InFlight

Liebherr-Aerospace Magazine
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LIEBHERR

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www.liebherr.com

From left to right: Alex Vlielander – Chief Customer Officer, Martin Wandel – Chief Operating Officer, François Lehmann – Chief Financial Officer, Dr. Klaus Schneider – Chief Technology Officer

Dear Reader,

Imagine we would live in a stable and conflict-free world with all-over growing economies, level playing fields, robust supply chains and a carbon neutral transport system. Difficult to imagine? Well, that's not what we see just now. We are navigating our division through troubled water, confronted with overlapping challenges requiring our full attention.

Yes, we are back to pre-COVID levels in global air traffic and aircraft production is ramping up in all market segments, but it's still quite a way to go to rebuild supply chain resilience. The trend towards isolation and uncertain security architectures are impacting on our decision making for future investments, whilst at the same time opening up business opportunities in the defense sector. Climate change is no fake news and requires continuous and steadfast efforts towards carbon neutrality, despite deteriorating political commitment. Artificial intelligence is positively impacting our way of working, accelerating time-to-market and efficiency, whilst challenging cybersecurity and compliance.

Despite these uncertainties, our strategy is clear. We constantly invest in new technologies, driving solutions for a more sustainable air transport. Electrification of aircraft systems, hydrogen technologies for power generation on board or 3D printing for critical applications are just a few examples. At the same time, we invest in our industrial capabilities and production capacities to cope with our customers' needs for best costs, high production rates and efficient MRO services. Also, digital transformation is at full speed. We are on our way to becoming a model-based enterprise, we are supporting digital initiatives of our customers, and we want to make value from data, e. g. by offering analytic health management solutions.

All this is embedded in a framework of corporate responsibility and compliance, proving our commitment towards a sustainable development of our business activities. And all this is not possible without our skilled workforce and young talents taking on the challenges. In return we offer inspiring projects and fascinating jobs.

Explore our magazine, discover exciting stories and let us impress you with our capabilities. Enjoy reading!

Together, we are preparing the future of mobility.

The Board of Liebherr-Aerospace & Transportation SAS

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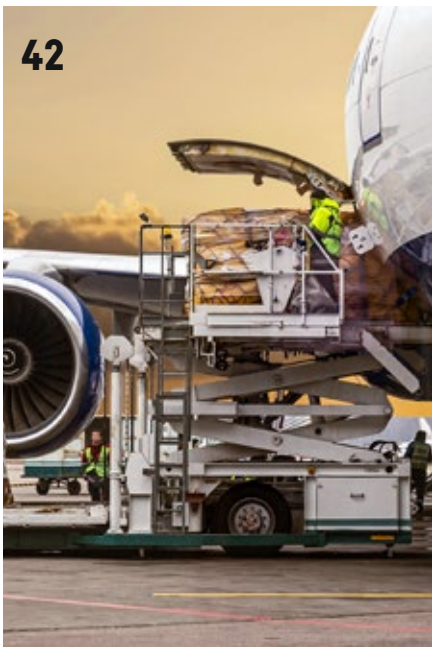

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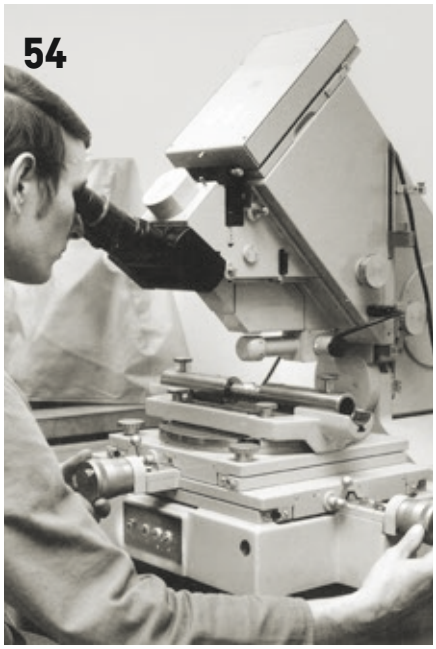

