EUROFIGHTER
PROGRAMME NEWS & FEATURES
JULY 2015

WORLD



- STRIKER II: BRING ON THE NIGHT
- SPECIAL RUSI REPORT: THE FUTURE IS TYPHOON
- THE ULTIMATE TEST DRIVE

BALTIC GUARDIANS
SPANISH AIR FORCE ON PATROL

Eurofighter Typhoon



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Baltic Air Policing with the Spanish Air Force

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IN OUR NEXT ISSUE...

WELCOME



Earlier this year I was privileged to travel to Ämari Air Base in Estonia where I witnessed at first hand the work of the Spanish Air Force as they provided 24/7 NATO Baltic Air Policing.

The Spanish were following the German and Italian Air Forces and they have since been replaced by the British - all deploying Eurofighter Typhoons.

The crews had been operating in severe conditions with temperatures down to -20°C. Despite that, the alert response time required by NATO is now just 15 minutes – whatever the weather throws at them.

Joining me on the trip were a number of Spanish aviation journalists who were incredibly impressed, not just with the warm reception we were given, but with the dedication and professionalism of the Spanish detachment.

We all left Estonia with a much greater understanding of the importance of the role the NATO air forces are being asked to play. We also saw how the Eurofighter Typhoon is a key asset for this vital policing role. You can find out later in the magazine.

In this issue of Eurofighter WORLD we also hear all about how the aircraft fared in the latest Red Flag exercise in the United States.

There's a feature from a test pilot on what it's like taking a brand new jet out of the factory and into the skies for the very first time. Getting a first hand account of what happens during an initial test flight makes for a fascinating read.

Another story that I'd recommend is a feature on the new Striker II helmet. We give you a pilot's perspective on what makes this latest piece of equipment such a step forward. There's an interesting look at the DASS system and the measures the aircraft can take to protect itself. Fundamentally, it underscores just what a clever design the aircraft is.

One story I'd particularly like to draw your attention to is the Royal United Services Institute`s (RUSI) report 'Maximising European Combat Air Power'. It's a detailed analysis on how Eurofighter fits into debates on European air power and our story looks at the key findings.

Plus there's a report on how we are spreading the word about Eurofighter in Indonesia.

Of course, I know that Eurofighter is not just about a machine. It's also about the people who make it work. So it's also great to learn more about some of these like Flight Test Co-ordinator Reyes Carrion who help make this a special organisation.

I hope you enjoy the read and, as always, I'd welcome any feedback you may have.

Alberto Gutierrez
CEO Eurofighter Jagdflugzeug GmbH

STRIKER II: BRING ON THE NIGHT

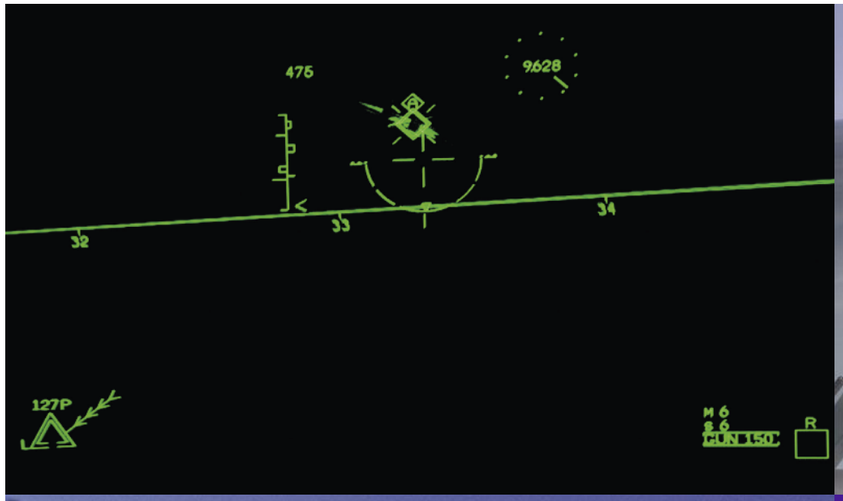


Using a Striker HMD system the pilot has all the information he needs.



An incredibly sophisticated digital innovation, Striker II is BAE Systems' latest Helmet Mounted Display system (HMD). It's also believed to be just about the most advanced helmet ever devised and is about to be put to the test for the very first time. In this edition of Eurofighter WORLD we discover just what makes the system so impressive. >>

>> STRIKER II: BRING ON THE NIGHT







THE CAP FITS – PERFECTLY

The Striker HMD systems are so sophisticated every pilot has to have their head scanned before being issued with one. This level of surgical precision allows every contour to be mapped in detail. The inner liner of the helmet is then manufactured to match exactly the shape and size of the pilot's head. This meticulous process is carried out to make sure the helmet fits perfectly and is completely stable on the pilot's head. With a good fit the pilot hardly knows he's wearing it.

The sensor also doubles up as a high definition camera.

A fast jet fighter pilot often only has a fraction of a second to absorb a vast amount of information. Radar. Comms. Weather. Weapons. Location. Speed. Height. Defensive Aids. Any enemies.

Making sense of it all quickly is one of the most essential skills any pilot can possess. That's why the original Striker HMD, which came into service with Typhoon fleets in 2010, was regarded as such a revolutionary step. It ticked two key boxes. It gave the pilot vastly improved situational awareness – building an instant image of what was happening in the world around them. At the same time it reduced the pilot's workload.

Before Striker came along a pilot would have relied on a fixed point Head Up display. The act of reading a radar screen would have required him to look into the cockpit. If a rival aircraft was out there, say at 30 degrees to his left flying at 20,000ft, compared to his height of 35,000ft, he would have to carry out a rapid calculation to work out where his adversary was in relation to his current position. He'd then have to scan the radar and carry out that mental arithmetic for any other possible targets. Even for the elite this little test of cerebral alacrity could take anything between 15 to 20 seconds when faced with a busy radar screen. Then he would have to decide what he was going to do next. However, using a Striker HMD system the pilot has all the information he needs in an instant and can immediately work out his tactics.

"In the Eurofighter Typhoon the pilot has a number of very sophisticated sensors and weapons at his command and consequently he is interested in a very big volume of sky," says Alan Jowett of BAE Systems. "The pilot needs to know exactly what is going on for many miles around him. The helmet tells him this story very intuitively. Everything he needs to know is right there: height, speed, points of interests, where all his mates are and so on."

The development of the system was carried out by a dedicated and talented team at Rochester and took several years. The two biggest problems faced by the engineers were weight and brightness.

"One fundamental issue around helmets is weight and balance", says Alan, "particularly because you have to factor in the effect of G-force. If something weighs a kilo on the ground then it will weigh the equivalent of 9 kilos if you are pulling 9G, as Typhoon does.

"The other issue is brightness. A Eurofighter pilot usually operates at 40,000ft where you get a lot of glare from the sun and therefore the screen has to be bright enough to cope with that extreme. Think about it in terms of trying to see your mobile phone screen in bright sunlight. You have to have a very high brightness display so it will show up."

Striker was built with these issues in mind and is already used by Typhoon pilots in the air forces of the UK, Germany, Italy, Spain and Saudi Arabia. As we go to press 600 helmets have been delivered to these customers.

But now a new improved version is on the way. With the original helmet pilots have to clip on a pair of night vision goggles (NVG) if they're flying after dark. NVGs are heavy, cumbersome and difficult to use, particularly when you encounter G-forces.

"The RAF first used NVGs in the Falklands in 1981 but wearing them is pretty grim," says Alan. "They are heavy and clip onto the front of the helmet which means if you pull G they want to force your head down into your knees, so they tend to restrict a pilot. They're also tricky to put on if you need to do it in the middle of a sortie and equally tricky to take off. Then there's an issue if the pilot has to eject. Plus there's a significant fatigue issue. In short they're messy. The magic they perform is they let you see in the dark."

The original intention for the first Striker helmet was to make night vision integral but at the time the technology wasn't good enough to make it work. The new Striker II helmet incorporates a night vision sensor in the front of the helmet. Pilots are now able to see in the dark without goggles.

"There is a very slight increase in weight of helmet but nothing like NVGs. The centre of gravity is just where you would want it which means the pilot can happily perform the full envelope of the aircraft. There's also completely seamless day/night transition so no fiddling around trying to clip goggles on when it goes dark." >>

>> STRIKER II: BRING ON THE NIGHT

With its high resolution, binocular, visor-projected display, the new system has already undergone a series of clinical engineering and aircrew assessment trials where the performance of the camera proved itself to be on a par with goggles. In fact, the ability to see the battle space despite the dark is just one of the advantages of Striker II. The sensor also doubles up as a high definition camera which is capable of recording a whole flight and playing it back with the pilot's eye view.

"This is ideal for good quality debriefs because it offers the opportunity for great analysis of exactly what happened on the sortie. It is much more realistic for everyone because you see what the pilot is actually looking at rather than a fixed camera built into the cockpit which just looks forward."

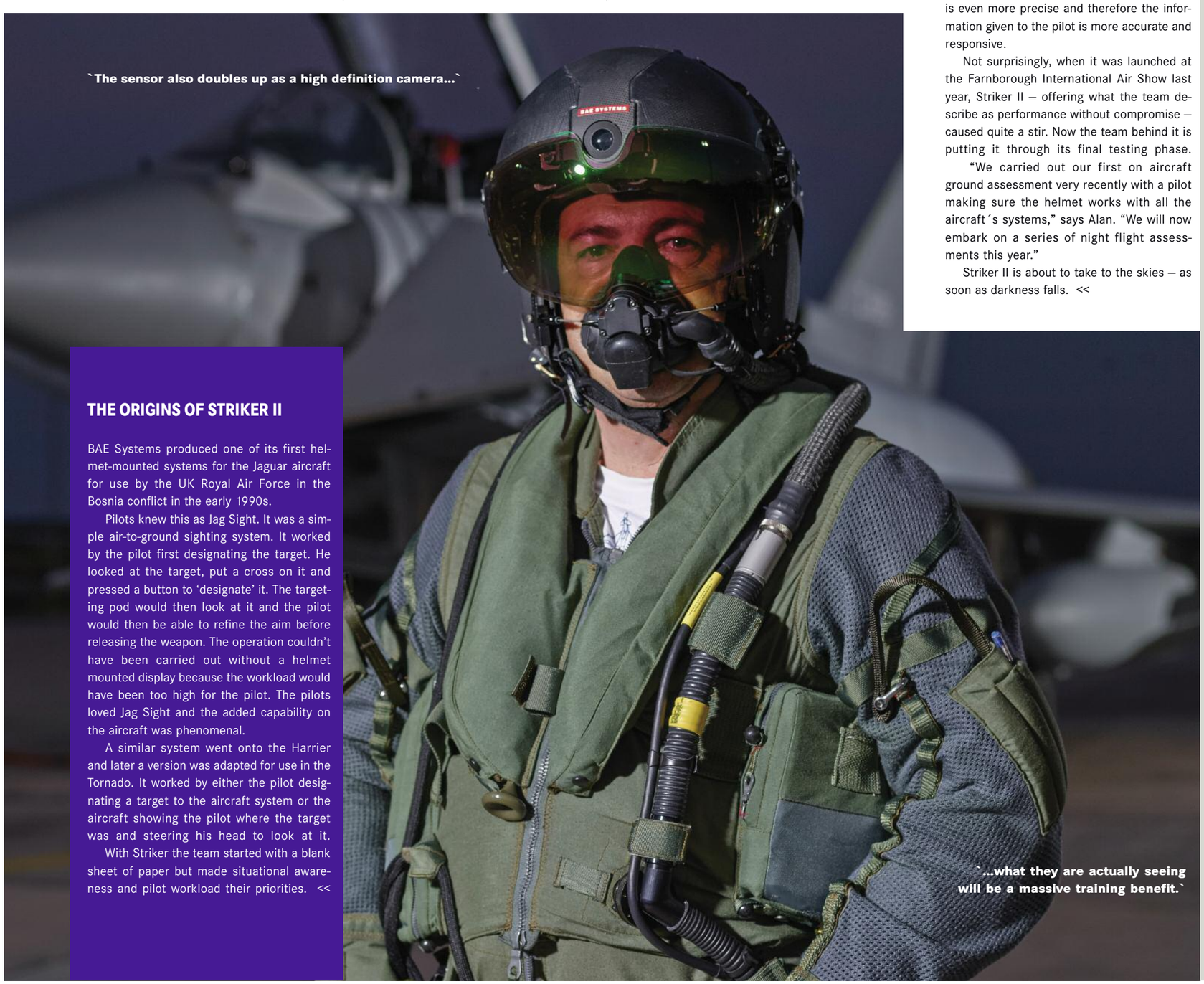
Another fundamental change to the helmet is in the technology used to create the bright green display. Until now the only technology with the power to produce something bright enough to work in a cockpit environment was a cathode ray tube. This had two drawbacks, it was quite dated technology and it needed 25,000 volts to power it. Striker II has gone digital making the cathode ray obsolete. Instead it uses flat panel displays which are far less voltage heavy and more reliable.

