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PROGRAMME NEWS & FEATURES
JULY 2022

- Halcón contract signed at ILA
- Eurofighter Long Term Evolution (LTE)
- Delivered to Kuwait
- Shaping the Future

FARNBOROUGH INTERNATIONAL AIRSHOW
18-22 JULY 2022

SPECIAL EDITION

Eurofighter Typhoon

The Backbone of European Defence

Eurofighter Typhoon

2022 · EUROFIGHTER **WORLD**

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Claire Hartley

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Contents

Programme News & Features
JULY 2022, Farnborough International Airshow
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The Backbone of European Defence

It's about improving the existing platform step-by-step, and through this, paving the way for the future and helping to mature technologies.

Eurofighter will long endure as the backbone of European air defence, says the organisation's new leader.

Carlo Mancusi, CEO of Eurofighter, says an evolved and advanced Eurofighter Typhoon is currently being shaped — ensuring it remains in service to 2060 and beyond.

"We have a strong programme, with a strong future and we have already secured a number of developments that will keep the weapons system at the forefront of European defence," he says.

The key strategic elements of a 10-year plan for Eurofighter development have been agreed among the key partners, with the first five years of the plan already on contract. Carlo says this plan will also see two key programmes of work crystallise. Firstly, the next capability enhancement contract known as P4E, which will ensure the E-Scan radar can reach its full operational capability. Secondly, the Eurofighter Long Term Evolution (LTE) study, which will underpin the future development of the weapon system. →

"Our 10-Year Plan secures our development activities — with the first five years' work already on contract and we are working hard to extend this for the next five years. It is important because the aircraft will be able to offer additional capabilities to meet evolving operational requirements.

"We are looking forward to making progress on P4E and the additional capability that it brings. In terms of LTE, we have put some options on the table, but we need to let individual nations take decisions about the future of their armed forces. The world has changed significantly in a short period of time and it's important that nations have a chance to reflect on their requirements."

He adds that the LTE maturation phase is due to take place between 2023 and 2025 and will demonstrate in a practical way what technologies can be used in an 'LTE Eurofighter'.

Carlo says: "It's about improving the existing platform step-by-step, and through this, paving the way for the future and helping to mature technologies. Just how radical and ambitious the nations are and what is practically possible needs to be worked through."

Having taken on the CEO role in January, Carlo says the programme has performed well in the last two years capturing a number of significant contracts, including the extension of the C1 and C3 support contracts.

Looking to the prospect of further orders he says: "Notwithstanding the success we have with the Qatar, Kuwait and Quadriga contracts, we are seeking further contracts to keep our production lines busy.

"We are looking both to core customers and to the export market for additional buys and there are positive signs out there. There is a growing interest with respect to mature aircraft that can be used together with other platforms to give nations the best possible synergy. It is up to us to turn these opportunities into contracts.

"Of course, we know that to win new contracts we need to show that we are thinking about the continuous development of the weapons system. That's why our 10-Year Plan and LTE are so important. They demonstrate we have the contractual route in place to achieve additional capabilities."

Carlo, who has worked on the Eurofighter programme from its inception in the 1980s, says he is proud about what it has achieved and is optimistic about the future.

"The programme brings together different skills, cultures and requirements," he says. "We have developed a truly collaborative way of working and have built a valuable legacy. We have become accustomed to working together in an innovative environment, with teams and companies who come together to deliver strong results.

"Of course, on a day-to-day basis we focus on the challenges directly in front of us, but when you take a step back and look at the big picture the programme has achieved great success.

"Our aircraft is one of the cornerstones of European defence and the Eurofighter programme is the backbone of European defence. What we do is difficult, it is complex both in terms of the weapons system and the programme but we have the expertise."

The programme brings together different skills, cultures and requirements.

He says that Eurofighter and its partner companies — Airbus Germany and Airbus Spain, BAE Systems and Leonardo — rose to the challenge of the Covid-19 pandemic.

He explains, "Despite the issues brought about by Covid we performed well. Of course, we missed the direct contact with people, with our customer, with our nations, and with our partner companies. The success we enjoyed is down to the dedication of the people. The way they reacted was outstanding. The first thing I did when I was appointed was to congratulate the team for their dedication and commitment.

"Looking to the future it will be good to get back to some of the things we took for granted before Covid, like the opportunity to meet our customers and stakeholders face-to-face in familiar environments like air show and conferences. It will be good to re-establish some of our normal habits." ■

A LONG-TERM CONNECTION WITH EUROFIGHTER

Carlo Mancusi joined Eurofighter in January 2022 from Leonardo, where he held a series of senior roles, most recently as Head of the Fighter Line of Business for the Leonardo Aircraft Division, where he was responsible for Eurofighter Typhoon and other programmes.

He started his career in 1981 and was involved in the Eurofighter forerunner - the EAP demonstrator. At the beginning of the Eurofighter project, Carlo took part in the early meetings where the design standards and materials were discussed. Later, he was appointed Eurofighter Production Director, overseeing the establishment of the final assembly in Caselle, near Turin.