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Impressions

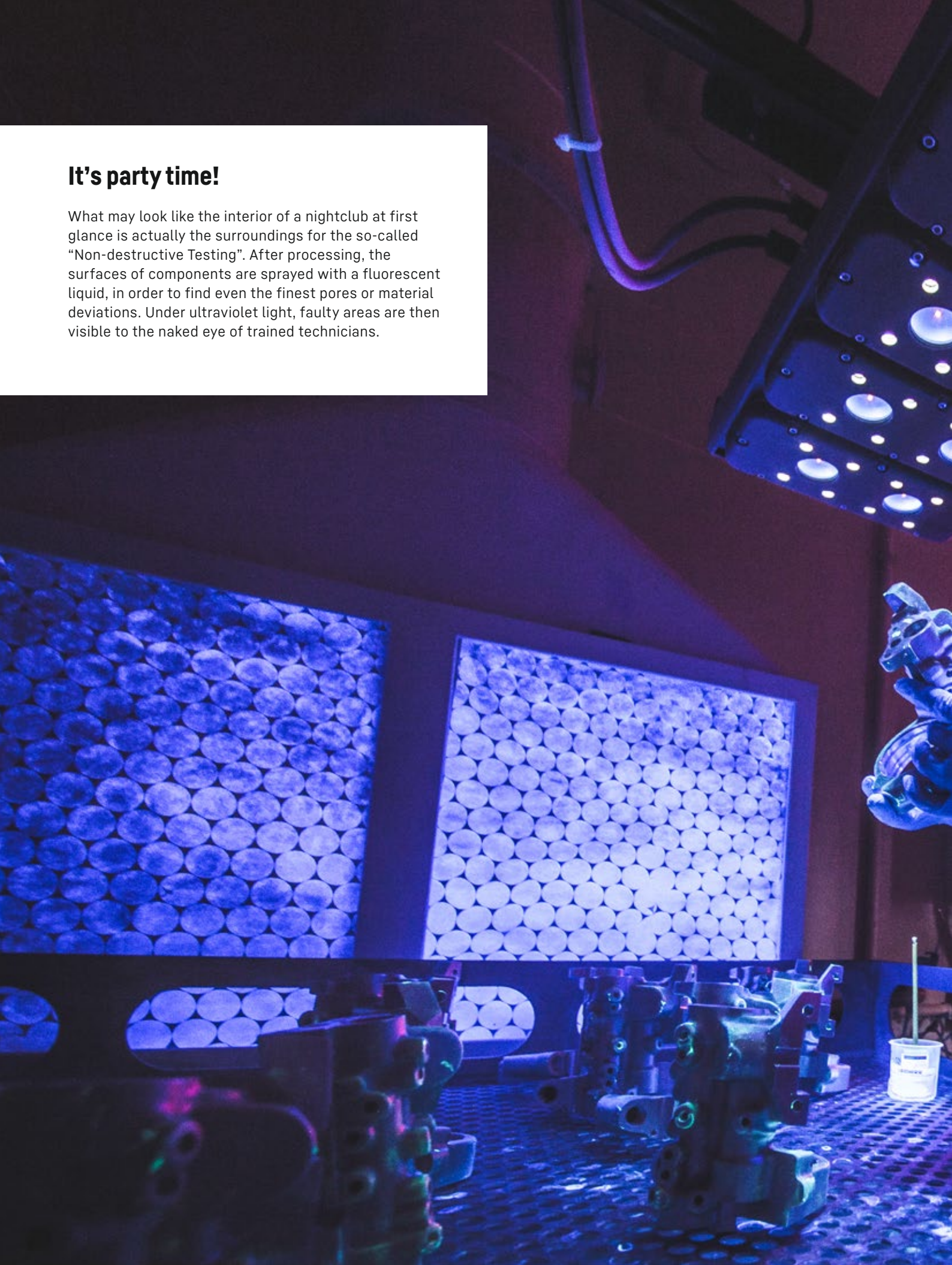
All in blue
Structural tests are used to test the structural integrity of aircraft landing gear - far beyond regular operation. For the fatigue test, the landing gear is exposed to millions of load cycles over one year introducing the damage equivalent of five aircraft service lives to the structure. For the static load tests, the landing gear structure is loaded up to 1.5 times of normal operating loads. To track exactly how the landing gear behaves under these conditions, adhesive dots are attached to selected areas. With the aid of a specific camera system, the 3D movement of the dots can be accurately tracked. The results obtained are then compared to simulations for evaluation purposes.

