EUROFIGHTER

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SPECIAL EDITION

- Eurofighter Long Term Evolution (LTE)
- Delivered to Kuwait
- NATO Air Policing
- Shaping the Future

Eurofighter Typhoon

The Backbone of European Defence

Eurofighter Typhoon

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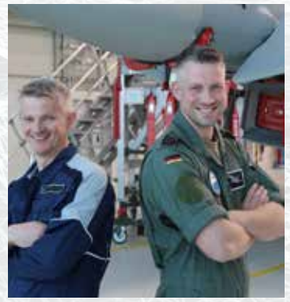

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The Backbone of European Defence

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. ■

© 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!" ■

© Picture by Alessandro Maggia

German Eurofighter Typhoons at Ämari Air Base, © Luftwaffe

Air Policing: Two Nations

Established in 2004 as a defensive peacetime measure, the aim of the NATO Baltic Air Policing mission is to protect the integrity of the Baltic airspace and the adjacent international airspace. The Bundeswehr has been involved in the Baltic Air Policing since 2005 and the first Eurofighter Typhoons took part in 2009. Since 2014, the German Armed Forces, have sent a detachment every year. In recent years it has been helping develop a new 'Plug and Fight' concept to enhance the interoperability between the Eurofighter Typhoon nations within the Alliance.

Created jointly by the German Air Force and the UK Royal Air Force, Plug and Fight sees small contingents supplement the forces of the respective lead nation. It is based on the existing capabilities of the lead nation to reduce the logistical effort.

The first such mission was a collaboration between the Bundeswehr and the UK Royal Air Force in 2019 in Ämari, Estonia, followed by another improving step in 2020 at the same location. Last year the two forces combined again, for the first time at Constanta in Romania.

Earlier this year, the Bundeswehr took part in the NATO enhanced air policing south mission in Romania with a new partner — the Italian Air Force.

Side by Side

RAF Typhoon on take off during a training sortie from MK Airbase in Romania. © MoD Crown Copyright

Two German Eurofighter Typhoons taking off from Ämari Air Base, © Luftwaffe

In this case, three Eurofighters from the Tactical Air Force Squadron 74 from Neuburg an der Donau reinforced the operational contingent of the Italian Aeronautica Militare. The rotation took place between February and March.

Combat aircraft from the alliance nations were stationed at the Romanian military base Mihael Kogalniceanu near the city of Constanta on the Black Sea.

True to the Plug and Fight concept German and Italian aircraft completed Quick Reaction Alert protective flights together. The usual two-ship formation was composed of an Italian and a German Eurofighter.

The two nations were able to harmonize seamlessly as they had already taken part in joint training flights over Baltic airspace at the beginning of 2021.

Plug and Fight is seen as a stepping-stone towards a homogeneous, bi-national task force and will be an important focus during the upcoming eight month enhanced Baltic Air Policing commitment beginning in August this year.

In order to include all the NATO Eurofighter nations in the concept, a contingent of Spanish Air Force aircraft will link up with Luftwaffe in Ämari in the autumn. ■

WHAT IS PLUG AND FIGHT?

In practical terms it sees an existing deployment from one of the two nations, supplemented by the second nation with a minimal technical and logistical footprint. The augmenting nation uses as many of the lead nation's resources as possible, including personnel support and ground support equipment.

The objective behind is to establish the capability to deploy, command and control Eurofighter contingents. In addition, it allows air forces to complement each other during exercises and operational commitments through short-notice provision of small detachments — hence Plug and Fight capability.

WHAT ARE THE BENEFITS?

Plug and Fight provides significantly increased interoperability within a few days multinational military operations can be conducted. It offers:

- High flexibility
- Quicker reaction times
- Reduces costs
- Reduces logistical resources

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

Germany's One Team Approach a Winner

Christian Dotzauer Chris Limpächer

Based in Manching, Bavaria, the Eurofighter Kooperation Zelle (EKZ) is a ground-breaking collaboration between Airbus and the German Air Force (Luftwaffe). With around 200 people, the EKZ provides technical and logistical support for in-service Eurofighter combat aircraft. We discovered more about it from German Air Force Master Sergeant **Chris Limpächer**, an Avionic-Tester, and Airbus' **Christian Dotzauer**, a crew chief and mechanic.

Not many people can say their career has spanned a nation's entire combat aircraft production run. Christian Dotzauer can. When it comes to Eurofighter production, Christian has been there, seen it and worn the blue overalls.