"For me, Eurofighter is an old friend," he says. "Time and again it has been part of my career. Indeed, before joining Eurofighter in January I was involved in the delivery of the first two Kuwait aircraft in December last year.

"I'm returning to a programme I know well. Personally, this is an opportunity to contribute to building something for future generations. The Eurofighter programme offered a wonderful chance for young engineers like me to develop and progress our careers. I want to make sure others have a similar experience in the future. With an out of service of 2060, 2070 so there is plenty of development, production, and support required for many years to come. "

Evolution of Eurofighter Taking Shape

How important is the Long-Term Evolution (LTE) Study in the history of Eurofighter?

The Long-Term Evolution (LTE) Study represents a revolution for Eurofighter Typhoon. It's not about adding new software capabilities, it's a redesign of the aircraft for the next 40 years. It's a whole new chapter for Eurofighter.

What is the current situation?

The LTE Study period started in 2019 and is due to be completed by the end of this year. This phase has given the nations time to decide and agree on the direction they want to go. What's clear is that the changing geopolitical situation has meant everyone is looking at their challenges and requirements with real urgency. The Study will lead to an agreement with the customer about what to focus on during the Technology Maturation Phase which will be carried out over the next three years.

What will happen in the Technology Maturation Phase?

The aim of the maturation work is to de-risk and mature the required technologies before the final decision is taken on the exact configuration of an LTE Eurofighter. All the key technologies, including cockpit, the avionics solution, as well as a series of basic technology enablers will be matured in the most enriching environment, potentially up to flight testing.

What are the key changes we will see?

Shaping an answer to that is what this work is all about. We are designing an aircraft today which will have to be mission proof for 40 years and that is a big task. You need to make sure that what you are designing is good for the job that Eurofighter needs to do. And when you are looking so far into the future even identifying the true needs for the weapon system within a system of systems is a challenge in itself. Plus we are not going to draw on a blank sheet.

How will the LTE Eurofighter fit with FCAS or Tempest?

LTE will be a bridge to the respective future combat air systems – and be available between five and 10 years earlier than they are.

The teams working on LTE and the future combat air systems will be thinking about taking advantage of precisely the same technologies — around the same kinds of themes: processing, artificial intelligence, cyber resilience, communication, and rapid capability, or technology insertion. For Eurofighter it's about having much more powerful and agile architectures.

Fabio Michael Boscolo, Vice President Eurofighter LTE Campaign & Strategy, CSFE

What role will Eurofighter have in the system of systems?

We are working to a number of key operational scenarios which have been set by the nations. These give us a set of parameters about what they expect and what they need Eurofighter to be.

We know that Eurofighter will not be a Day One weapon — it's not stealthy — but it will be in a contested environment and it will be capable of performing several roles.

What are the key attributes the Eurofighter LTE will need?

Everything will be data driven and data hungry. So, the short answer is processing power. Eurofighter LTE will host top class sensors, starting from the new electronic scan radars, and will want to maximize their content by elaborating and fusing data provided by all the sources. As an example, a pilot will need to receive radar images from his own or other aircraft in real time, to receive targeting information in real time and will need to be connected in a network. All this information will need to be processed, fused, and presented in the optimum manner to the pilot. It will require high speed data networks to ensure the bandwidth availability for the data transmission from pods and antennas, shear processing power and a state-of-the-art cockpit.

Operational flexibility, further increasing Eurofighter's swing role capabilities' will be part of LTE, too.

What are the main challenges?

Some of the technologies we are looking at are currently very immature in terms of their readiness level but we need to look at them because we want to be able to future proof the LTE aircraft as much as possible. As ever, there is a balance to be found here.

We are talking about maturing technologies, potentially up to flight testing within three years. To do it in this time frame is ambitious and will require a significant reshaping of the organizational model, as well as in the processes. What we need to do is ensure that in all the areas – avionics, cockpit, airframe, aerodynamics — we introduce something which is valuable for the customers for the next 40 years. ■

Halcon contract for 20 more Eurofighter Aircraft signed at ILA Berlin Air Show

The Halcón agreement for 20 new Eurofighter aircraft for the Spanish Air Force was signed at the ILA Berlin Air Show in June.

Spain will receive 16 single-seater and 4 twin-seater fighters equipped with electronic (e-scan) radar which will replace part of the legacy F-18 fleet. It will increase the Spanish Eurofighter fleet to 90 aircraft.

Like those in the German Quadriga programme signed in 2020, the aircraft will also be equipped with future-proofed hardware, software, and an even broader multi-role capability for engaging air and ground targets.

The Halcón contract was signed at a special ceremony at ILA by Miguel Ángel Martín Pérez, General Manager NETMA; Carlo Mancusi, Chief Executive Officer, Eurofighter GmbH; and Gerhard Baehr, CEO Eurojet Turbo GmbH. The signing was attended by senior military, industry, and diplomatic dignitaries from the Eurofighter core nations.

Miguel Ángel Martín Pérez, said: "These new 20 Typhoons and 48 new EJ200 engines for Spain demonstrate that this weapon system is still operationally relevant for our Air Forces, an excellent option for core nations and any potential export country.

