045 look like?

First, for the UK customer it will have to be interoperable with the F-35 providing the RAF with a flexible and dynamic air control capability. It is also likely to incorporate a new glass cockpit as part of a mid-life update, leveraging consumer technology such as iPad-style large displays.

More futuristically, Smith also talks of the Typhoon of 2045 being a 'hybrid' air platform – incorporating new levels of autonomy to help the pilot. He says a hybrid manned vehicle with autonomous capability is an interesting byproduct of unmanned vehicles and manned vehicles.

Smith notes that the Typhoon's advanced MMI (along with 'carefree handling'), which allows the pilot to concentrate on the mission, mean it is "not a far stretch of the imagination" to take this even further. Related research work already underway may at some point turn a single-seat Typhoon into a 'virtual twin-seater' with the second 'AI' crewmember providing enhanced situational awareness, suggesting courses of action, or perhaps even flying the aircraft back to base should the pilot become incapacitated. Although this sounds like science fiction, some of BAE's work on autonomy for the civil ASTRAEA UAS project is already laying the groundwork for this advanced 'computer co-pilot'.

Aided by a smart AI as a 'virtual WSO', the potential 'Super Typhoon' pilot of 2045, with its AESA radar, thrust vectoring and extra range thanks to CFTs will be part of an extremely capable multi-role platform.

As the F-15E Strike Eagle demonstrates, converting an air superiority fighter into a multirole strike aircraft produces a phenomenal platform. Says Bob Smith: "If you really want to build a multirole combat aircraft then build an extremely capable fighter first."

Smith says that the Super Typhoon of 2045 might also include LO tweaks such as stealth pods (such as proposed for the International F/A-18E/F Super Hornet) or other measures to reduce its RCS – and it might also become a UAV or UCAV mission commander.

Explains Smith: "By that time there will be a lot more unmanned vehicles flying around and it would be an interesting concept, because of the interoperability capability, to operate a few UAVs from a Typhoon cockpit." Potentially, the Typhoon pilot could then command an AI wingman, perhaps to clear air defences out of the way. "You could see yourself being in a situation where not only have you got onboard capability on your own aircraft but you are controlling airborne capability too."

Again while this might seem like science fiction, the UK has already undertaken 'UAV wingman' trials using a Tornado and BAC-1-11 (as a surrogate UAV). Indeed, one could also imagine that the Eurofighter's direct voice input (DVI) system (where the pilot can already set radio frequencies, check fuel and even designate targets) could even be used to command robot UCAV wingman.

It may have taken a while to get to this point, but the full gale force of Typhoon is now set to be unleashed.

Hang on to your hats.

A version of this article was originally published in Aerospace International - to find out more log onto: www.aerosociety.com

A glimpse of what the Eurofighter Typhoon might look like in the years to come

EUROFIGHTER TYPHOON

THE INTELLIGENT OPTION FOR FUTURE-PROOFED AIRPOWER

OUR APPROACH

The procurement of a fast-jet multi-role fighter for any customer is a major undertaking. We recognise this. Much has to be taken into consideration. The capabilities of the platform, the capabilities of the weapons and systems it carries. The combined capabilities of these three things working together. We also recognise that in procuring such a capability the customer will, not unnaturally, require some sovereign capability and will want to maximise both the opportunities for technology transfer and industrial participation.

None of this will matter if the aircraft is too expensive to run, or prohibitively difficult to maintain and keep in the air – or worse still, after a substantial initial outlay – the aircraft and the systems that support it are not future-proofed in such a way that upgrade and enhancement is a natural part of evolution.

Meeting these pre-requisites makes for an intelligent choice. Meeting these pre-requisites are the foundation stones upon which the Eurofighter programme has been built. Understand this and you understand the DNA that runs through everything we do.

CAPABILITY

Capability can only really be optimised if the fundamental elements of an aircraft platform are correctly conceived and balanced. Is the power-plant adequate? Is redundancy built into it? Have the materials used to construct the airframe been optimised for lightness and strength? For Typhoon, on all these counts, the answer is 'yes'. And then there is the balance between agility and carrying capacity. Are there enough hardpoints? Can the airframe adapt to and accommodate future upgrades? Again Typhoon has been conceived with this in mind from the outset. Flexible and adaptable.

And what about stealth? For some, it shapes everything they do. But at a cost. For others it is a factor in the total mix. Perhaps more important is the ability to prosecute the mission whilst operating beyond visual range – or to have the carrying capacity and the power and agility to seamlessly switch between air to air and air to ground attack – or even do both simultaneously. Typhoon can do this. And we believed it offers the best defensive aids systems currently available.

Of course none of this is matters if your pilot is not operating in the optimum environment. It's all useless if he can't make decisions quick enough – or if he can't access the information he needs in the most efficient way possible.

Typhoon puts man and machine more closely in synch with each other than any other fighter in the world. A Typhoon pilot is linked umbilically through his Helmet Mounted Symbology System to his aircraft's software systems – both weapons and operating systems. It gives him what has been established as a 20:1 hit rate advantage over conventional platform/pilot combinations. And that bestows on Typhoon the kind of potency others can only dream of.

SUPPORT

And then there is support. Any customer procuring an expensive item needing through-life care will want to know that right level of cost-efficient support is in place to offer that care. So a provider who already has six nations operating his aircraft and a seventh on the books is clearly likely to be on solid ground when it comes to optimising through life support. Typhoon is that provider.