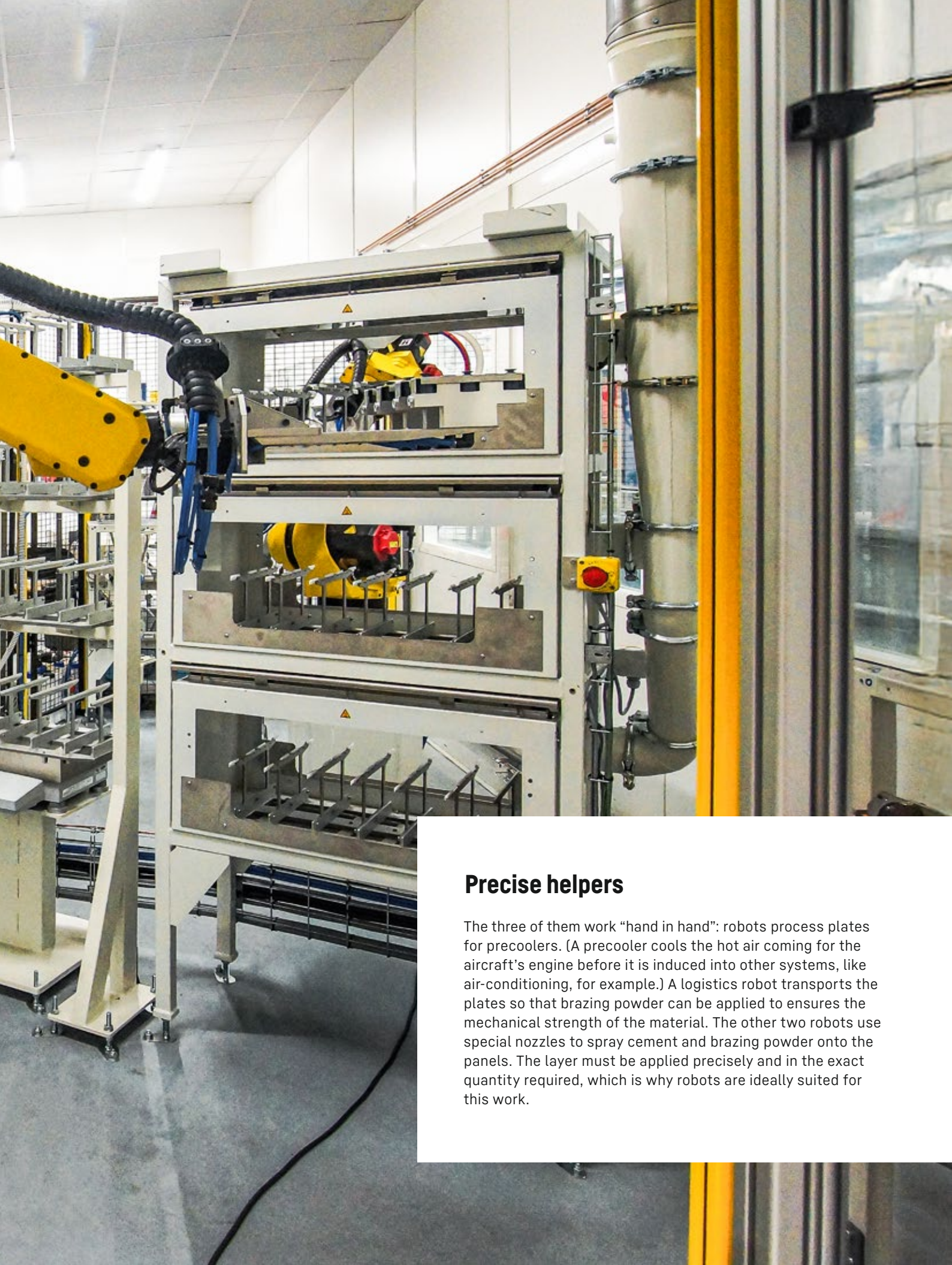
A massage jet in a whirlpool?