"Complementarily with other emerging European fighter programmes, Eurofighter and EJ200 engine offer a proven, modern and reliable capability with potential for future growth based on an experience of more than 35 years."

Carlo Mancusi, said: "The announcement is great news for many reasons, particularly though because it signals the continued commitment to the future of Eurofighter Typhoon from one of the four core partner nations.

"The order also highlights the current and future strength of the programme – which will ensure Eurofighter continues as the backbone of European air defence for many years to come – as well as representing welcome support for the European aerospace industry."

Gerhard Baehr, said: "I would like to thank the Spanish customer for their confidence in the Eurofighter platform, the EUROJET consortium, and the performance and sustainability of the EJ200 engines. This order enhances European defence capability and simultaneously provides long-term security for a number of highly skilled jobs in the European aerospace industry."

The first Halcón aircraft will be delivered in 2026 and the new aircraft will secure industrial activity until 2030. With a service life well beyond 2060, the Eurofighter Typhoon's technical capabilities will allow full integration into the Europe's future air combat environment. ■

© Picture by Alessandro Maggia

ANDREA THOMPSON
Managing Director of the Europe & International business at BAE Systems, and Chair of the Eurofighter Supervisory Board

A Brighter Future

With a 10-Year Plan taking shape Eurofighter is entering a crucial phase which will keep it operationally relevant into the 2060s. **Andrea Thompson**, Managing Director of the Europe & International business at BAE Systems, and Chair of the Eurofighter Supervisory Board, believes the future is bright.

This is a pivotal moment for Eurofighter. Today our partners are mapping out the future capability journey, and in particular the Long Term Evolution (LTE) that underpins the future development of the weapon system and P4E which will ensure the E-Scan radar can reach its full operational capability.

The groundwork is complete. Last year, Eurofighter laid out a 10-year plan with the core nations, Germany, Italy, Spain and United Kingdom and their respective industry partners, which describes the capability journey. Essentially, the first five years are well defined and include on-contract programmes.

The focus now is on crystallising the final five years of the plan and that comprises the technologies and capabilities which will ensure Typhoon's role as the backbone of air defence across the world.

We're now in the process of defining specific national requirements and timescales harmonising these and looking at the sequencing for this new capability to be delivered to meet the needs of our customers. There is a key window between 2028 and 2032 for the delivery of the next phase of capability upgrades, known as P4E. This a sweet spot where the four Eurofighter core nations require pieces of, or all the capability, during that period.

Beyond that comes LTE with a focus on longer term development of capability. This is about supporting Typhoon to ensure it remains operationally relevant to 2060 and beyond. We're in the Study Definition Phase, finalising options for the nations. Later this year, we expect the 10-year plan to be finalised.

TYPHOON IN THE FUTURE BATTLESPACE

The 10-year plan is important because we know that Typhoon will be flying for decades and must be cutting-edge throughout. But it also has to be cutting-edge in terms of interoperability with other platforms as well, whether its Tempest, F-35, or the French-German FCAS.

BAE Systems is no different to other businesses, we need to ensure we invest where we are going to get maximum benefit. So, the technology streams we are developing that are intended for FCAS/Tempest will, wherever possible, be developed and demonstrated on Typhoon.

We are having discussions with our customers and partners about the priorities and the technologies are and looking at common technologies that will support both platforms and how we best optimise them.

Across the Eurofighter consortium we are very focussed on affordability and continuously evaluating our value proposition. We also recognise that we need to keep driving down our costs.

Part of this is the agile way we are looking at implementing any new capability. Traditionally, we've delivered big blocks of capability improvement every couple of years. The future will see smaller blocks of capability that come more frequently. Not only will we deliver new capability more often but doing it that way allows us to test and drive out costs more efficiently.

It's about constantly improving by focussing on those key technologies that link into Tempest or FCAS. That way you only invest once which is the key to getting the best value. Spend once, use many times.

We have developed real examples on demonstration rigs. These are tangible technologies, and we are working with our partners to see how we can optimise them for use within Eurofighter and off onto the future platforms.

This all feeds into future market opportunities for Typhoon too. When people start to understand the capability that's coming — when they see some of the things that are now on the demo rigs — it's very exciting. That is certainly something we see reflected in the feedback we are getting from our customers.

A MARKET FULL OF OPPORTUNITIES

There are certainly realistic opportunities to secure additional orders. When you look at the landscape and the possibilities — like Halcón in Spain, the Tornado Replacement in Germany, possible second buys from other nations and more aspirational activities too — you can quickly get to more than 100 potential new aircraft orders.

Obviously, it takes a lot of work from everyone on the industry side and support from governments to be able to secure these deals, but it is something we are all striving for.

These opportunities are another reason why we need these capability programmes to be settled and we need to deliver in an agreed timeframe.

The situation in Eastern Europe has already led many nations to re-evaluate their operational defence requirements and re-examine what they need in their portfolio. The capability Typhoon brings today — and will bring in the future — must deliver what our new and existing customers require.