There is an additional major change in the way the system calculates where the pilot's head is at any one time. The original helmet uses a system of infrared LEDs that 'talks' to three optical sensors in the cockpit. A processor then calculates which direction the pilot is facing. With Striker II this optical system has been supplemented by inertial head tracking, which measures the rate a pilot's head is turning and is predictive about where he is. This gets around any potential tracking issues caused if the pilot's head is moving particularly fast. In those cases there is a slight lag or 'latency' in the picture being painted. Essentially the optical system means tracking is even more precise and therefore the information given to the pilot is more accurate and responsive.

Not surprisingly, when it was launched at the Farnborough International Air Show last year, Striker II – offering what the team describe as performance without compromise – caused quite a stir. Now the team behind it is putting it through its final testing phase.

"We carried out our first on aircraft ground assessment very recently with a pilot making sure the helmet works with all the aircraft´s systems," says Alan. "We will now embark on a series of night flight assessments this year."

Striker II is about to take to the skies – as soon as darkness falls. <<



`The sensor also doubles up as a high definition camera...`

`...what they are actually seeing will be a massive training benefit.`

THE ORIGINS OF STRIKER II

BAE Systems produced one of its first helmet-mounted systems for the Jaguar aircraft for use by the UK Royal Air Force in the Bosnia conflict in the early 1990s.

Pilots knew this as Jag Sight. It was a simple air-to-ground sighting system. It worked by the pilot first designating the target. He looked at the target, put a cross on it and pressed a button to 'designate' it. The targeting pod would then look at it and the pilot would then be able to refine the aim before releasing the weapon. The operation couldn't have been carried out without a helmet mounted display because the workload would have been too high for the pilot. The pilots loved Jag Sight and the added capability on the aircraft was phenomenal.

A similar system went onto the Harrier and later a version was adapted for use in the Tornado. It worked by either the pilot designating a target to the aircraft system or the aircraft showing the pilot where the target was and steering his head to look at it.

With Striker the team started with a blank sheet of paper but made situational awareness and pilot workload their priorities. <<



▲ Paul Smith

EUROFIGHTER TYPHOON PILOT **PAUL SMITH VERDICT ON STRIKER II**

The key benefit of both Striker 1 and 2 is the helmet display gives a pilot the complete sensor-fused picture you see on the HUD – but now through 360°- whichever way you look. This has massive benefits for a pilot because it allows you to assimilate lots of information quickly without taking your eyes off the area of interest and also to interact and exploit your sensors far more flexibly and efficiently. The wide field of view of these helmets, approximately 40 degrees, also improves their utility.

The pilot was always a sensor, your Mk 1 eyeball is one of the best sensors out there, but Striker enhances that by giving a cue of where to look. In effect, the data flow is now two-way. The helmet cues me where to look, but I also use the helmet to cue the aircraft sensors. For example, I am given a position cue to my wingmen from the Data link. Without any of my sensors pointing at him I get a high rate data feed on his position, which is essential, especially during a visual engagement. If any of my sensors have detected tracks of interest I get a cue to them as well.

Of course I can use the helmet to cue my weapons, but also any of my sensors. In air-to-air I can cue the radar to enemy contrails or other visual indicators. In air-to-ground I can use it to mark the position of friendly troops once visual, or if they are hostiles, mark that as a target position instantaneously with one switch on my HOTAS (Hands On Throttle And Stick). Due to Typhoon's integrated weapon system this is recorded directly in the navigation kit and the LDP (Laser Designator Pod) slews automatically to that position. I can then refine the aim point, zoom in to gather better data, or if the situation warrants it, roll in and release weapons. This ability to target so quickly and accurately will save allied lives in a combat situation and provides a lot more operational flexibility.

The two key benefits of Striker II over Striker are the new night sensor and the removal of any latency when rapidly moving your head.

When you make very rapid head movements there is usually a small amount of lag in helmet cueing systems. Striker II removes this, really increasing the usability and effectiveness of the helmet cueing system. During an air combat scenario I might only get a fraction of a second to take a missile shot, so by removing this latency Striker II enables me to maximise these opportunities to employ weapons.

The night sensor is cutting edge and removes the need for separate NVGs providing a high quality night image with much reduced pilot fatigue and workload. There is no need to adjust the focus and gain of the image, there is no 'bloom' from strong light sources as there was on legacy NVGs and the image can be instantaneously selected or occulted as the tactical and environmental situation dictates.

Around twilight this gives greater operational flexibility. At 5000ft it might be completely dark but above the clouds it may be much brighter. In Eurofighter I could go from 5,000ft to 30,000ft in seconds but donning and doffing the NVG whilst manoeuvring rapidly is not practical. NVGs can be fiddly to clip on so you often use the autopilot; with Striker II it is one HOTAS switch selection.

The reduction in pilot fatigue is important too. Unlike NVGs which necessarily clip on the front the helmet, the night sensor adds almost no weight and the Striker II is well balanced. As a result, you don't get the same neck fatigue issues and there is no need to restrict maximum G as you have to do with NVGs.

From an operational safety perspective, you will have increased flexibility in when you can use the night sensor because there is no need for NVGs. A no notice ejection whilst NVGs were still attached might well result in a broken neck. So to reduce risk, there were usually restrictions on NVG use during critical stages of flight such as air refuelling, or during take off and landing. Those issues go away with Striker II. It is just another sensor in the centre of the helmet and it does the job.

Finally, the HD camera in Striker II is great for both intelligence gathering and debriefing. In air policing roles it will remove the need for pilots to use hand-held cameras. We fight how we train and the ability to debrief how pilots are using the helmet and what they are actually seeing will be a massive training benefit. <<

TYPHOON SHINES AMID THUNDER AND LIGHTNING



Outside fat bolts of lightning raced for the ground and pea-sized raindrops spattered the windows. But six levels above the streets of Bandung, in the humid heat on an Indonesian Spring afternoon, 25 aeronautical engineering undergraduates clung to every word that came from the mouth of Group Captain **Laurie Hilditch** in the impromptu classroom >>

The Eurofighter Typhoon MasterClass was in full-swing, and the theatrics of a thunderstorm outside only served to underline the point that the former UK MOD Chief Test Pilot wanted to make to his attentive students.

"When you design and build a fighter using a high percentage of carbon fibre composites, you have to be sure the airframe and the systems within it can withstand the most challenging conditions," he said. "Conditions like these. The Eurofighter Typhoon is designed to cope with such conditions – and it does."

The MasterClass was being held within sight of Bandung's main airport which also happens to be the home of PT DI, the Government affiliated aerospace manufacturer in Indonesia and a company which has a long history of working with one of Eurofighter's Partner Companies – Airbus Defence & Space.

The undergraduates were one of a series of groups who attended Eurofighter MasterClass series in Spring to hear for themselves some of the key considerations that need to be factored in when assessing fighter procurement. Other groups included industry representatives, the media, the Military and even community groups.

The prize for the students' attentiveness lay less than three miles away in a hangar just yards from the airfield's main runway, a full-size Eurofighter Typhoon Exhibition Demonstrator, faithful in every detail to the real thing. It proved a big hit with everyone able to see it.

Eurofighter had already caused a stir at the close of 2014 when it showcased it's Eurofighter Cockpit Demonstrator at IndoDefence and took to the streets of Jakarta to meet with the taxpayers who will effectively fund any new procurement. Now it was back – and this time it won even more attention.

It may all seem a novel approach to positioning the credentials of a fast-jet fighter into the consciousness of a nation – but there is little doubt that it is effective. Where once the talk was all of a Russian procurement, now the debate is much more about what makes the most sense in the long term – and what will be for the benefit of the Nation as a whole – not just in terms of national insurance, but in terms of jobs, skills development and technological competency.

As Eurofighter's Head of Industrial Participation, Martin Elbourne, said: "As in so many of these situations, this is a marathon, not a sprint."

The Eurofighter Team in Indonesia, led by Export Director Joe Parker, is positioning the Eurofighter Typhoon as a 'Strategic Opportunity' for Indonesia as it seeks to replace its existing F5 fighters and further develop its military aerospace competencies in country. Part of the Eurofighter offer on the table is the development of an assembly facility in Indonesia giving the Nation genuine indigenous capability. <<

ADVANTAGE EUROFIGHTER





LUIGI TROTTA
VICE PRESIDENT
IN SERVICE SUPPORT

What's the cost of a military fast jet aircraft? The headline writers and media prefer a simple 'fly away now' answer. The reality is more complex. In search of the real answer, in this edition of Eurofighter WORLD, we launch the first of a series of features looking at how Eurofighter Typhoon offers lifetime value. It's what we call the Life Cycle Advantage. >>



Life cycle cost advantages can be found in a number of areas when it comes to military fast jets. From more efficient operational use, from refined and finely honed maintenance procedures, from more effective use of training – and even from a growth-programme that ensures the very best value can be gleaned from the airframe over every decade of its life. In this feature, we're looking at maintenance and operational efficiencies – an area covered by Eurofighter's In-Service Support Team – and headed up by - Gino Trotta, Vice President In Service Support.

As Gino says, operating a fast jet aircraft fleet over many years, sometimes decades, means that any considered answer to the question of cost has to take a myriad of factors into account. For example, what exactly do you measure? Would fuel, maintenance, spares, consumables and technical support cover everything? How is the support structured and what level of capability does the fleet require? These are all the kinds of questions that need to be sensibly considered.

But whatever way you look at it, In-Service Support, including engineering services, spares deliveries and repairs services, is a fundamental concern when you're looking at the life of the aircraft.