Not at all! To ensure that everything works smoothly in flight, even the smallest components are tested thoroughly. Just like this filter, which will be installed in the flight control system. Despite its length of just 14 mm, it has space for around 12,000 holes – each drilled by a laser. The so-called Bubble Point Test is then used to determine how big the largest hole is and whether it is within the required norm.

It’s party time!

What may look like the interior of a nightclub at first glance is actually the surroundings for the so-called “Non-destructive Testing”. After processing, the surfaces of components are sprayed with a fluorescent liquid, in order to find even the finest pores or material deviations. Under ultraviolet light, faulty areas are then visible to the naked eye of trained technicians.



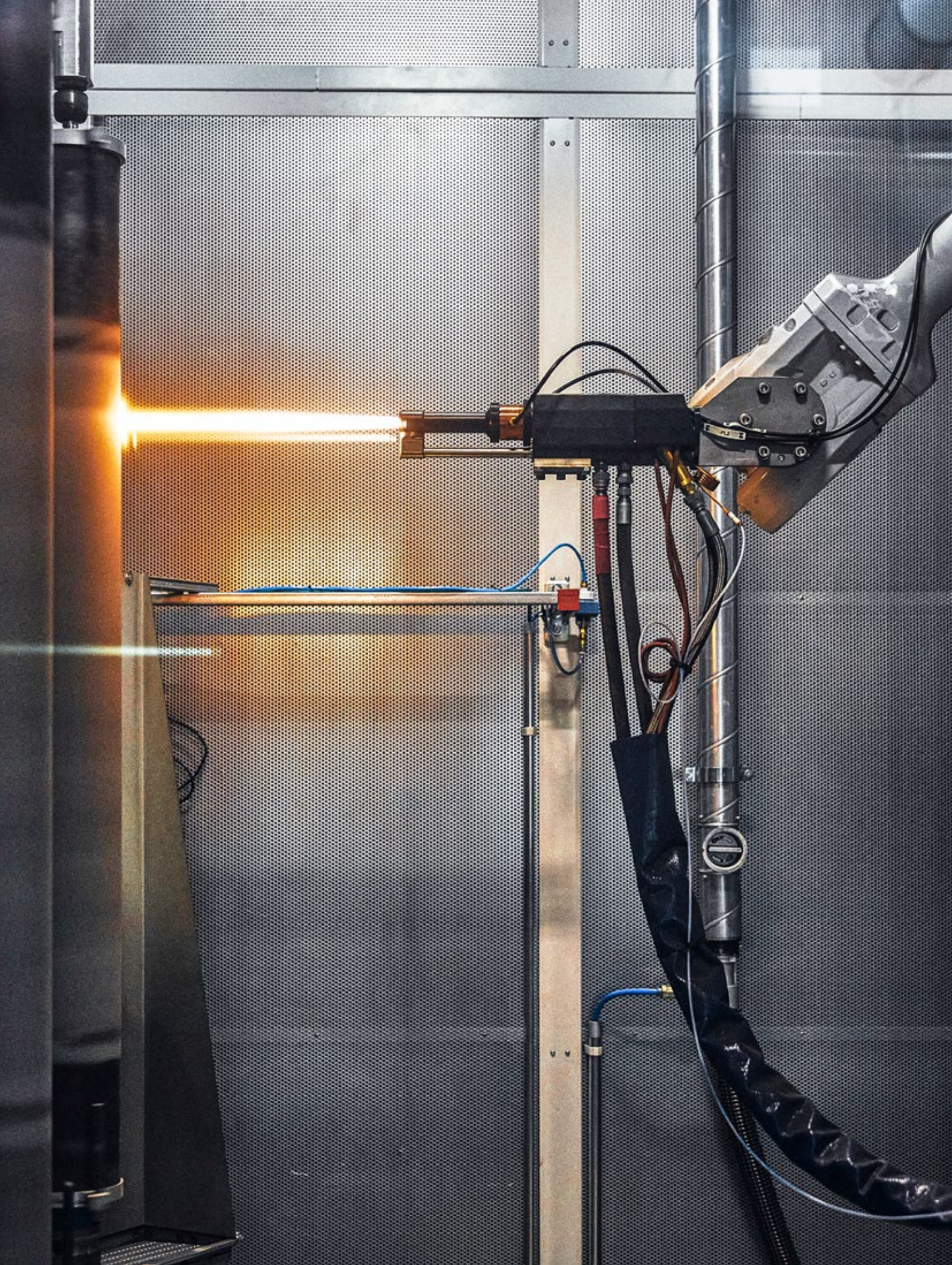


Precise helpers

The three of them work “hand in hand”: robots process plates for precoolers. (A precooler cools the hot air coming for the aircraft’s engine before it is induced into other systems, like air-conditioning, for example.) A logistics robot transports the plates so that brazing powder can be applied to ensures the mechanical strength of the material. The other two robots use special nozzles to spray cement and brazing powder onto the panels. The layer must be applied precisely and in the exact quantity required, which is why robots are ideally suited for this work.

Industry Information

Hot and fast
High-velocity oxygen fuel spraying, or HVOF for short, is a more sustainable surface treatment that replaces the chrome-plating process previously used at Liebherr's Lindenberg site in Germany. During this process, the component is sprayed with a jet of kerosene and tungsten carbide, cobalt and chrome powder under extremely high pressure: the particles hit the component at supersonic speed and a temperature of around 1,700 °C. To prevent the component from heating up too much, it is constantly rotating during the process.



Keeping pace with the times

In recent months, Liebherr-Aerospace has signed many agreements, broken ground and inaugurated new buildings. Liebherr is continuously updating and expanding its sites for increased capacities, new production technologies or customer service excellence. An overview of current projects and developments.