We've got to be able to deliver a huge capability package for Typhoon. This includes the radars, the supporting radar software packages and a host of other capabilities. When you bring it all together, it's a package for Typhoon that delivers the next significant step up in capability.

That's what core nations and potential export campaigns are looking for from Eurofighter. And that is what we firmly believe needs to be delivered for Eurofighter.

EUROFIGHTER: EUROPE'S MOST SUCCESSFUL DEFENCE PROJECT

We know we can deliver because we've done it before. Eurofighter represents the best of four nations coming together — the best technologies, the best intellect, and the best resource packages. You've got to be impressed with the way the core nations have collaborated to produce what I believe is the world's best multirole aircraft.

It's proven itself over time and the platform is hitting its stride. We continue to push the boundaries of what this platform can do, and we're absolutely in it for the long haul. We have been in this for many years now and will continue into the future. ■

EUROFIGHTER STARS AT TOP GUN: MAVERICK LONDON PREMIERE

The Eurofighter Typhoon played a starring role on the red carpet at the Top Gun: Maverick premiere in London's Leicester Square in May.

Supplied by BAE Systems, the full scale replica was the main attraction at the dazzling event, with videos and photos published around the globe.

Tom Cruise, the lead actor, was joined by the movie's cast, as well as a host of VIP guests and celebrities including the Duke and Duchess of Cambridge.

High Flyer Nat's New Horizon

"Being a Typhoon pilot in Eurofighter means I act as the voice of the operator."

Photo: © Charly Hodges

After learning to fly in 1985 **Nat Makepeace** spent the next 35 years in various cockpits clocking up nearly 5,500 flying hours, predominantly in fighter jets. Today, he passes on all this knowledge and experience to help Eurofighter programme teams deliver the best possible product.

Photos:
© BAE Systems

For much of the last decade Nat has gone to work in an office that can travel at twice the speed of sound. And, now, while he's swapped the cockpit for a more traditional office in Eurofighter's Munich HQ, he still has a unique role that draws on all that experience.

"Being a Typhoon pilot in Eurofighter means I act as the voice of the operator," says Nat. "I do the job because I want to make the product better for the operators. Helping them get the product they want is important and the complexity is such that the guys writing the code can't possibly know what all the operators are going to use the product for.

"You could almost call me a consultant within the business. It's a very interesting role. I support all the programmes on technical matters, give briefings to programme management teams, and liaise with my counterparts within NETMA, our customer organisation. The rest of my role involves helping on programmes and trying to help engineering and operators."

The job at Eurofighter means Nat is still in regular contact with the men and women who fly the aircraft both from industry and from the air force community. He plays a pivotal role organising two committees: first, the Joint Flight Ops, which is made up of the project pilots from the four industry partner companies (BAE Systems, Airbus Germany, Airbus Spain and Leonardo), and second, the JCORD, which brings together project pilots plus operational pilots from the national air forces of Germany, Spain, Italy and the UK. This group looks at aspects of the design, like the cockpits and avionics, to help further develop the aircraft.

A LIFE IN THE COCKPIT

Nat has lived and breathed fast jets for most of his adult life. Inspired by the aircraft flying over his boyhood home in Yorkshire, he learned to fly at Blackpool Airport in 1985, whilst still at Southampton University where he was studying aeronautics and astronautics. After joining the Royal Air Force in 1987 he carried out basic flying training before progressing to RAF Valley for advanced flying training and then becoming a flying instructor.

"After Valley my career took me onto the Tornado and I was stationed at RAF Bruggen in Germany for five years. While there I spent over a year flying over Iraq in a peace-keeping role."

At the end of 1998, Nat's RAF career took a turn that would have a lasting impact when he secured a place at the Empire Test Pilot School and became a test pilot. Following graduation Nat Joined the RAF's Fast Jet Test Squadron where he worked on the Tornado GR4 upgrade and several other programmes. He also ran the Research and Development flight where he did a lot of work on helmet display technology. Nat's team became one of the first in the world, to fly with a helmet mounted display inside night vision goggles.

Then in 2002 he was posted to the United States Air Force to Eglin Air Force Base, Florida, as an experimental test pilot carrying out weapons development, predominantly on the F-16. The US left a lasting impression not least of the skill and knowledge of the pilots he worked with.

FLYING SOLO

On his return to the UK in 2005 Nat left the RAF and took his skills into industry. He joined BAE Systems, initially working on the Hawk programme and spent a lot of time overseas, including a Middle East and Europe tour with the Red Arrows.

Another key career milestone arrived in 2008 when Nat started flying Typhoon. Two years later he was appointed Project Pilot responsible for Typhoon, a role which included several firsts: he piloted the first flight of the P1E standard jet, the first flight of a Tranche Three aircraft, fired the first Meteors missiles from Typhoon, and also dropped Storm Shadow and fired Brimstone during test flights.

Says Nat: "I spent a lot of time transiting Typhoon around the world and during that role flew regularly with the RAF's 41 Test and Evaluation Squadron, carrying out operational and development tests flying with them."