"The key element of the life cycle is cost effectiveness," says Gino, " By that I mean we have to make the cost of the aircraft effective for our customers.

"Our customer's budgets are part of their nation's public spending. So, because of that, we have a tremendous duty to demonstrate that the money spent — on the aircraft Development, Production and Support - has been spent for good reason and spent cost effectively.

"From my perspective, that's one of the main reasons why the life cycle story should be at the centre of any discussion on the cost of an aircraft. It can demonstrate more clearly than anything else that Industry is effective and it shows how the Customer is spending the money to support and sustain the fleet when the product is in service."

With an aircraft like the Eurofighter that has now been in service for more than 10 years, there's a growing body of evidence around life cycle costs. It has seven customers, more than 500 aircraft under contract and more than 400 in service. There are 16 different Military Operating Bases and 20 Operational Units all over the world. Taken as a whole, the fleet is close to achieving 300,000 flying hours.

For Gino, this level of experience isn't just a series of milestones but rather it evidences experience in developing good standards of maintenance, good service availability and, crucially, excellent levels of flexibility. >>



>> ADVANTAGE EUROFIGHTER





"Flexibility is a key aspect of Eurofighter," says Gino. "It contributes to making the product more cost effective because it allows us to meet the specific needs of each nation. It's about finding customer-oriented solutions.

"The aircraft has a good baseline and from that there is the opportunity to embody different types of customer needs and requests. This is flexibility in practice. Each customer has a particular focus on their national needs and each is different; this could mean different weapons and different capabilities. We have seven customers and seven different needs, which we are endeavouring to integrate as much as possible to maximise commonality while respecting the specific needs/requirements of each of them."

A key area where you see this adaptive approach brought to life is in the support, as each of the core nations has its own maintenance policy.

"Spain is different to Germany which is different to the UK and Italy," says Gino. "The UK has the Typhoon Availability Service. The Italian Air Force has evolved things in a different way again. There they have a repair service in place, which leaves the management of repairs to an industrial contractor, Alenia Aermacchi, and their three main suppliers. The Air Force is very happy with the arrangement because of the high fleet availability percentage. Handing the responsibility over to industry in a well-organised and managed way, with some specific services at operating bases, has been a success. It also makes a difference to the life cycle cost – it means that the aircraft is more cost effective in operational terms."

This ability to tailor the overall package to suit requirements feeds into what the Eurofighter Programme says is the most complete, flexible and value for money Life Cycle Advantage concept on the market.

A good example of this customer focus and how it produces cost effective results is the International Weapon System Support Centre (IWSSC). The IWSSC is a unique co-located joint international team of military and industry personnel, based in Munich. The centre is home to core Customers who get to share experience directly between air forces and with the Industry team, who are engineers with Air Force experience. The IWSSC role is to centrally manage the in-service aspects and to jointly keep the fleet flying efficiently.

Recently a Royal Saudi Air Force (RSAF) Representative has joined the IWSSC providing a wider contribution to the In-Service Support experience.

Communication and collaboration are at the heart of what the IWSSC provides. If a customer is experiencing a problem, all they have to do is ask and people come to help. Without the IWSSC, there's little doubt that individual companies would have been producing solutions, with varying degrees of success, and undoubtedly there would have been a degree of duplication.

"The IWSSC facilitates sharing information and experiences," says Gino. "By working in an open and transparent environment where customer and industry come together, the nations have the chance to speak directly to chief engineers on the industry side. This sharing of knowledge saves costs and leads to a much quicker resolution of issues which generate a positive reputational impact and make our products cost effective."

As well as providing a forum for day-to-day contact, the IWSSC also holds an In-Service Panel (ISP) several times a year. The ISP is supported by IWSSC (Industry and Customer elements) together with National Users and Eurofighter Partner Companies (EPCs) with the scope of managing and coordinating the resolution of In-Service Issues across Nations/ NETMA and EPCs/Eurofighter by placing the required actions. If required, it can also establish cross-functional working groups and call Ad-Hoc Functional Reviews, to resolve in-service issues.

"Today we are talking with NETMA and the nations about how to make the repairs service even more effective and affordable. We want to make the customer happy by providing an even more cost effective repair service. Between 65% – 70% of support cost is linked to spares and repairs services, the rest is mainly engineering support services. Therefore if we are able to manage these key cost elements better, we will make the product and service support more affordable for each customer and make the life cycle costs of the product more affordable without prejudicing the Operational Requirement."

Life cycle cost is clearly a difficult thing to measure and comparing two aircraft types is even trickier, rather like trying to compare an apple and pear. However, the phrase 'cost effective' crops up constantly in relation to the Eurofighter offer. In that context, Gino says there is another aspect of the life cycle that is much broader than looking at repairs and maintenance schedules. It's what he calls the wider benefit to a nation.

"This whole enterprise is a good investment of the four core governments' money because the money invested by them is returned directly to the industrial companies within the country and it has a ripple effect. The Eurofighter Programme works with more than 400 world class suppliers from around Europe. It provides opportunities for the nations to have a return in terms of industry jobs, experience, knowledge, technologies and capabilities.

"This is another reason why the product is cost effective for our national customers. This is a key element for the export customers, too. Indigenous industry can make use of Eurofighter technologies."

So in future, when you see a headline figure for an aircraft, it's worth pondering for a second if that truly tells the whole story. You've got to consider the Life Cycle Cost, too. You also need to understand how different elements like support combine to make a complete Life Cycle picture.

Unless this is accomplished, comparisons between different platforms might lead to a wrong perception of the reality. <<



´...THE MOST COMPLETE, FLEXIBLE AND VALUE FOR MONEY LIFE CYCLE ADVANTAGE CONCEPT ON THE MARKET.`



THE FUTURE IS TYPHOON: RUSI REPORT

The Royal United Services Institute (RUSI) recently released its report ´Maximising European Combat Air Power.` Subtitled 'Unlocking the Eurofighter's Full Potential', it's a well-crafted and intelligent assessment from an independent and respected think tank. >>

Detailed and thoughtful in its analysis, ´Maximising European Combat Air Power` doesn't simply examine Eurofighter's capabilities, but paints a bigger picture of how the aircraft ought to be considered in any debate on European air power.

Author Justin Bronk, a research analyst specialising in air power and technology in the Military Sciences team at RUSI, wanted to address 'a perceived lack of understanding in political, media and some military circles of the Eurofighter Typhoon multirole combat aircraft, its capabilities and level of maturity.' To do this he conducted independent research of the aircraft's qualities, in particular with operating nations and allied front line pilots.

He says: **"The Eurofighter will provide the core of four of the five most powerful European air forces for at least a decade between the late 2010s and around 2030.**

A thorough understanding of the platform is, therefore, important in an era where air power is the cornerstone of modern defence capabilities, and defence budgets are under constant pressure."

Bronk's report provides real context for discussion on any likely future force mix, looking at what needs to be done to best operate the Eurofighter alongside so-called fifth-generation assets such as the F-35. >>



SO WHAT DOES THE FUTURE HOLD?

The report points out that Europe's major air forces face serious challenges in the 15 years up to 2030 – shrinking budgets, ageing legacy fleets, expensive fifth-generation platforms, and at the same time the proliferation of high-end ground and air-based threats. However, it adds some words of comfort: **"In the Eurofighter, European states have the most-formidable non-stealth air-superiority platform in the world."**

"Once the CAPTOR-E AESA radar and Meteor BVRAAM are integrated, European air forces will have a fighter capable of deterring and, if necessary, defeating any opposing air threats they may meet until the mid-2020s and any non-peer threats substantially beyond that." Bronk bounds the scope of the report to this period due to the lack of credible threat data beyond 2030.

Already described as 'formidably capable', with radar and armament upgrades that are funded and on schedule, Eurofighter will only become even more so.

One of the major misconceptions that Bronk believes clouds the debate around Eurofighter's future is around F-35. He points out that "significant parts of the political, media and, in some cases, military circles see the stealthy US F-35 as the future of Europe's combat air fleets. If the common political and media narrative is to be believed, the F-35 has already made all previous fighter aircraft designs obsolete and will soon revolutionise Western air power."

But he says that such an assumption is misguided, arguing that because of serious delays and cost increases in the F-35 programme the likelihood is for relatively small European F-35 fleet sizes, and even smaller numbers of aircraft actually available. As a consequence, working out how Eurofighter is able to work alongside these assets is going to be far more important than many appear to grasp.

The report says: "The F-35 is a potentially huge force multiplier for other networked assets on the ground and in the air. However, unless NATO is prepared to accept a crippling reduction in combat mass in the air domain, the F-35 alone cannot fulfil Europe's combat-air requirements within the timeframe envisaged by this study. Therefore, measures which could obtain the best combat capability and flexibility out of the Eurofighter, given the limited defence funds available, must be considered."

The good news says the author – potentially for both aircraft types – is that recent exercises have proved that **when working effectively together the Typhoon and the F-22 are greater than the sum of their respective parts. It is reasonable to assume that the same may be true of the F-35 working alongside Typhoon** - if the F-35's developmental issues can be overcome. Hence, maintaining, sustaining and ensuring systems and tactical interoperability will become increasingly significant, because interoperability will ensure Eurofighter remains a vital part of any future force mix for decades to come.



The RUSI report puts this clearly: "Developing maximum network, systems and tactical interoperability between the Eurofighter and F-35 offers significantly increased combat effectiveness for both types. Each is capable of offering strengths where the other is comparatively weak. The Eurofighter offers exceptional performance, heavy and diverse-ordnance capacity, long-range and combat mass, whilst the F-35 will bring unmatched situational awareness, low-observable survivability in defended airspace and powerful electronic warfare capabilities. Due to repeated successes whilst operating with US F-22s at Red Flag exercises, the Eurofighter's capability is held in high regard by the elite of the USAF's air-dominance community and has shown it can offer significant combat advantages to a high-end US strike package."

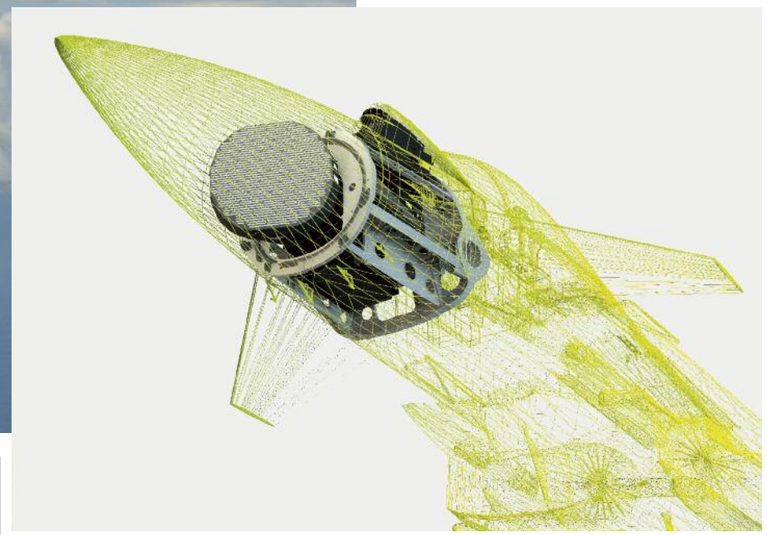
Another key thrust of the report is to underscore Eurofighter's inherent aerodynamic strengths. It states: "The **Eurofighter's combination of high thrust-to-weight ratio, manoeuvrability at all speeds, 65,000-foot service ceiling, supercruise capability, powerful radar and large missile load ensures that it outclasses any currently operational fighter aircraft in the world with the exception of the US F-22 Raptor."**

At the same time the aircraft is lauded amongst pilots and maintenance crews for its excellent reliability record and operational output per airframe and pilot.