The commercial aviation market is set for significant growth following a recovery to pre-pandemic levels in early 2024. The increasing demand requires over 40,000 new passenger aircraft in the next 20 years, with around 15,000 already in the order books of major aircraft OEMs. Furthermore, high aircraft utilization drives significant global demand for MRO services. Business jets, helicopters, and defense aircraft markets are also poised to grow.

In light of this, Liebherr-Aerospace's new investments focus on securing and developing its industrial and customer service capabilities. This includes the extension of the Campsas facility in Toulouse (France) as well as the facility in Guaratinguetá (Brazil), the enhancement of HVOF coating capabilities in Lindenberg (Germany) and the improvement of heat transfer equipment re-coring in Shanghai (China), Singapore and Saline (Michigan, USA). Furthermore, a new Liebherr-Aerospace service center will start its business in 2026 in Dubai (UAE) covering the Middle East region; and last but not least, two suppliers in Toulouse were acquired to strengthen core competencies in manufacturing and surface treatment for Liebherr's air management portfolio.

Growing in France

In Southern France Liebherr is investing in the future with a new industrial building at its Campsas site in the Tarn-et-Garonne region. The facility started operations in 2025 and is located close to the current plant, which specializes in the machining of high-precision mechanical parts. These include turbine and compressor wheels and high-temperature valve bodies, which are integrated into bleed air and air-conditioning systems.

With a surface area of 12,000 sqm, the new low-energy building will be dedicated to the production of heat exchangers, key components in aircraft air-conditioning systems, currently carried out at the Toulouse site. This eco-responsible building is also the company's "industry 4.0" showcase, featuring advanced production technologies and industrial processes.

At Liebherr's facility in Toulouse, the area freed up by the relocation of the heat exchanger production activity will enable a significant increase in industrial capacity for the assembly and maintenance of other equipment for air systems.

Liebherr expands its aerospace manufacturing plant in Guaratinguetá, near São Paulo (Brazil) and celebrated the ground-breaking for the new building in February 2025.