He was even in the public eye from time to time. He says: "I was lucky enough to display Typhoon at the Farnborough International Air Show in 2010 in its heavy configuration with real bombs and →

in 2011 displayed at the Dubai Air Show and in Malaysia. Then in 2016, I also displayed the 'Centurion Fit' Typhoon at RIAT and Farnborough — winning the Steedman Display Sword at the former."

Such was his standing within the test flying elite, Nat was called to become a Fellow of the prestigious invitation-only Society of Experimental Test Pilots.

A FRESH CHALLENGE

In 2019, Nat brought all that knowledge and experience to Eurofighter when he took up the job as Head of Operational Factors.

"I love flying, but after 34 years and over 5,000 flying hours, I always knew it would come to an end. That said, in some ways the skills needed in this role are very similar to when I was a Project Pilot but the emphasis is different. It's still about trying to bring the aircraft to life for people who have never flown it but, whereas at BAE Systems I was focused on pure technical discussions, my current role has far broader scope.

"Yes, I still work in a technical capacity for the Chief Engineer, but I also spend quite a lot of time talking to the programme teams and the strategy teams. It's my knowledge of the platform and the experience of what it's really like to fly that's key. In this role you have to look at things from the point of view of every person involved in the programme."

Nat says that as well as bringing a fresh challenge the new role has also brought him an appreciation of the wider Eurofighter enterprise.

He explains: "As a test pilot and an operational pilot, you're only looking at things from the cockpit perspective. Coming to Eurofighter you get to see the different national political aspects up close and the commercial reality much clearer. It helps you truly understand the complexity of the programme.

People working in Eurofighter get an amazing opportunity to learn about the big picture and see that it's about more than just the product we're working on."

Nat says that one of the key attributes needed to be successful in the current job is to form good relationships. "Very often my job is all about getting the right people talking to the right people at the right time. Understanding who needs to connect with whom and when is vital.

The ability to prioritise is important too, as is the ability to communicate a simple message to decision makers. My rule is that if I have a one-hour presentation to make the maximum number of slides I should have is four."

As for a typical day. Well, forget that notion. It varies from current day problems to looking at the future strategy and things like the Long Term Evolution Study. On any one day he might be reviewing classified tapes and briefing programme managers and board members. Another day will see him attending technical meetings or liaising with the customer about a design assessment.

However, while diary demands may vary, Nat's motivation is constant: his primary focus is on the man or woman in the cockpit and translating the technical engineering difficulties into priorities.

"Having a focus on the operator and their role is important if we are to produce a better product. Whatever the task it always comes back to that." ■

NAT'S FLYING COLOURS

- 5,300 flying hours, the vast majority on fighters
- 1,250 flying hours on Typhoon
- 1,800 Tornado flying hours
- 40+ Different aircraft types flown
- 20 Different air forces worked with

Show Business

© Claire Hartley

Flight Lieutenant **Adam O'Hare** of 29 Sqn is the RAF's 2022 Typhoon display pilot. Flt Lt O'Hare spent the winter at RAF Coningsby carrying out detailed preparation for the display. We caught up with him to discover more about the man who will be wowing the crowds.

When were you first inspired to be a pilot?

Like many people in the Air Force I've been fascinated by aircraft and engineering for as long as I can recall.
I grew up in Northern Ireland which meant I was mainly exposed to helicopters from RAF Aldergrove. I used to see the helicopters flying low level past my house on a regular basis. That was what sparked my interest.
I joined the Air Cadets as a 13-year-old and went with them to my first ever air show at RIAT. It was like nothing I had ever seen before. There were all sorts of jets that until then I'd only ever seen in magazines or on TV. The chance to get up close to those fighter jets and see them display had me absolutely mesmerised. It was a kid in a candy store moment. That's when it clicked that this is the job for me and something I wanted to do.
Thankfully, through the Air Cadets, I started to do a lot of flying and became a gliding instructor. I spent all my free weekends as a volunteer gliding instructor, which cemented the idea that I wanted to make this my career. It was in this period I first became aware of Typhoon through talks and visits from Typhoon pilots.

How did your early career develop?

I went to university for a year to study Mechanical Engineering, but I had also applied to the Air Force, and thankfully they made me an offer. I then had to have an awkward conversation with my mother, to tell her that I was no longer going to university but instead was heading to England to join the RAF. In my early years I went through a significant number of highs and lows. In the first couple of months of officer training, I managed to break my wrist mountain biking during adventure training. That resulted in me being held back waiting for my wrist to heal. Having just started my dream job, the delay was hard to take.
Then there was a long hold in flying training. Thankfully I was able to use my qualifications as a gliding instructor at the Central Gliding School. That gave me a real sense of achievement. I get a lot of pride from bringing students on, which is why I got a lot of fulfilment from my primary role on 29 Squadron as a Qualified Flying Instructor (QFI).

What are the key attributes you need to get to the elite level?

For me, you need a couple of things — persistence and determination. Becoming a Typhoon pilot takes years and a lot of very difficult training. You experience lots of highs and lows along the way. You definitely need the motivation to work hard and keep your head high — even after a hard day.
In addition, Typhoon can move at incredible speeds and has great manoeuvrability which means you also need good thinking and reasoning skills to be able to make quick decisions.
And finally, there are the missions that Typhoon flies. These can be long and arduous, demanding high levels of concentration and the ability to remain patient and calm in stressful situations. Missions can be ever evolving, and you need to be able to adapt within a split second.