Bronk says that with few rivals in the air-to-air domain – indeed at one point he describes it as the most formidable non-stealth air-superiority platform in the world – he believes that the Eurofighter Typhoon still has to establish its credentials in the air-to-ground context. To be fair, the report was researched before the outstanding air-grounds results currently being achieved by the Royal Saudi Air Force with Typhoon in concurrent campaigns against ISIS and in Yemen were widely publicised.

That said, he accepts that "the performance and load-carrying capabilities of the jet mean it can be made substantially more capable in a strike role than legacy designs", mentioning the Tornado, F-16 and Rafale. To achieve that, Bronk says, will require continued investment in the integration of the likes of Brimstone II and Storm Shadow missiles.

"The integration of Storm Shadow and Brimstone II remain a priority for the RAF, with both planned for integration by 2018. These will be increasingly attractive for the Italian air force as their Tornado IDS fleet is drawn down around 2020. With these capabilities, the Eurofighter will **represent a mature and extremely potent strike platform".** He recommends a "relatively modest level of sustained funding to complete the Eurofighter's maturation into a fully functional multirole asset with capabilities to outmatch any operational fighter outside the US."



Drawing on the historical experience of frontline pilots, the report notes some of the small-scale problems with subsystems they would like resolved as a priority. Of course, due to differing delivery dates of national embodiment programmes, frontline pilots may not yet have seen the fixes that have already been developed. Their view of major airframe or engine upgrades is that whilst they would improve the aircraft's performance, they're not viewed as particularly urgent, given the fact that Eurofighter's "kinematic performance is already superior to any other currently operational fighter aircraft with the exception of the F-22."

While, in a comprehensive and independent document, Bronk doesn't shy away from pointing out these previously documented development issues, it's worth remembering that further enhancements are being introduced by Eurofighter as a matter of priority. Indeed the underlying theme of the entire narrative is that **Eurofighter will be the backbone of European air defence beyond 2030.** An opinion evidenced by operating nations' Typhoons providing 50% of the Baltic Air Policing forces over the last two periods. It points out the high regard the USAF's air-dominance community has for the Eurofighter, and clearly states the Eurofighter has shown it can offer significant combat advantages to a high-end strike package.

The report calls for continued investment at a relatively modest level and argues that this is more than justified to further enhance the Eurofighter's multirole capabilities making sure the jet's full potential is unlocked. The executive summary concludes with a recommendation of Typhoon to other nations requiring a new combat aircraft: "any new operators would benefit greatly from the investment in the Eurofighter's journey to maturity made by existing partner states as they would be buying a 'finished product' – and one with the potential for significant future enhancements." <<

https://www.rusi.org/publications/whitehallreports/ref:N553E2DE7813E9/

BALTIC GUARDIANS

SUCCESSFUL SPANISH DETACHMENT IN ESTONIA

It was in the deepest northern winter when the Spanish Air Force took over the lead to provide 24/7 Air Policing at Ämari Air Base in Estonia. They followed the German Eurofighter detachment featured in the last issue of Eurofighter WORLD. >>



It was in the deepest northern winter when the Spanish Air Force took over the lead to provide 24/7 Air Policing at Ämari Air Base in Estonia. They followed the German Eurofighter detachment featured in the last issue of Eurofighter WORLD.

To gain a deeper insight into how the Spanish detachment operates, we joined them on their tour of duty in Estonia. On board for the trip were Eurofighter CEO Alberto Gutierrez, NETMA Commercial Director General Salvador Alvarez, and five journalists from the Spanish aviation press.

NATO Baltic Air Policing has been operational in place since 2004 at Siauliai Air Base in Lithuania, and in May 2014, the Ämari Air Base in Estonia became the second Baltic location from where Eurofighters from Germany, Spain, the UK and Italy are taking on the duties on a rotational basis.

Tcol. (EA) Enrique Fernández Ambel Spanish DETCO and Eurofighter CEO Alberto Gutierrez

Arriving at the base, about an hour's drive from the picturesque Estonian capital city of Tallinn, we were warmly welcomed by the Spanish Chief Detachment Commander Lieutenant Colonel Enrique Fernández Ambel.

In the morning briefing at the Base, the Commander underlined the importance of the mission which was led by the Spanish Air Force from January 1st – May 4th this year. It consisted of immediate reassurance measures and showed Spanish solidarity with fellow NATO members.

The Spanish Detachment in Ämari was operated by four Eurofighter Typhoons from Morón Air Base close to Seville in the South of Spain. In total, 115 people were deployed on the mission, covering everyone from pilots, maintenance crew and support personnel, right through to a doctor and fire rescue team. It's a tried and tested formula which >>

>> BALTIC GUARDIANS







generates a proven and professional result. The Spanish mission in Estonia provides further evidence of the reliability and the strong performance of the Eurofighter Typhoon.

During our visit, Colonel Ambel told us that the alert response time required by NATO has now been reduced from 30 minutes to 15 minutes – whatever the weather. On the subject of weather, he explained that the Spanish Eurofighters had been operating under severe conditions meaning snow and frozen tracks at temperatures down to -20°C. He also said that there had only been a handful of occasions, during 300 start-ups, where there had been any serviceability issues.

After the briefing, we were given a tour of the facility's maintenance hangar. It's the core technical centre - the place where skilled engineers and technicians ensure the aircraft are serviced and ready for rapid deployment. The feeling of a good team spirit was palpable - and the spirit of true collaboration amongst the different parties at the Base without doubt contributes to what is another successful detachment.

All of this, of course, only makes sense when the reality of what this is all about hits home. That moment comes when the fighters scramble, their twin EJ200 engines lighting up the runway as the sound of 40,000lbs of unleashed power echoes between the forest that flanks either side of the runway.

It's a defining moment. A moment of purpose. A moment of power. And it makes a statement to those that need to know. <<

THE FACTS

- During the time Eurofighter WORLD was on base the Spanish detachment reached the outstanding number of 400 flying hours in the Eurofighter Typhoon in the NATO Air Policing mission.
- The Spanish Eurofighters took part in more than 10 interceptions.
- The increase in violations of borders and safety incidents in recent years from zero violations and 53 incidents in 2011 to 8 violations and 144 incidents in 2014 tells its own story.
- On May 4th the Spanish Air Force handed the baton to the UK Royal Air Force.

Mission Accomplished.



GUARDIANS OF THE BALTICS...



At Readiness and on Patrol – Photographer Christian Schrik captured these images of the Spanish Air Force at work in Estonia, one of four Eurofighter Partner Nations who have been patrolling the skies of Northern Europe under the guidance of NATO.





THE ULTIMATE TEST DRIVE

Power, speed and outrageous agility – the Eurofighter Typhoon aircraft has it all. Those qualities are brought to the fore when each new aircraft rolls out from the factory floor and onto the runway for its first flight. For just over an hour Eurofighter is taken right to its limits in a way that very few ever experience. Here test pilot Nat Makepeace describes the ultimate test drive. >>



NAT MAKEPEACE
TYPHOON TEST PILOT

'After making a rapid climb to 40,000ft I slow right down to a point where we can barely fly and then slam the engines into full throttle. If there's anything wrong with the engines this is where you're going to find out...

'For me this is one of the most critical test points because at 40,000ft you'd typically be flying at 0.9 Mach, but we are back at 0.5 Mach – that's only 150 knots, which is not much more than landing speed. At this height the air is only a tenth of the density compared to ground level. Even in full reheat the aircraft struggles to stay level. You are in a very challenging part of the envelope. We're flying as slow as we can and then we slam the engines! (That's pilot-speak for mishandling them in a very severe way).

'It's all part of ensuring the performance of the engine is guaranteed.

'It's extreme flying but in a sense this is the whole point of a first flight or Production Flight Acceptance Test (PFAT). We are giving the aircraft a thorough workout through most of the envelope – at high speed and low speed and we slam the engines in a way that would not happen in normal flight.

'We try to make the engines surge at altitude and then slam the throttles in and out of reheat. If you did that in an old jet they'd cough, splutter and stall.

'The fun starts even before we leave the ground because as you taxi out I take the nose wheel steering out to make sure the flight control system is okay. No pilot would ever do that on purpose. Once I'm happy everything is good, I take off and pull straight into a steep reheat climb.

"We have to check the maximum and minimum G, that's usually around +7g and -3g, at high supersonic flight to give the flight controls a full workout. That's phenomenal performance. You're basically going to the limits that the aircraft was designed for. You're doing things with the aircraft that would never normally be done by the aircrew, except perhaps in real combat situations. Full stick rolls, where you slam the stick hard to full deflection and the jet aggressively rolls and pitches as we do it. Then it recovers.

'At 25,000ft I shut the engines off one at a time. It's the only time in normal service it occurs. We shut it off for a minute and then relight it again. Then you drop down to about 10,000ft and fly upside down for 30 seconds. Even a display pilot doesn't normally do it for that long. Then I drop to 2,000ft and slam the engines again. This is one of the most dangerous phases because if anything was to go wrong you don't have a lot of time to react.

'Even the first landing is extreme. I deploy the parachute and stamp on the brakes, which, I can assure you, is not a normal pilot technique but it heats the brakes and tests the anti-lock system. Everything is beyond what you would do on a normal flight, but within cleared envelope of the aircraft.

'A PFAT is a high workload flight and it's demanding for a pilot. Is it the ultimate test drive – I guess so. There's constant noise and vibration and all the time you're making notes, recording times, and moving on from test point to test point. It's a discipline and one that's carried out by every partner nation. There are more than 100 test points but you can split it into two parts: the aeromechanical, like the engines and controls, and then the systems and avionics.

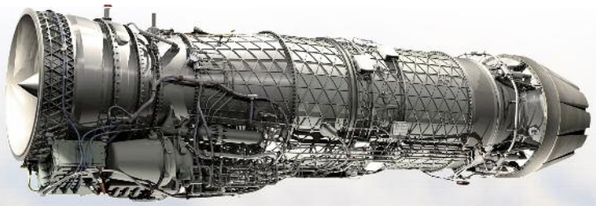
'Testing the airframe and engines takes you to the edges of the design envelope which is the exciting test pilot stuff you often read about. You could look at it another way; we are testing to ensure the aircraft is safe and that there aren't any product quality issues.

'The point of the whole exercise is to put the engines, the flight controls and things like the cockpit pressurization and anti-g protection systems through to the extremes of their cleared envelopes to make sure they work. We have a very strict schedule to follow but, in essence, what we are tying to do is say the aircraft is built perfectly. It's also about learning and improving.

'As a test pilot you are the tip of the iceberg – the work that has got you there by teams of people is vast.