TECHNOLOGY TRANSFER & INDUSTRIAL PARTICIPATION

Any claims to effectively promote technology transfer and industrial participation should be evidence-led. The very construct of the Eurofighter Typhoon programme has been built around four nations transferring technological know-how and actively promoting industrial participation – not just in the core programme but also in the much wider supplier base. And the consortium has done this with its export customers too.

Eurofighter recognises that a possessive and insular approach to the sharing of technology and the promotion of industrial participation can leave customers feeling sometimes excluded and vulnerable – and if political situations change they could even find themselves with an effectively redundant investment. Right from the outset we factor in these concerns and work to minimise or even eradicate them.

FUTURE-PROOFING

Typhoon was designed from the start with the future in mind. Technology changes, requirements change. A platform with a limited scope to accommodate these changes could be a severely restricted investment.

Typhoon was never designed as a 'one size fits all' solution. Even in stable technological times different customers will want to play to different strengths and capabilities. We recognise this, and the agile and hot production lines that support Typhoon manufacture and development are well geared to flex as needed – and have the depth and capacity to do so.

It's a strong story. It's our story. It's the Eurofighter Typhoon story.

FACTS & FIGURES

20 UNITS OPERATE EUROFIGHTER TYPHOON

United Kingdom:
Coningsby no. 3, 11, 17 and 29 sqn
Mount Pleasant no. 1435 Flight RAF
Leuchars no. 1 and 6 sqn
Germany:
Laage JG 73 Steinhoff
Neuburg JG 74
Nörvenich JGB 31 Bölcke
Spain:
Morón 111 sqn, 113 sqn
Albacete 142 sqn
Italy:
Grosseto 9 and 20 Gruppo
Gioia del Colle X and XII Gruppo
Trapani 18 Gruppo
Austria:
Überwachungsgeschwader, Zeltweg
Kingdom of Saudi Arabia:
In-Service

■ SERIES PRODUCTION - STATUS

United Kingdom: 136 a/c delivered +++ **Germany:** 101 a/c delivered +++ **Spain:** 49 a/c delivered +++ **Italy:** 69 a/c delivered +++ **Austria:** 15 a/c delivered +++ **Saudi Arabia:** deliveries started +++ **In Total:** 370 production a/c + 1 fatigue test delivered +++

■ ORDER

719 under contract and **571** aircraft ordered +++ ordered by seven nations +++ Germany +++ Italy +++ Spain +++ United Kingdom +++ Austria +++ Kingdom of Saudi Arabia +++ Sultanate of Oman +++

■ FLYING HOURS

six air forces have accumulated over **186,000 flying hours** +++

■ EUROFIGHTER EXPORT CUSTOMERS

+++ Austria +++ Kingdom of Saudi Arabia +++ Sultanate of Oman +++

■ PARTNER NATIONS

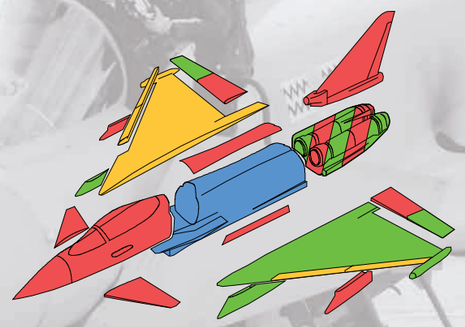
+++ United Kingdom +++ Germany +++ Spain +++ Italy +++

■ MARKET OPPORTUNITIES

United Arab Emirates +++ Malaysia +++ Qatar +++ Kuwait +++ Republic of Korea +++ India +++ Denmark +++ Poland +++

■ EUROFIGHTER PROGRAMME JOBS

+++ more than **100,000 jobs** across 400 companies in Europe +++
Germany: 25,000 +++ **Italy:** 24,000 +++
Spain: 22,000 +++ **United Kingdom:** 40,000 +++



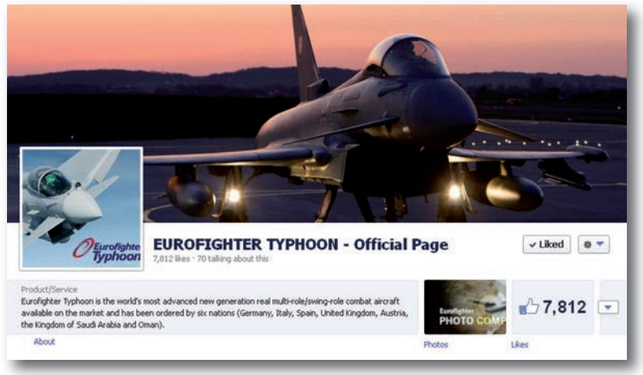
- 30% Cassidian Germany
- 13% Cassidian Spain
- 19.5% Alenia Aermacchi
- 37.5% BAE Systems

BE A PART OF THE EUROFIGHTER SOCIAL MEDIA MIX

We at Eurofighter WORLD recognise that there are now more opportunities to connect with us. That's why in this issue we want to show you the many ways for you to follow our news and express your views.

You can find us on Twitter at "Eurofighter_1" and on Facebook at "eurofighter.typhoon.official.page". Why not get engaged now and take a look inside the world of Eurofighter.

We'd love to hear from you.



To keep up to date with Eurofighter Typhoon, you can sign up to the following media:

Twitter: http://twitter.com/Eurofighter_1

Facebook: http://www.facebook.com/eurofighter.typhoon.official.page

You can also get in contact with us via email:

martina.schmidmeir@eurofighter.com; simon.shrouder@eurofighter.com

MEET THE TEAM –

The Eurofighter Social Media Team:

Martina and Simon


Eurofighter
Typhoon