After joining the German Air Force (GAF) in 1993, he went on to serve for 12 years, predominantly working as Crew Chief on the F-4F Phantom in the GAF squadron TaktLwG 74 in Neuburg in South Germany. Highlights included training missions overseas, which took Christian to Sardinia, Portugal, the United States and Canada — before taking up a new challenge in industry.

"The end of my service in 2003 coincided with the start of the Eurofighter programme in Manching," he says. "It was a one-time chance to be part of a Serial Instruction Pilot Training project — essentially, the pilot and technician training involving both the industry and the German Air Force. I was lucky."

Christian joined the industry team just before the world's first series production Eurofighter jet took off on its maiden flight from Manching on 13 February 2003.

The aircraft GT001 (GT stands for German Trainer) was delivered to the German Air Force School of Engineering No.1 in Kaufbeuren, where it was used to train ground personnel.

"I am proud that I can say that I have been here for the entire series production," he says. "I've also been here for the delivery of every aircraft to our neighbour Austria. It is an honour for me to work on this programme."

"Of course, when you have been around the programme so long you become the 'go-to' person. When new people join the team, they tend to come to me when they have questions. But when I started it was really all new territory for me. I had to make a transition from the air force to civilian life, and from F-4F Phantom to Eurofighter, so I really had to rely on my new Airbus colleagues. They were very familiar with the Eurofighter prototypes and trained me on the new weapons system. Even back then there was very close cooperation between the industry team and the air force and the working relationship was very good." →

Fully rigged in Dock 8: In the Airbus flight operations hangar, the 31+15 receives an 800 flight hour inspection and new modifications. © Bundeswehr / Max-Joseph Kronenbitter

WE LEARN FROM EACH OTHER

That partnership — solidified with the founding of the EKZ EF — continues today. And it's as important as ever. German Air Force Master Sergeant Chris Limpächer, an Avionic-Tester, is part of the unit in Manching. He says: "There are strong synergies between the Air Force and Airbus. We learn from each other. As soldiers we learn from the industry and get to see from them how the aircraft is built. Of course, it works the other way around too. Our industry colleagues learn from the people who fly the aircraft and who can flag up new issues, because they have an operational understanding of what's required."

This pooling and exchange of knowledge is what makes the EKZ such an effective collaborative effort. Says Chris: "In my team — the Tester team — there are three soldiers from the Air Force and around 30 Airbus people. In other areas of the centre the numbers are different but whatever the function, we all work side by side."

Chris actually started his working life training to be a car mechanic but decided to join the army because he felt it would be a better long-term career. After joining the Bundeswehr as an apprentice aircraft mechanic in Rostock/Laage (North Germany) in the GAF squadron TaktLwG 73 , his four-year apprenticeship took him all over Germany. Then, within a few weeks of completing it, he was deployed to Sardinia. He says: "It was the first time I worked on the Eurofighter, and it was very exciting. It was an interesting experience not least because I was working alongside Italians, seeing a different culture, and a completely different way of working." I really enjoyed the corporation between the different countries."

On his return to Laage, Chris was encouraged to develop his knowledge further and he became a leader of the High Frequency Technology team. Then after learning about the EKZ from other colleagues, he volunteered to be transferred. In Manching, Chris was testing all the aircraft's different systems, which meant expanding his understanding further.

"What I find interesting about the corporation is that you get to learn how the aircraft's systems are connected and interlinked," he says. "You're not solely focussed on one system, which you can be in the Air Force. Instead, you get the whole overview. Working here also creates shared connections and experiences between people. So even when Air Force colleagues move on to bases, they can still tap into the knowledge of the teams here.

A TYPICAL (FLIGHT OPERATION) DAY FOR A CREW CHIEF THROUGH THE EYES OF CHRISTIAN DOTZAUER

Flight safety is paramount in everything we do. Test work starts on the day before the flight with the registration of the aircraft

On the day itself, work starts at 6am. We carry out a series of pre-flight checks. This means checking the aircraft from the outside and inside the cockpit including the ejection seat. Once everything is checked, I sign the documents and report the aircraft ready for flight at the Flight Operations Centre.

Then the main pre-flight briefing takes place. This includes members of the ground crew, the pilot and the flight test engineer. Here, we discuss any maintenance required on the aircraft may have had previously and the work we've done to solve them. The pilot discusses the test points he has to carry out during the flight. Then I sign the paperwork that states the aircraft is fit to fly and hand it to the pilot. At that point the responsibility for the aircraft transfers to the pilot.

Before the pilot enters the cockpit, he does a final walk around. During this "See Off" inspection, a number of checks are carried out with running engines. If everything is okay, the pilot taxis to the "Last Chance Check", which is carried out by the crew chief before the Eurofighter takes off for its test flight.