'Another way to look at the PFAT is that it's the pilot's quality control stamp in what is otherwise an extremely complex engineering process. It's the aircrew saying the aircraft is good enough to give to the customer.' <<

THE EJ200 PHENOMENON





Royal Air Force Flight Lt. S. Harth, No. 6 Squadron Typhoon FGR-4 pilot from RAF Leuchars, United Kingdom, parks aircraft on the Nellis Air Force Base, Nev. flightline after a Red Flag 14-1 training mission Jan. 28, 2014. Red Flag is conducted over the Nevada Test and Training Range, which allows pilots from the United States and allied countries to train to a level of realism not encountered outside of real combat.

No sooner had the words “Welcome to Lossie” come out of the officer’s mouth when a Eurofighter Typhoon roared overhead. Almost in its slipstream came a second. As the pair moved side by side, they made a slight left turn and then soared off into the wide blue yonder. Welcome indeed! >>

Situated in Moray, Scotland, RAF Lossiemouth is one of the Royal Air Force’s most important and busiest bases. Tornado squadrons are stationed there, alongside three Typhoon squadrons: 6 Squadron, 1 (Fighter) Squadron and II (Army Co-operation) Squadron, which relocated from RAF Marham in early 2015.

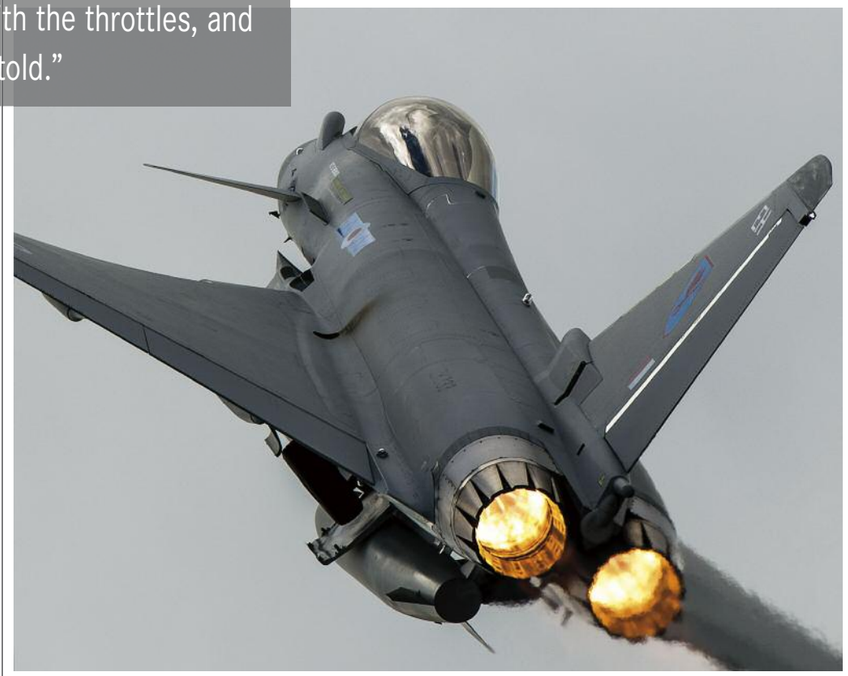
From last September, RAF Lossiemouth also assumed Quick Reaction Alert (QRA) duties, with crews and aircraft at a high state of readiness 24 hours a day, 365 days a year, to police UK airspace and to intercept unidentified aircraft.

QRA is the Typhoon’s day job and to carry it out to maximum effect the aircraft needs a holy trinity: reliability, speed and power. A huge part of that triumvirate comes in the shape of the EJ200 jet engines. The EUROJET consortium, comprising Rolls-Royce (UK), MTU Aero Engines (Germany), ITP (Spain) and Avio Aero (Italy), is responsible for the management of production, support and export of the EJ200 engine system. It is an engine that has proven itself over the last decade of in service use. The EJ200 has clocked up more than 550,000 hours powering the Eurofighter Typhoon among six of its seven air force customers worldwide the seventh customer to join the programme, (the Sultanate of Oman), is due to receive its first aircraft in 2017.



▲ RAF 6 Squadron Eurofighter Typhoons on Exercise Bersama Lima 11 in Malaysia

“You just do what you want with the throttles, and the engines do what they are told.”



Flight Lieutenant Stuart Harth is a pilot with more than 950 flying hours under his belt. As the Typhoon Standards and Evaluation officer, he knows a thing or two about the aircraft and its capabilities. As far as the engines go, he has got real faith.

“In day to day operating they are not in the forefront of your mind; they have such a good track record you know that pretty much everything is sorted out behind the curtain,” he says. “You only really get to appreciate what a good thing that is when you start to talk to >>



▲ Eurofighter Typhoon at Farnborough International Airshow 2012 which was flown by Sqn Ldr Scott Loughran from 6 Squadron, RAF Leuchars

>> THE EJ200 PHENOMENON

guys from other aircraft types. Then you begin to realise how many engine limits they are working to or how closely they have to monitor things for lifing, on take-off and so on. We just don't have any of those concerns.

"You just do what you want with the throttles, and the engines do what they are told. You don't think about them because you don't have to think about them."

For the RAF pilots, the power and performance of the EJ200 package really comes to the fore when it is up against a different type of aircraft.

"When you get an opportunity to fly against something else, you know you have got an advantage. The energy regain is the big thing. Whilst we can't pull as much alpha (quickly change the angle of attack) as some others, we just know that as long as you keep the jet fast, the energy regain is going to be there for you.

"So, for example, when you pull hard in a visual range combat scenario you will inevitably bleed speed off the airplane – everybody does it. If you go up against the Alpha fighters they have the ability to 'flat plate' or spin round in front of you. Of course you have got the shock of realising 'something is going on' but you also know he has paid a price for it.

"That price is speed. Then it is all about who can get their energy back to the right state quickest and that's when our engines really come into their own.

"The whole package on Typhoon is brilliant. If on an exercise you go up against an F-15, for example, they will turn up to the merge and they will have pretty much bled themselves dry because they have no tanks on the aircraft. So they will do a couple of times round the circuit and then they'll say that's me done. Everyone in the Typhoon force is just chomping at the bit to do more.

"The power available to you is simply amazing. But it has the right mindset to go with it. The aircraft has the right numbers, the right energy bands and that's with everything hanging off it – that's stores and tanks. That just builds a pilot's confidence. You know that if you had to strip off the stores because you were down on the fuel and fighting to get back to base, you could manage safely."

What all this means is that pilots get to concentrate on flying the missions without having to worry about things like the G-meter or Alpha limits.

"When I graduated from the Hawk to Typhoon, I thought you would actually lose a lot of the kinetic feedback. But even in a typical training circuit you feel the air surging over the top of the main plane and you still get a feedback connection through the airplane that's really good.

"It's an easy aircraft to fly in terms of mechanics because you don't have any dead



▲ Squadron Leader Johnny Meehan

zone. You touch the stick and it responds. You can focus on the best way of getting the aircraft to do the things that you want."

The message about ease of use at 25,000ft is echoed at ground level by II Squadron Senior Engineering Officer Johnny Meehan, who works with the Typhoon day in, day out and knows all about the aircraft's beating heart.

"From my point of view, the EJ200 is a phenomenal bit of kit," he says. "In terms of engineering, it does exactly what we need it to do. And the power it generates for the pilots is prodigious. They speak volumes about its performance.

"Time will tell how it works through life. We have had 10 years of Typhoon operationally so we are still very much in the first half of its life but it has already demonstrated much higher reliability than many people expected."

"Engineers enjoy the fact that it requires very little maintenance to keep it on the wing. It rarely goes wrong but when it does the repair loop, thanks to our relationship with Rolls-Royce, is very efficient and effective."

That working relationship between the RAF and Rolls-Royce is mirrored among the other nations in the EUROJET family, with partner companies through MTU Aero Engines in Germany, ITP in Spain and Avio Aero in Italy each playing a similar close role with their respective nations air force.

A good measure of the engine's reliability is the fact that Lossiemouth doesn't currently have a Typhoon engine testing facility.

"Despite the fact Typhoon squadrons have been operating here since summer last year, we don't have a facility to carry out high power ground runs. But in truth, it's not been required because the engines are so serviceable. For me, they are far more reliable than anything else we have used in the fast jet fleet.

"The only time you have to carry out an engine ground run is when you have a double engine change and that is rare. We have been operating at RAF Lossiemouth for nearly a year and we've never needed one."

Throughout operations with six fleets since 2003 (the Air Forces of Germany, Spain, Italy, Austria and Saudi Arabia, as well as the RAF), the EJ200 has produced some impressive numbers. For example, over more than 550,000 engine-flying hours, the flight shut down rates and the mean time between engine removals beats specification and reliability figures far better than planned. In fact, the RAF is the fleet leader and has achieved over 1,800 flying hours.

The average time on the wing of the EJ200s in use on the Typhoon fleets is currently more than 1,100 operational hours and EUROJET is aiming to increase this figure still further. It might be pushing it to say that the EJ200 is head and shoulders above the rest, but there's little doubt that engineers working on the Typhon enjoy a number of benefits over previous aircraft.

Says Johnny: "The engine is at the perfect working height for an average person standing up, so the inspections and maintenance we need to perform are really easy to carry out. When you compare this to other aircraft, where you may need steps or to get on some staging simply to carry out an inspection, it's a real practical advantage.

"With the Harrier, for example, you had to remove the engine to carry out routine maintenance but when you did the airframe would bend. Therefore, taking it out and putting it back in was not a simple process. The Tornado was much quicker to take in and out. It was great up until you used thrust reverse because it caused FOD ingestion."

FOD – Foreign Object Debris – is a potential danger to all aircraft engines. There's been a keen awareness of the problem over many years and processes have been introduced to help minimise it, like tool control and regular sweeps of the airfield.

"One of my fears when coming from Tornado was that FOD would be a big problem for Typhoon because the intake position is quite low to the ground," says Johnny. "But that's not been the case. It really isn't. You don't see anything like the level of FOD issues >>







>> THE EJ200 PHENOMENON

that you see on other aircraft. Because the EJ200 has bladed discs with an anti-FOD design, it means they are very FOD tolerant."

Another big advantage that the EJ200 displays is its power. "What you notice day to day here on base is that the Tornado aircraft have to use reheat to get off the ground. The Typhoons just disappear with very little noise. In fact, when it was announced that the Typhoon was to be based at Lossiemouth, the expectation of the general public was that it was going to be a lot louder. But in the main it is very quiet. It is so quiet, in fact, that when you are operating around it you have to check you have your ear defenders on!"

Johnny says that in terms of health and safety, operating around the aircraft and carrying out its maintenance cycle, the EJ200 "is a whole epoch ahead".

"It is a pleasure to work with this bit of kit. We are aware that you can't treat it like an old piece of mechanical engineering. You can't take a big hammer to fix it. We talk a bit like it's an F1 engine. You have got to appreciate that there is a scientific standard of engineering involved and stick to good engineering principles. You certainly can't treat it like an old tractor. It's a massive leap in technology and concept."

A good gauge of what that leap means for the people who spend their working lives around the engine can be seen when they describe the ease of a Typhoon engine change. In a word it's: straightforward.

Johnny explains: "To get the engines out, you open the bay doors on the swing arm, pin the engine up, remove the pins and winch it out. Then you dress the engine that you want to put back in. You have to turn new engines into left or right-handed at the time you need them; this is done concurrently with other aircraft prep. Finally, you change the cell to make sure no damage has been caused to the interior of the engine bay. Then it's straight in – a piece of cake. If it's a single engine change, you don't have to carry out significant functions afterwards as it comes ready made.