What are your memories of your first Typhoon flight?

I was in the back seat, and at the end of the runway the instructor asked, 'Are you ready?' I just sort of laughed in reply saying, 'Sure. Let's give it a go.'
And then the sensation... Well, it was just a total sensory overload. As he opened the throttles I was rammed into the back of my seat. I thought there was something wrong with my kit because it was a feeling I'd never had before. The sheer acceleration of Typhoon. That was a real smile on my face moment.
My first solo flight was on another level. I recall looking around a single seat cockpit, realising that it was just me strapped to a Typhoon. It's a memory I'll never forget.

From a pilot's perspective, what's the aircraft like?

The Typhoon is a sensational aircraft. It's performance, manoeuvrability and thrust are at eye watering levels. →

Typhoon has developed into a world leading combat platform. It performs admirably in all domains. You can take the fight directly to the enemy, wherever that is, and whatever the mission or role. Its swing role capability means we have a tool for every job. Having used the Typhoon both on operations abroad and on Quick Reaction Alert (QRA) launches in the UK I have total confidence about the reliability that the Typhoon gives me every time I ask it. I'd say it's a great aircraft.

Why do you think it impresses so much at an air show?

Its level of performance is almost unrivalled. There are very few jets at air shows that can take off, go straight into a vertical climb, and then continue to accelerate. It's truly unmatched. And that's what makes it so popular with the fans and other pilots.
If you couple that with its agility and its ability to sustain 9G and continue to accelerate in turns — as painful as that is for the pilot — it puts a smile on everyone's face on the ground.

And then there are those Rolls-Royce engines and the rumble that people feel in their chest standing in the crowd line. The aircraft leaves people wanting more and more from every show.

What are you looking forward to most in the display season?

From a flying perspective, I'm looking forward to the challenge. It's something that I've never done before. I'm looking forward to challenging myself to reach the level of flying excellence and professionalism required to be able to perform a safe and spectacular display time and time again — wherever the venue, whatever the weather challenge.
Out of the cockpit I am absolutely buzzing at the thought of getting to meet everyone — the sponsors, industry partners and all the fans.
I'm looking forward to being able to meet young enthusiasts — the equivalent of the 14-year-old me at RIAT — and hopefully encouraging them in the same way I was to follow their dreams. I want to be able to inspire people in whatever way that is. Whether it's to join the military, go into industry or to study science, engineering, maths or technology. That's what I'm looking forward to.

Have you started working on the display?

Yes, the hard work of getting me from a novice to a highly trained display pilot started in the winter. It began with me pulling together some very basic drawings and then jumping in the simulator to see if they work. Once we get a basic display that I'm happy with, I sit with my supervisors and last year's display pilot to really scrutinise it in the simulator before taking it airborne.

What are you going to try to bring to it?

Everyone loves to see fast jets going fast. I want to design a sequence that will show off the incredible speed of Typhoon and also its ability to regain that speed quickly from a slower approach.
I want to take it to the maximum possible limit — obviously we're governed by display rules — and I want to make sure I put smiles on everyone's faces. I know that everyone likes to have that rumble in their chest when they feel the reheat kick in and, at those high-performance moments, I'll be doing my best to keep the back end of the jet pointed towards the crowd. That way they will get a real sense of the raw acceleration and power from the two big engines.

Are there any past displays that you will be drawing inspiration from?

The short answer is: all of them. Most people would agree that all the previous Typhoon displays have been incredible. Each display pilot puts their own unique touch on it, and that's what I'll try and do.
Unfortunately for me the past display pilots have set the bar incredibly high. It definitely feels like some tough acts to follow. But that's the challenge.
Of course, there are only so many manoeuvres the Typhoon is allowed to display but it's my job to come up with something different.
I want to do something that the crowds haven't seen before. I hope that when people see the display, it leaves them wanting more. I want it to be the talk of the car on the way home from the show. That's the aspiration. ■

Shaping the Future

With a track-record of operational delivery across five European air forces, Eurofighter remains central to the continued development of the continent's military aerospace industrial base. Eurofighter Chief Operating Officer Programmes, **Wolfgang Gammel**, explains how Eurofighter Typhoon has a key role to play in shaping technology from here through to the next generation combat air solutions.

Wolfgang Gammel

How important is the Eurofighter programme for European defence industries?

Eurofighter remains the lead defence programme in Europe. It was founded to bring Europe's military aircraft industries together and, when you look to the future, such collaboration is more important than ever.

This industrial footprint will be further strengthened through the Eurofighter programme to ensure Europe can take on future challenges and support co-operation programmes. How? Well, looking at the requirements of the air forces across Europe, it's clear that you need a stable platform like Typhoon where you can mature future technologies. For example, in areas like enhanced communications, additional weapons or airborne electronic attack, capability can only be developed if we have a stable industrial foundation — and this is secured by the Eurofighter programme.