Typically, the flight time is 50 to 70 minutes and during that time my team and I are on standby in the hangar. Then, on the aircraft's return, there's another 'see in' inspection, before the debriefing when the pilot talks through how the flight went.

"That's where the co-operation with industry has been valuable. I really like the environment here. Working alongside industry, is different to the way things work in the Bundeswehr. But obviously I am still in the army and must fulfil those duties too. It's like having two jobs!"

Christian says understanding the Air Force perspective also helps his crew chief role: "Having the background knowledge is very useful because when a pilot is describing a problem you need to have a good all-round understanding of the aircraft. The good thing is that here you have people around you who understand the whole aircraft.

"Of course, I've worked in the aerospace industry for 30 years and experienced many highs and lows, but we have a simple mantra — never give up. We know that, together as a team, we will be able to solve the challenges and problems that come our way."

A TEAM WITH A MISSION

There's a real sense of pride and purpose among members of the EKZ.

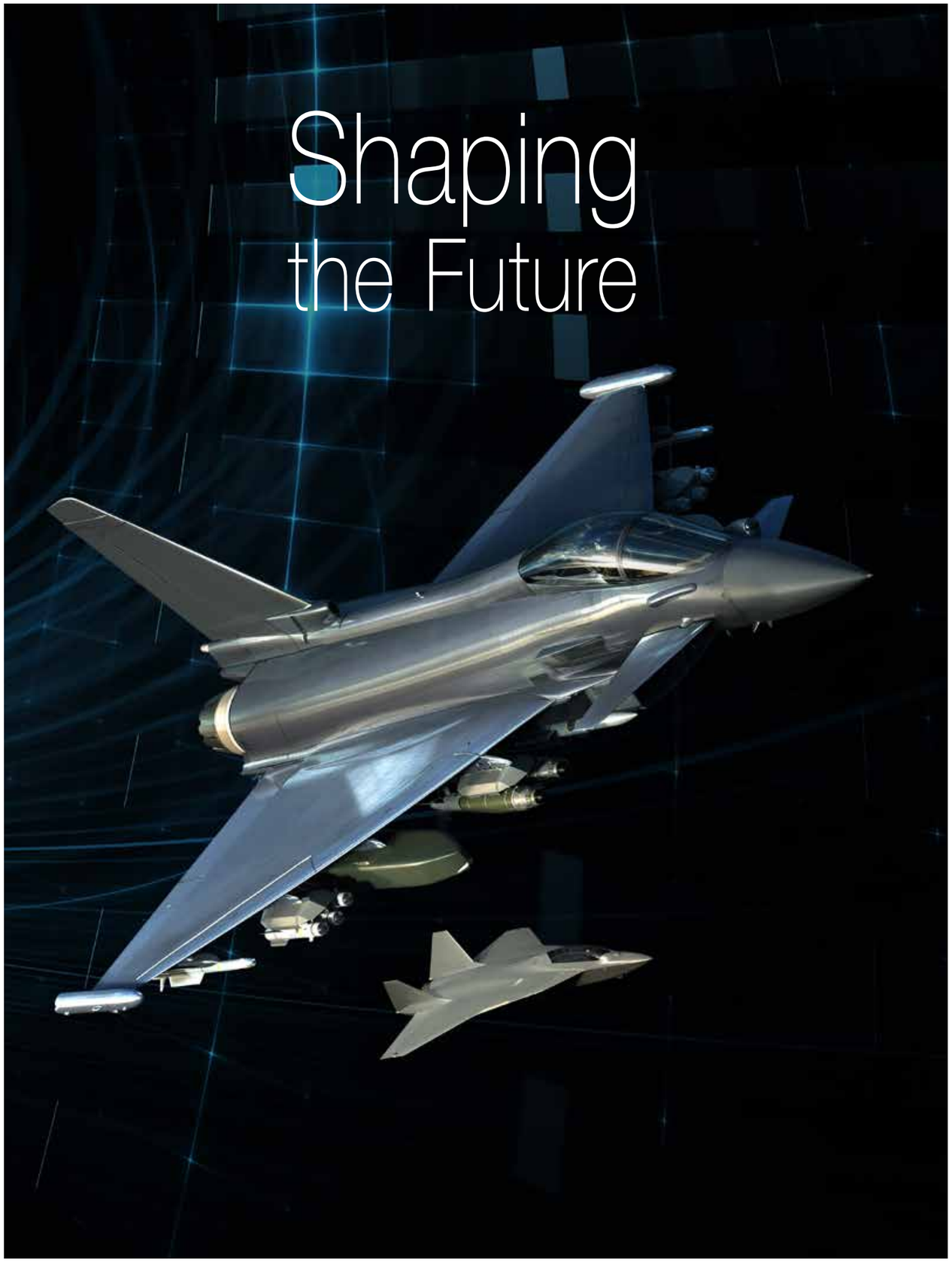
As crew chief, Christian's job comes with great responsibility. His is the last signature on the paperwork (the Flight Service Certificate) before the pilot gets into the cockpit.