"There is a downside. If you don't carry out an engine change very often, you don't have many guys that are familiar with doing one and if you are out on operation you want to be fully capable. So you plan, train and have regular events."

At Lossiemouth, the RAF enjoys an excellent partnership with Rolls-Royce, which has representatives permanently stationed on the base to provide the technical back up when it's required.

Johnny says it works really well: "A good example happened the other day. We found some suspected damage and to examine the engine we had to use a borescope (a camera in a flexible tube that's used to inspect the insides of the engine). The method the Rolls-Royce team has created for us is very clever. It involves going through the back of the engine, rather than going through the doors. In the recent case, it turned out that there wasn't a crack and we were able to keep that aircraft flying.

"These inspections are vitally important. For example, if we find cracks we have to change the engine. But it's not always that easy because you are right inside the depths of the engine when you are doing it. However, having that relationship between us and the Rolls-Royce team on site allows us to carry out more effective maintenance, right at the point of use, which is great. We know they have a huge amount of expertise about the engine and our strong relationship helps to solve our problems a lot faster.

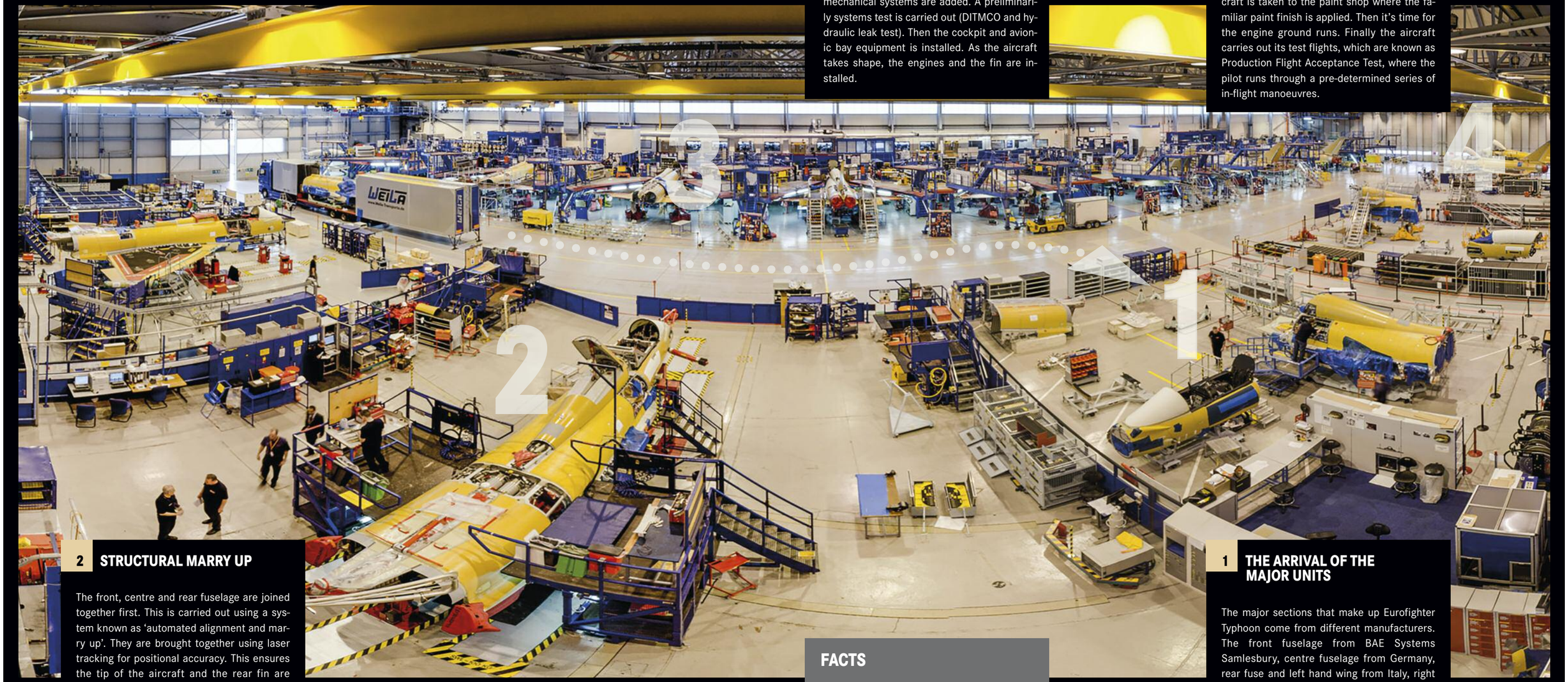
"I don't write the contract but whoever does has got it right. They have enabled us to have a contract where we can work together. It is a relationship where we can create quality and have an engine that stays on wing longer. This in turn means far less maintenance for me and more aircraft for the pilots to fly." <<

Many thanks to the RAF at Lossiemouth for making this article possible.



"We talk a bit like it's an F1 engine. You have got to appreciate that there is a scientific standard of engineering involved and stick to good engineering."

HOW THE EUROFIGHTER TYPHOON COMES TOGETHER



3 SYSTEMS MARRY UP

At this point in the process the electrical and mechanical systems are added. A preliminarily systems test is carried out (DITMCO and hydraulic leak test). Then the cockpit and avionic bay equipment is installed. As the aircraft takes shape, the engines and the fin are installed.

4 SYSTEMS INTEGRATION TESTING

This is where all the final touches are applied and all the systems are tested ahead of getting the aircraft set for engine runs. The tests include: fuel, hydraulics, undercarriage, flying controls, avionics and electronic displays and controls. Then the ejector seat and canopy is installed.

Once this testing phase is complete the aircraft is taken to the paint shop where the familiar paint finish is applied. Then it's time for the engine ground runs. Finally the aircraft carries out its test flights, which are known as Production Flight Acceptance Test, where the pilot runs through a pre-determined series of in-flight manoeuvres.

2 STRUCTURAL MARRY UP

The front, centre and rear fuselage are joined together first. This is carried out using a system known as 'automated alignment and marry up'. They are brought together using laser tracking for positional accuracy. This ensures the tip of the aircraft and the rear fin are aligned to a tolerance of less than a millimetre. It's important because an aircraft that's built 'straight' lasts longer as there's less stress on the airframe and it performs as designed.

The next stage is to add the wings and install the main under carriage.

FACTS

Float on: The Final Assembly facility in Warton in the UK is built on a 'floating' 4-meter concrete raft which has been designed to take account of the tidal movements which otherwise could throw the jet fighter tolerances out.

Weigh in: Each aircraft is weighed ahead to establish its centre of gravity, which is accurate to the size of a postage stamp.

1 THE ARRIVAL OF THE MAJOR UNITS

The major sections that make up Eurofighter Typhoon come from different manufacturers. The front fuselage from BAE Systems Samlesbury, centre fuselage from Germany, rear fuse and left hand wing from Italy, right hand wing from Spain and the engines from Eurojet. Other equipment arrives from the partner companies' supply chain.

First a document check is carried out. Then the parts are thoroughly inspected. Then they are prepared for the marry up.



SWING - ROLE ON RED FLAG

With its Tranche 2 Eurofighter Typhoons in full swing-role configuration, the Royal Air Force's No 1(Fighter) Squadron headed to Nellis AFB to put its jets to the ultimate test – Exercise 'Red Flag'. >>

"We've been practicing our swing-role flying here, working with F-15s, F-16s and F-22s: fighting our way in to the target through an advanced air threat, 'firing' our AMRAAM missiles, then fighting our way through an advanced SAM (surface-to-air missile) threat, while simultaneously dropping live Paveway IV [precision-guided bombs], then fighting our way back out again'. So says Wg Cdr Mike Sutton, Officer Commanding No 1 (Fighter) Squadron, as he talks on the hot and noisy flightline at Nellis – the self-proclaimed 'home of the fighter pilot."

Wg Cdr Sutton was in Nevada with his squadron in order to achieve three main goals: to train at the highest level, to develop interoperability with close allies, and to provide the ultimate test for the new standard of swing-role Eurofighter Typhoon – the P1EB variant.

"Red Flag is preparing us for any contingent operation we are likely to face," he said. "We are flying large missions with up to 100 combat aircraft, both day and night. The interoperability of these aircraft is essential."

Sutton picked out the participating F-22 Raptors, with which he said the RAF Typhoon community has some 'tried and tested tactics'. "We're working with the low-observable assets extremely effectively in the air-to-air role," Sutton continued. "It's critical that we do more of this [type of training] as the F-35 comes into service in the UK."

Typhoon pilot Flt Lt Rory Denman from No 6 Squadron is attached to the deployment. "So far I've flown three missions and it's incredibly challenging – there's more aircraft than I've ever flown with on an exercise and the variety is quite remarkable. The ability of the Typhoon to fight air-to-air and then bomb with [the] Paveway IV is something the other nations are actually quite taken aback with. [Plus we have] a lot of performance, so we can fly fast and high!"

Flt Lt Dan Jones was flying on his second 'Red Flag' exercise. "On the aircrew side we are generally working 12-hour shifts with mission planning and flying, or both. On the engineering side they are working equally long days and we are running a six-turn-six program, so that's 12 flying serials per day. On certain days we are launching two multi-role bomber serials where the jets will be armed with live Paveway IVs.

"It is hard to explain and understand the complexities of flying and fighting in such a vast and demanding environment. Many regard 'Red Flag' as more complex than recent >>











RED FLAG FERRY

Taking eight RAF Typhoons from RAF Lossiemouth in Scotland almost 5,000 miles away to Nellis Air Force Base in Nevada represents a massive logistical challenge. Here's how the crew involved made it happen.

"We started in September 2014 with the process by identifying the aircraft we would need for the exercise," says Junior Engineering Officer, Flight Lieutenant Darren Tremble of 1(F) Sqn, who was involved from the beginning.

As Senior Engineering Officer, Tim Lowing 1(F) Sqn explains it was an important decision: "For Typhoon, this was the first major exercise for P1EB standard aircraft. They would also be dropping live Paveway IV bombs. The aircraft would be carrying out missions in true swing role mode, meaning bombing and counter air missions on the same sortie in the most challenging international environment."

Once agreed which aircraft we'd be taking we started looking at the other equipment we needed and then the route was selected, this is known as the trail.

Flt Lt Tremble says: "The trail – the route chosen to get the aircraft to their final destination – is planned early as well. The idea is to take as many spares as you might need to get you through the trail but not too many because you have to carry it on the Voyager, along with the pilots and the engineering team. To get this right, we drew on some of the experience of people who had been around before.

"The eight Typhoons went in two trails with a Voyager aircraft accompanying each to carry out tanking (refuelling) en route. We went in a series of hops. First stop was Lajes in the Azores, then Bermuda, next Eglin in Florida and then across the US to Nellis, which is near Las Vegas. In manpower terms, each trail team had an Engo, a SNEC and small team from each trade, Lineys (ground crew who work on the aircraft line) and GSS computer support.

"You meet different challenges in different places but in Eglin it was a very unseasonal minus 17 degrees overnight. We went from temperate in Scotland, to humid and hot in Bermuda, then to extreme cold in Florida. This brought different issues to think about. But we got through OK. Spares wise we were lucky, as we didn't have to break into them on the trail."