How is the Eurofighter programme currently performing?

From an in-service perspective, we are doing a very good job with high availability rates across the air forces. Just before Christmas we met a significant landmark when we delivered the first two aircraft equipped with E-Scan radar to Kuwait. We announced the Halcón agreement at ILA. And later this year we will have another big milestone to celebrate with the delivery of the first production aircraft to Qatar.

Where does Eurofighter fit as nations look to future combat systems?

We're in the early stages of the next generation fighter development across Europe, but regardless of whether a nation goes for FCAS or Tempest, it's clear Typhoon will be vital to developing a platform capable of dealing with future threats.

For example, we know that success in a future threat environment will demand a different way of communicating. But to mature the necessary technology we need to invest and start the development now. Once matured it can then to be brought onto Typhoon and later onto the next generation fighter. Developing new technologies from scratch — under normal development cycles of pre-development, development, prototyping and production — brings high risk. Typhoon will de-risk this cycle.

So, how exactly will Eurofighter evolve — what is the next step on this process?

It's clear that we need to continue the capability development of Typhoon to ensure that the aircraft maintains optimum operational performance in the 2040s, 2050 and beyond. As we look to these future decades and consider the threat environment, the four core-nations (Germany, Spain, UK and Italy) and their respective industry partners (Airbus; Leonardo; BAE Systems), alongside teams from Eurofighter and NETMA, have been managing a Long Term Evolution (LTE) study to agree how we collectively deliver the required capabilities. We will maintain this positive dialogue and drive a consistent approach towards meeting future threats while satisfying the respective national interests.

As these LTE study conclusions are formalised over the coming months there are already discussions about bringing forward additional capabilities, including new weapon integration under what's known as P4E. Beyond this, we aim to deliver greater processing power, new computers and new avionics, to effectively future-proof Typhoon. The platform will have the required computing power to maintain effective operations over the coming decades.

How does the Typhoon remain a key asset for the German Air Force and other Air Forces?

Without a doubt. Germany has made significant investments into Eurofighter in the last two and a half years. First, in the shape of the E-Scan radar upgrade contract for its Tranche two and three fleet. Then with the Quadriga contract award — the replacement of Tranche one aircraft with 38 Tranche four jets. These contracts underscore the nation's strong commitment to Typhoon and signal to the world that Germany will fly the aircraft for many decades to come. It's a message that others have taken note of.

In addition, we strongly believe there are opportunities for second batch orders from existing customers in the Middle East. Now we can offer more capabilities, I'm sure there are chances for us to secure more orders.

Another big opportunity for us this year is the decision by the German government over the German Air Force Tornado replacement. We believe Eurofighter can deliver the required capabilities in the given timescale and we are looking forward for this decision. ■

ITAF Achieve Flight Endurance Record on Task Force

Two Eurofighter Typhoon aircraft from the Italian Air Force achieved a record of eight continuous flight hours, from take-off to landing, to accomplish a long-lasting Intelligence, Surveillance & Reconnaissance (ISR) mission.

The pair were part of the Task Group Typhoon of the Task Force Air of Italian National Contingent Command Air (IT NCC AIR) – Kuwait as part of the Coalition Operation Inherent Resolve.

They were able to complete the flight milestone thanks to the expertise acquired in air-to-air refuelling activities and the support of Coalition tanker assets deployed in the area. Successfully accomplishing the mission demonstrates the full capability of Coalition Air Power against the DA'ESH.

PLANNING IS KEY

Not only does the eight-hour assignment represent a new record for Italian Air Force Eurofighters, but it is the longest ISR mission performed over Iraq skies. It's a great example of the cooperation among the Coalition partners. The team was able to guarantee the persistence and presence of the Coalition in the operational area.

The mission was achieved thanks to in-depth planning, as part of a well-structured training and maintenance system. The Italian Air Force has put in place a proven logistic chain of flight engineers and technicians, as well as spare parts, to ensure the availability and efficiency of its deployed aircraft on 24/7 basis

OPERATION INHERENT RESOLVE

The Coalition came together to prevent the expansion of ISIL, formerly ISIS. Its aim is to provide the Iraqi Security Forces with the necessary operational support.

The Italian Air Force Eurofighters were first deployed to Kuwait for operation Inherent Resolve in March 2019, replacing the Italian AMX and Tornado aircraft, which previously operated in the area. It's the first time Italian Air Force Eurofighters have been deployed abroad to carry out reconnaissance duties.

Over this three-year period the Eurofighters have demonstrated their full operational capability in ISR flight missions and contributed fully to enhance the Coalition's Situational Awareness. The Italian Air Force Eurofighters provide high quality images and valuable information for the land and other coalition forces employed in the operational area. ■

© Picture by Alessandro Maggia

A Mighty Challenge Overcome

The first Kuwait delivery was celebrated across the Eurofighter community but especially for those who had been directly involved like Maurizio Fornaiolo the Eurofighter Vice President Kuwait & P3Eb and his team.

For them the challenges involved in getting to this stage were significant, not least because the programme developed the most up-to-date configuration in Eurofighter history.