"You must take the job seriously," he says. "The German Air Force is tasked with securing the borders of NATO countries. That is only possible if the pilots are well trained, if the aircraft is working well and if it is maintained the way it should be. Obviously, we are a part of the big picture but if we don't work together, don't maintain the aircraft and if it's not ready to fly, then the borders can't be secured."

Chris agrees that it's a job with significant responsibilities. "Every job is important, but the Eurofighter programme is a special one. There's a serious side to what the Eurofighter represents. Everyone working on the aircraft has to act responsibly because the pilots operate in very difficult and often dangerous situations."

Today the Eurofighter programme is entering a new phase, following the Quadriga contract which will see 38 new Eurofighter jets built for the German Air Force. They will be the most up to date European combat aircraft ever with a service life well beyond 2060.

It means Christian, Chris and the rest of the EKZ will be busy for many years to come! ■



Shaping the Future

Wolfgang Gammel

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.

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 airforces. Just before Christmas we met a significant landmark when we delivered the first two aircraft equipped with E-Scan radar to Kuwait. 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. ■

The Power in the Raw

Experienced aviation photographer, **Andreas Zeitler**, doesn't like to spend hours on Photoshop to come up with the 'perfect' image. For him it's about trying to 'show performance and raw power' but in a realistic way.

ANDREAS ZEITLER

Photographer

"I'm technically-oriented — I want people to see and experience the same scene as I have seen it," says Andreas who started learning about aviation photography in the late 1990s.

"The biggest compliment I receive is when people don't believe I have taken certain photos, but 'photoshopped' them.

"The truth is I don't like spending too much time on my computer, tweaking photos or applying filters. My aim is to produce a technically perfect photo, which will fit the need of its future use. Some of my photos are printed on walls or tents, 4m wide, so I need a sharp photo.

"I also aim for technically difficult photos and here it's amazing how camera technology has evolved. Nowadays you can mount small action cameras on the outside of an aircraft that provide image quality which is good enough for magazine double spreads. The autofocus is ridiculously good. Likewise, the image sensors are so sensitive that it has opened up a whole new world of night photography. Even in pitch black you can take great results if your exposure time is long enough."

Andreas, whose work has appeared in the likes of Flug Revue, Air Forces Monthly, J-Wings out of Japan, and Flugzeug Classic, as well as a host of other commercial organisations, says buying his first digital DSLR camera around 2004 was a gamechanger.

He says: "This is when it turned into a serious hobby. I would not call it a career, but it is a serious hobby – one that has professional aspects. I invest a great amount of time and effort into my aviation photography but I also have a full-time job in the aviation industry."

In the hands of talented people like Andreas, aviation photography can produce some incredible results but getting the perfect shot isn't easy. Access is limited, then there are safety constraints and even when you have planned every aspect, something might go wrong at the 11th hour which prevents the shot. →

"Photojournalist Robert Capa famously said: 'If your pictures aren't good enough, you aren't close enough'. Of course, getting close is not easy as Air Forces are very reluctant to give access to their airbases.

"Getting the right shot depends on trying to orchestrate many different moving parts. If one element fails, the whole thing doesn't work. It happens. On the special days everything works out but even so, you always need a bit of luck too, along with weeks, sometimes even months of preparation, but that's quickly forgotten once you get that one shot."

As author of the self-published '10 Years of Eurofighter On Luftwaffe Service', it's natural that the star of many of Andreas' photos is Eurofighter. He says: "I like Eurofighter's power. The two engines in reheat look very good on photos, especially when it's dark. It can also pull a lot of G force, and during an airshow display under the right conditions you see a lot of 'vapor clouds'.

"The delta wing is a very nice feature which on photos makes the aircraft look very fast, and you can work with that. It can also change its look quite a bit. You can have a slim and sleek jet, built for air superiority. But then if you load it up with weapons, then it really becomes a truck, which is an interesting aspect as well."

For Andreas, aviation photography is a labour of love that has taken him to five continents, and more than 70 countries. "It has also taken me to 40,000ft several times, with Eurofighters posing in front of a perfectly clear and deep blue sky. It has been a real pleasure to work with them in this 3rd dimension! I would be very happy to repeat this anytime." ■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