SENGO Lowing adds: "You have to expect anything on a trial and to get eight Typhoon aircraft halfway across the world is pretty challenging. It is virtually unheard of to get eight aircraft across there like that without any issues but it was seamless. The aircraft were very good. It was amazing how well the jets survived without a fault."

So was it all worth it? Well SENGO Tim Lowing has absolutely no doubt: "There is no better air war training exercise in the world. The aircraft at Red Flag are phenomenal." Entire US Air Force squadrons are set up to play the enemy in what's as close to a representative air war environment as there is in the world." <<

combat air operations, and arguably as tough a challenge as many pilots will face. You are trying to co-ordinate a huge number of aircraft in a relatively small piece of airspace, often operating dynamically and at night, while still maintaining situational awareness and still operating effectively," explained Jones.

"I've done a mixture of pure air-to-air and the swing-role missions," he added. "The Typhoon is performing extremely well. In generic terms, in the swing-role environment as we ingress the fighters will create a favourable air situation, such that we are not overwhelmed by adversary aircraft. This gets us to the target without being targeted ourselves and then drop our weapons. Once we've dropped we can re-role into a pure air-to-air fighter to take over from our previous escorts for target area CAPs [combat air patrols] or as HVA [high-value asset] defence."

Summing up the new P1EB-standard jet, Jones said: "Most impressive is the ability to switch from the self-escort to ground attack; it's literally one switch on the HOTAS [hands on throttle and stick] controls. You can be ingressing as a fighter, then switch into the bombing role, then one switch and you're back into the air-to-air role – it's very simple."

Asked about his best moment in the exercise, Jones smiled and added: 'Watching my Paveway IV direct hit yesterday."

A TOUGH TEST

Proving the ability to move a squadron of complex fighters over a long distance to then establish a core fighting capability in such a harsh environment was one of the key aims of this deployment. Throw into the mix the Nellis aggressor forces in the air and on the ground trying to spoil their day, and the value of the opportunity is underlined.

Sqn Ldr Tim Lowing is the Senior Engineering Officer (SEngO) on the squadron. "It's a big effort to move eight aircraft half-way round the world," he explained. "We have 120 engineers here, and the jets are both bombing and flaring. In order to meet this task the engineers are working in four shifts. There is a line shift for the first wave, then we have a small rectifications window ahead of the evening mission. The real bulk of the work is done from 01.00 to 07.00 hrs, when we dig into the deeper snags that we've picked up during the day."

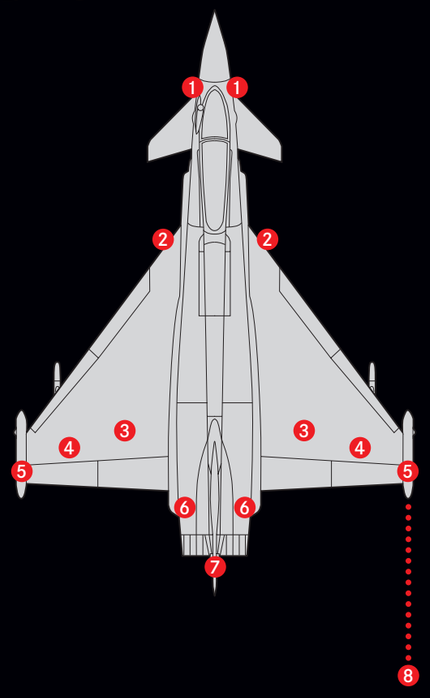
As well as ironing out any problems, the end of each day usually included applying lessons learned from the day's flying and the intense debriefings in the 'Red Flag' building.

Summing up the value of the exercise, Wg Cdr Sutton said: "We are an exclusively Tranche 2 P1EB-standard detachment here. Throughout the whole process of deploying, the pre-exercise flying at RAF Lossiemouth and through exercise 'Red Flag' itself, the aircraft have remained extremely serviceable.

"We've flown more than 175 sorties and we've only dropped a handful through unserviceability, so the reliability has been excellent. The Typhoon Force has been working towards a declaration of the P1EB capability for well over a year and this has been the final proving ground here. The Typhoon has been performing magnificently, the pilots have a lot of confidence and trust in the system, and the weapons have all hit their targets! This has been the best possible training opportunity and the Typhoon Force is now well placed for the challenges ahead." <<



WHAT IS DASS?



DASS – DEFENSIVE AIDS SUB-SYSTEM

The DASS, which constitutes the Electronic Warfare suite, monitors and responds to the outside world. It is installed internally and provides the pilot with an all-round prioritised assessment of Air-to-Air and Surface-to-Air threats, with fully automatic response to multiple threats; manual override is available. Space and computing power expansions will house continuous evolution for future threats, enhance Eurofighter Typhoon's survivability and greatly increase overall mission effectiveness.

1 FRONT LASER WARNER

2 FRONT MISSILE WARNER

3 FLARE DISPENSER

4 CHAFF DISPENSER

5 WING TIP ESM/ECM PODS

6 REAR LASER WARNER

7 REAR MISSILE WARNER

8 TOWED DECOY



Flare dispenser

Chaff dispenser

Wing tip ESM/ ECM pods

Rear laser warner



Rear missile warner



Towed decoy



ON THE RECORD WITH ROB WELLS

Eurofighter Export Future Business Manager

THE PROTECTIVE SHIELD

Every Eurofighter has its own protective shield known as the Defensive Aids Sub System or DASS. Its primary objective is to protect both the pilot and the aircraft and provide the weapon system with information needed to keep both viable. The DASS forms part of Eurofighter Typhoon's avionics system and is one of six sub systems. Its alternative name is the Electronic Warfare suite.

When dealing with potential threats there are two basic techniques – the first is to disrupt and the second to distract. Disruption means jamming the enemy radar or weapon and is almost always the preferred option. Distracting means trying to make the threat believe the aircraft is somewhere else.

HOW DASS OPERATES

In essence the DASS, which has 360 degrees spatial awareness, detects transmissions that impact on the aircraft and identifies and acts on potential threats. This includes assessing radar emissions and inbound missile threats (both from the ground and from enemy aircraft) and actively working against the threats where appropriate by using Electronic Counter Measures. It also logs any information it detects, storing it for later use, even if it is not necessarily a threat today.

Passive Electronic Support Measures (ESM): This is the first line of defence and it's all about watching, listening for and detecting potential threats. It looks out for unknown, unfriendly and uncertain transmissions and categorises them. Suspect ones are passed to the active part of the DASS which will jam the transmission if it is hostile.

ELECTRONIC COUNTER MEASURES (ECM)

Jamming: The DASS generates jamming signals to disrupt enemy RF sensors (e.g. radar). It's the primary method to prevent enemy aircraft and ground-based systems from engaging, tracking or firing at the Eurofighter.

In addition the system has Missile Warning and, on the UK aircraft, Laser Warning.

Towed Decoy: This is essentially an ECM but it's deployed on a wire well behind the aircraft to confuse potential threats by trying to make them think the aircraft is at the other end of the wire. Inbound missiles are attracted to the decoy.

Chaff: Used to decoy radar guided missiles, the aircraft releases a small cloud of chaff which are packs of aluminium that confuse the radar by giving false returns. The chaff is stored in dispensers near the wing tips so that when they are released the vortices from the wing tip helps to disperse it very quickly and in a good dispersal pattern.

Flares: These pyrotechnic devices help to decoy infra-red guided heat seeking missiles. They are highly sophisticated pieces of technology as they have to match and outsmart the sensors on the infra-red heat seeking missiles that pose the threat. The flares are stored in dispensers close to the engines, which are the primary heat source of the aircraft.

Computer: At the heart of the DASS is the defensive aids computer. It deals with all the data it gets from the individual sensors and passes useful info to the weapon system. The pilot gets to see what is happening but doesn't have to take any action as the DASS is fully automated. That said, the pilot still has the ability to have the final word and override the system. The defensive aids computer also provides the last line of defence by providing emergency manoeuvre cueing to the pilot, to help him avoid inbound missiles.

Mission critical: The effectiveness of any DASS system depends on how good your mission data is. Mission data comprises information on the threats that are likely to be faced– including information on enemy radar and missiles.

A LIFE IN A DAY





REYES CARRION
Eurofighter's
Flight Test Coordinator

On November 5, 1985 Reyes Carrion started work on the first day of what was supposed to be a brief two-month placement at Eurofighter in Munich. Almost 30 years later she's still there! Not surprisingly, over the decades Flight Test Coordinator Reyes has become part of the Eurofighter family – and the aircraft has become part of hers. >>

"I love this aircraft," she says. "Not just because it's technically amazing but it's so smart and elegant. For me there's something very British about the aircraft. To me it combines the elegance of Concord with the soul of a fighter and that's magnificent."

If there's a heartfelt passion in the picture she paints it's because the Eurofighter has been such a massive part of her life. It still is. Though born in Barcelona, Reyes lived most of her pre-Munich life in Madrid, only arriving in Germany in the very early days of the programme.

"They were actually looking for someone who was confident enough to go to another country and could speak other languages. Initially they asked me to come to Munich for two or three months. I've been here ever since. I met my husband here - he worked for EADS - and have since had my family here and so this isn't just a job for me but it's become a huge part of my life. Without this aircraft I wouldn't have the three children I have today and I wouldn't live in Munich."

Today Reyes has a key role in a crucial part of the programme. As each new capability development comes down the line a thorough test evaluation is required and it's her job to make sure these tests take place on schedule. She looks after the coordinating and planning of the whole flight test programme ensuring new systems and upgrades to the aircraft can be tested and validated.

"We have two aircraft that we use and at the start we work out which aircraft is the best fit for a particular series of tests, then work out its availability, the timeframe involved and so on. Both aircraft are equally capable but they are different with different capabilities and so one may be more suitable than the other.

"Every day in flight test is different because you have so many variables and constraints to factor in – good weather, bad weather. You often want to test in different types of weather conditions. Then an aircraft might have a technical issue or the clearances need to be done or the pilot might have a problem. You have to be aware of all these things and handle them. Dealing with so many variables means you have to try to coordinate a lot of different things and, even though I know the job well, each day can throw up lots of surprises. But that's why I love it so much. It's a very dynamic job, every day you get up and wonder what the day will bring.

"I am the kind of person who thrives off these things. When something happens I like to talk to people to see if I can come up with a solution. It can be challenging and ideally I would like to make sure the customer is 100% happy all the time but sometimes there are things you cannot control – like the weather or clearances – and that's one of the most difficult things," says Reyes, who away from the tests of work relaxes with her husband and three dogs.

One of the highlights of her varied career came on 27 March 1994 when Typhoon made its maiden flight. Though a relatively low key affair, Reyes was one of a select group invited to witness the milestone in the flesh. She was given the honour of representing the Works Council (Reyes has been chair of the Council for more than 20 years), and attended this little piece of aviation history with the managing director.

"That first flight of the Eurofighter prototype, the A1, is the day I remember most. After overcoming so many challenges over several years it was a very emotional day. I even kissed the aircraft! I can honestly say that first time Eurofighter flew was really the happiest day in my professional life.

"Seeing the aircraft fly for the very first time was like the birth of a new baby. Right from the beginning this is what we had been working towards. I know I wasn't very important in the company but in my own small way from my little desk I had been fighting to get the aircraft into the sky. So it was like a little brother of mine, because I had put so much emotion into it."