"The aircraft has a new suite of capabilities, and the integration challenges were huge," says Maurizio. "We created a new block (standard) clearance, we introduced a new E-Scan radar for the first time, and we updated the avionics configuration to the latest standard."

Given the ultimate goal, the programme represented a huge engineering challenge. One that involved all the disciplines that complete the big picture — from the avionics, flight control systems and through to the integration of the new stores. The work touched every single discipline involved in the Eurofighter programme.

CREATING A NEW BASELINE

While the programme headlines have focused on the new customer, Kuwait, Maurizio points out that it is not a pure export programme. It is qualified and certified under the Eurofighter four-nation umbrella (Italy, Germany, the UK and Spain) because P3Eb (the formal name of the programme) is a NETMA contract.

He says this new standard will form the baseline for the core nation programme. "We have now established a weapons system capability and that is a key first step in the Eurofighter 10 Year Plan. All future programmes will use this as a baseline for introducing the new capabilities. Indeed, even as we were delivering the initial aircraft, we were also working to progress future clearances to update the weapons system capabilities for the customer. So, the show goes on."

As the delivery team included Eurofighter, the Eurofighter Partner Companies — Leonardo, Airbus Germany, BAE Systems and Airbus Spain — as well as NETMA, it led to an approach which broke down boundaries across nations, across companies and across cultures.

The team is looking forward to building on the foundations it has created. Says Maurizio. "We are not at the end of a journey, we are at the beginning of a new era!" ■

Photographer Claire in Focus

Claire Hartley

Photographer

As these images prove, Claire Hartley is one of the finest aerospace photographers around — but she only got into the life by chance.

For someone so accomplished when it comes to fighter jet imaginary it's a surprise to discover that it was a different type of wing that first drew Claire to photography. "I initially focused on wildlife and nature and macro photos," she explains.

In fact, it was quite by chance that she turned her lens on aircraft. She lives reasonably close to RAF Scampton in Lincolnshire, which is where the Red Arrows — the world-famous RAF display team — are based.

"One day a friend of mine suggested taking the camera to a nearby picnic site. She had taken her children there and they were able to see the Red Arrows close up as they trained for their displays. It was this friend who suggested it might be good for photography.

"I went up with her the following day and that was it. I was hooked. From then I was back there three times a day, five days a week."

Claire lives in a part of the UK that is a veritable plane photographer's paradise but until this epiphany hadn't realised how lucky she was.

"I'd grown up in Lincoln so had always been used to seeing the Red Arrows, the Battle of Britain Memorial Flight (BBMF) and Vulcan flying past."

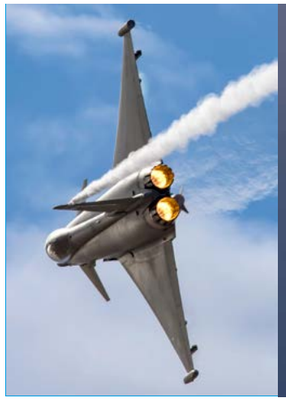
These were rich pickings for a someone who had just discovered a new passion. So, Claire took her camera to nearby RAF Coningsby, home to the BBMF and UK RAF Eurofighter Typhoon.

"After a while I started venturing further afield to air shows. Now I am out with the camera every few days."

Initially the images she took were for pleasure, but she soon discovered her services were in demand.

"It has turned into a partial career accidentally," she says. "I still have a regular full-time job alongside the photography, but this is shift work which means I am able to carry out my photography assignments on my days off.

"It started out as a hobby for me but over time more and more people began asking if they could buy my prints. Then I was approached by several agencies wanting to supply my images to the press and other media outlets. →



"I had my first Typhoon image published in a national newspaper in 2016 and haven't looked back since. I work as a freelance but have supported various display teams and airshow organisers too."

The portfolio of pictures Claire has amassed over the years is impressive, testament to her skill and her dedication. But it's not always an easy job.

"The main challenges are usually down to the weather conditions. For example, moisture in the air can create some great effects such as clouds of vapour on the wings but if the light is bad, it can be very difficult to capture the speed of the aircraft, whilst ensuring the shots are not grainy, and are sharp and in focus.

"I always look for something a little different like an interesting sky. I find the sun and the moon are always good to play with. I like to see the trails of heat jelly, vapour on the wings, or the after burners — or, if you get lucky all of them together!

"For me, the Typhoon is great to photograph. It's good for producing all these dynamic effects which means that you can get some interesting shots.

"The speed and noise of Typhoon is immense. I like to be able to capture that power in a photograph. From a personal perspective, I like the challenge of constantly trying to better previous shots I've got.

From a chance suggestion from a friend Claire has built up strong track record of work.

"I've had images published in the national press, aviation magazines, airshow programmes, posters and display team brochures. I have one on the RAF Typhoon Display Team event trailer. Some of my other photos have been in books, promo material for the companies that own the aircraft and on websites.

"All of the photography I've done has been in the UK, but I've been to different air bases and air shows right across the country. I've also been lucky enough to recently do some air-to-air photo sorties. ■

Strength through capability, commitment and collaboration.

Eurofighter Typhoon

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