Back at the start, with the Cold War still an ongoing factor, Reyes linked up with an enthusiastic team.

"When I was very small my parents sent me to France and other places to study. It wasn't a very normal upbringing because my father travelled a lot but I enjoyed it. So I knew from an early age that I wanted to be out in the world, to learn the languages and have contact with different people and cultures. That's why I like the Eurofighter world so much because it's a mix of all cultures.

"When I joined in 1985 it was a new thing for everybody and there was a great spirit between the companies with a group of people from different nationalities working together for a common goal," she recalls. "That was a wonderful feeling – a real bond. We had a feeling we were doing something very special together."

Not that it was an easy life. Reyes remembers working late into the night – though no-one complained.

"We often worked 12, 13 hours and sometimes even all through the night. That kind of thing didn't worry us because we all felt driven by what we wanted to achieve. It sparked the enthusiasm and energy which was at the heart of those early days.

"From a personal perspective I really liked meeting and working with people from other nationalities and I like this company because it is unique."

Like a proud mother Reyes believes that the Eurofighter has a real chance of enjoying a great future.

"I really hope so because for me, this aircraft is fantastic and has the potential to offer even more in the future. Time will tell but I expect the company will get more contracts. I really feel there's opportunity because it's a great product." <<

A EUROPEAN SOLUTION

FOR THE HEART OF EUROPE



As Belgium considers the selection of its future fighter fleet, we are working to ensure the Eurofighter Typhoon is recognised as the natural choice as the next major fast-jet procurement for the nation that sits at the heart of Europe. >>

Belgium needs to replace an ageing fleet of F-16's to be sure of sovereign protection for years to come - and to be able to offer an air-power solution that can interoperate effectively with its neighbours and effectively participate in expeditionary missions, as Belgium has successfully demonstrated in last decades. As the nation gets to grips with one of the most important spending decisions it will have to make in terms of defence for years, Eurofighter is pulling out all the stops in a bid to persuade the Belgians to join the Eurofighter family and thus further strengthen European air power and the industrial base which supports it.

Eurofighter's Partner Companies already have huge experience in delivering European and global defence programmes – not just with military fast-jets, but with helicopters, military transport aircraft and a variety of high-end military hardware.

"This is an important campaign for us and for the future of the European defence industry," said Alberto Gutierrez, CEO of Eurofighter GmbH. "A Eurofighter Typhoon solution would strengthen Europe's ability to operate as 'one' and would also help sustain and continue growing a European industrial base."

Working closely with its Eurofighter Partner Company, BAE Systems, a dedicated Belgian Campaign Team has been established to support the initiative. Christoph Kokott, who is heading the project management at Eurofighter GmbH for the campaign, said: "It's widely recognised that the Eurofighter Typhoon already forms the backbone of European air power and the recently published RUSI Report (see page 16) makes clear that the aircraft is destined to play a major role in European air power for decades to come.

"It's common sense that with the UK, Spain, Germany, Italy and Austria already operating Eurofighters, there will be real benefits in terms of 'critical mass' and interoperability if the Belgians chose to opt for us. We have already seen a lot of interest from the Belgian military in what we have to offer – and there have been visits by Belgian delegates to Britain and Germany to see Eurofighter on base and in action.

"If Belgium did opt for Eurofighter they would become one of the NETMA family with all the benefits that this membership would bring. It's an exciting prospect, but these are very early days and we have a long way to go in building partnerships."

What is certain is that a combined Eurofighter Typhoon acquisition with other regional allies would offer a unique and potent mix of potential economic, operational, industrial and support benefits. This includes benefits in terms of training, logistics and maintenance.

It's a compelling proposition – and one that Belgium is likely to consider extremely carefully. It is the European solution for the most European of European countries. <<

TYPHOON TEAM AT TURKU

Eurofighter had strong representation at Turku Air Show.



A Finnish first was marked recently when the Eurofighter Typhoon Team made its debut appearance at the Turku Air Show.

Over two days, the Team, supported by its Eurofighter Partner Company Airbus Defence & Space, briefed a wide range of Air Show delegates on the capabilities of the Eurofighter Typhoon and what it could offer this amazing and fascinating Scandinavian country.

Turku, Finland's former capital, is located to the Northwest of Helsinki and can be reached in a two hour drive from the new capital. On the Friday before the show the Team attended a Mayoral Reception at the local city hall and were warmly welcomed by the Finnish organisers and representatives.

On Saturday, June 6th, Paul Smith, former RAF Eurofighter pilot and now Capability Manager for Eurofighter, briefed 15 Finnish journalists on the Eurofighter Typhoon – already the backbone of European air power - and one which could provide the Finnish Air Force with proven and reliable equipment offering new levels of capability for decades to come.

Smith's presentation to the media was well received, and many visitors came to see the Eurofighter delegation at the Show to find out more.

Walter Mancini, Eurofighter's Vice President of Business Development welcomed Finnish delegates to a special Eurofighter briefing on the Sunday, the last day of the show where Paul Smith went into more detail on the operational capabilities of the Eurofighter and explained just what it could offer the Finns.

An interesting highlight at the Show was provided by Rauli Mard, a Finnish aviation artist, who used chalk to create a unique Eurofighter Typhoon artwork during a live session in the Air Show's VIP area.

Eurofighter Typhoon looks forward to further visits to Finland and will be happy to come back to Turku Air Show in 2016 to show more of the capabilities of the aircraft. <<

EUROFIGHTER OFFERS CANADA STRONG DEFENCE CAPABILITY

Eurofighter briefed delegates at Canada's premiere defence exhibition CANSEC 2015 this summer on the latest capability developments of the Eurofighter Typhoon.

A Team from Eurofighter's base in Germany, travelled to Ottawa to ensure the Canadians are up to speed on a story that continues to deliver.

Massimiliano Marchisio, Eurofighter's Business Development Manager for Canada, said: "Last year we made a compelling case for Eurofighter in Canada – not just in terms of why the fighter can offer the Canadian military what it needs, but also in terms of Canada becoming parts of the Eurofighter family.

"This year we returned to update them on our story. The Canadians are already aware of the benefits interaction with Eurofighter Partner Companies can bring and of the basic capabilities of the aircraft which they recognise can service their requirements. What we were able to do this year was update them on progress with many of the emerging capabilities that make Eurofighter the optimum choice for air forces looking for performance, reach and flexibility."

(L-R) Airbus Defence & Space's Senior Adviser Air Combat Operations, Joachim Borkenstein, with ADS Senior Manager Stephanie Offerdahl and Eurofighter's Business Development Manager, Massimiliano Marchisio.



The Canadian market analysis initiated two years ago by the country's Department of National Defence (DND), is likely to enter a more active phase after the federal elections in Canada which are scheduled to take place in October this year. Eurofighter is one of the aircraft that can meet Canada's new fighter requirement.

Max said: "The fact that the Typhoon fulfills all Canadian operational scenarios, while economically benefiting Canada along with serious commitment to grow in capabilities and operational experience, is giving us a great deal of credibility and capturing the attention of the Canadian military and government.

"We were well received in Canada and I am extremely pleased that we were made so welcome and such an interest is being taken in what we have to offer." <<

NEW ENHANCEMENT CONTRACT

Eurofighter has agreed a new capability contract that will equip the Eurofighter Typhoon with the ability to deploy multiple precision-guided air-to-surface weapons at fast-moving targets with low-collateral damage.

The Phase 3 Capability Enhancement will also introduce a number of upgrades to the Eurofighter's mission and maintenance systems.

Valued at EUROS 200 million this suite of new enhancements, confirms Eurofighter Typhoon's full multi-role, swing-role capability.

"THIS CAPABILITY UPGRADE GIVES THE EUROFIGHTER TYPHOON UNRIVALLED FULL MULTI-ROLE AND SWING-ROLE CAPABILITY" ...

"This capability upgrade gives the Eurofighter Typhoon unrivalled full multi-role and swing-role capability," says Alberto Gutierrez, the CEO of Eurofighter. "Although the prime focus is the introduction of the Brimstone 2 missile required by the UK RAF, P3E enhances the capabilities of the Storm Shadow long-range strike missile, the Meteor, Paveway IV and ASRAAM weapons, as well as introducing modifications to further improve the aircraft's already impressive availability. Support for the contract will come from all four core nations and the enhancement package will benefit all who use it."

Air Vice-Marshal, Graham Farnell, the General Manager of NETMA (NATO Eurofighter and Tornado Management Agency), who signed the contract on behalf of the core customer nations, said: "Over the last 18 months the Eurofighter Typhoon community has enjoyed a significant acceleration to the weapon system capability enhancement programme and I am pleased to say we have been able to agree a number of major contracts which really drive the weapon system's contribution to air power."

He said: "The agreement of the P3E contract is further evidence that this is a Programme which keeps on delivering. As the hugely successful Panavia Tornado moves towards the last decade of its life cycle, it is highly re-assuring to know that the mantle will be picked up by the Eurofighter Typhoon. Brimstone 2 capability is both a unique and welcome addition to the capability portfolio, and whilst it is just a part of the P3E story, Brimstone represents an extremely important capability to have."

The four nation contract between the UK, Italy, Germany and Spain will form the basis for the next major Eurofighter enhancement, the Phase 4 Capability Enhancement contract, now in its 'definition phase'. This will lay the foundation for the Nations' combat air capability requirements into the next decade.

The Phase 3 Enhancement contract is scheduled for delivery in 2017. All four core nations will work on flight control and avionics and the contract will centre round a scheduled programme of weapon testing, the development and testing of flight control systems, and finally store clearing and store release testing. The initial fit for the Brimstone 2 missiles on the Eurofighter will see two launchers fitted to the outboard pylons of the Eurofighter each carrying three Brimstone 2 missiles.

The full swing-role, multi-role weapons compliment on the Eurofighter could now include a mix of: six Brimstone 2 missiles; up to six Paveway IV bombs, two long-range Storm Shadow missiles, four Meteor beyond visual range air-to-air missiles and either two IRIS-T or two ASRAAM heat-seeking missiles.

This weapons package, combined with the high-kinetic performance and super cruise capability of the platform and AESA radar now being integrated onto the platform, confirms Eurofighter as the world's most versatile fast-jet fighter.



Details of the new enhancements were revealed at the IDEX defence exhibition in Abu Dhabi in February 2015.

The contract signing was made in the presence of Philip Dunne, UK Minister for Defence Equipment, Support and Technology, accompanied by Alberto Gutierrez, CEO of Eurofighter and Air-Vice Marshal Graham Farnell, General Manager of NETMA, and representatives from the other Eurofighter customer nations: for Germany, General Erhard Bühler, Director Defence Plans & Policy; representing Italy, Lieutenant General Enzo Stefanini; and for Spain, Ministry of Defence, Secretary of State, Pedro Arguelles, all showing their support for this essential capability.

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IN OUR NEXT ISSUE...

More on new capabilities for Eurofighter Typhoon, a report about UK RAF Eurofighters on duty in the Baltics - and updates on campaigns around the world including: Denmark, Belgium, Indonesia and the Middle East.

Close encounter of the Russian kind – a UK RAF Typhoon on patrolling duty.' © Crown Copyright 2015




Eurofighter
Typhoon