With an investment of almost €30 million, Liebherr confirms its roots in Campsas, and its determination to continue developing its expertise in France.

Trusting in Brazil
Liebherr expands the surface area of its production company in Guaratinguetá by 8,000 sqm. The new facility is expected to be fully operational in 2027. Over the next 10 years, around €45 million will be invested in the manufacturing site. The expansion will create hundreds of new jobs and thus strengthen the local economy.

The ceremonial groundbreaking took place at the beginning of 2025 and transfer of work from Liebherr-Aerospace's European Original Equipment Manufacturing sites in Lindenberg and Toulouse is planned to begin already in 2026 and ramp-up in the years to come. The production activities will comprise machining and surface treatment of high-precision aircraft components made of aluminum and steel.

The decision to invest in Guaratinguetá is based on Liebherr's trust in the local economic market conditions and related governmental support, as well as on the availability of a highly skilled workforce in the region.

Since 2005, Liebherr Aerospace Brasil produces critical high-tech components for flight control and actuation, environmental control and thermal management systems, landing gear systems, as well as for aircraft engines.

Securing expertise in Lindenberg
At its site in Lindenberg Liebherr has put a newly added production area of 1,000 sqm into operation. The new building features state-of-the-art heating technology that is already used in existing areas of the company: heat recovery with heat pumps, which are operated with gas instead of refrigerants. Furthermore, a photovoltaic system was installed on the gras-covered roof.

In the new facility Liebherr has set up a center of excellence for coating with a focus on more sustainable surface treatment. The key task in developing state-of-the-art coating processes is to identify and use alternative materials and more environmentally friendly processes – a challenge in aviation, because not all materials meet the high safety standards of the industry.

A new production building was constructed at the Campsas site of Liebherr-Aerospace Toulouse in the Tarn-et-Garonne region (France).

With high-velocity oxygen fuel (HVOF) spraying, Liebherr-Aerospace offers a solution to replace the currently used chrome-plating process without jeopardizing the quality or safety of aircraft components.

The new extension building is equipped with the latest technology for implementing this coating method in order to increase capacities for the HVOF process. Liebherr is thus not only securing its well-founded expertise at the site in Lindenberg but is also able to significantly reduce transport routes within the production process.

Liebherr-Aerospace is already using the HVOF process in series production – not just for the exterior, but also for the interior of components.

Latest HVOF technology is applied in Liebherr-Aerospace Lindenberg's new building for surface treatment.

Heat transfer servicing in the USA, Singapore and China
In Saline, Liebherr is enhancing its aftermarket service capacities with the fifth expansion since 1993. Spanning 3,065 sqm, the new expansion adjoins the existing heat transfer facility, which commenced operations in 2016.

The new facility will cater to the growing aftermarket demand for testing, repair, overhaul, and re-coring of Liebherr products installed on Airbus, Boeing, Embraer, Mitsubishi, and Bombardier aircraft. Additionally, the new facility will accommodate the internal movement of certain other products, thus increasing the required landing gear processing capacity at the main facility.

The positive and overwhelming acceptance by Liebherr's customers of the heat transfer servicing set-up in Saline has allowed the company to expand its offerings worldwide, thus validating its strategy to be close to its customers.

In Singapore, Liebherr extended its capabilities regarding the full overhaul and re-coring of heat transfer equipment on site. Thanks to the excellent collaboration with Liebherr-Aerospace's own centers of excellence in Lindenberg, Toulouse and Saline, this major milestone was successfully accomplished according to the customized requirements of the regional service center in Singapore.

This substantial investment enables the company to offer state-of-the-art repair capabilities for a further extended scope of Liebherr components to APAC customers. It also underlines once more Liebherr's commitment to the region and service excellence for its customers in Asia-Pacific.

In Shanghai, Liebherr is ramping up its offer to Chinese customers regarding the servicing of aircraft equipment. The company continues building up its industrial footprint at its MRO facility as well as for testing and reconditioning of its OEM heat transfer equipment directly on site and close to the customers.

In Saline, (Michigan, USA), Liebherr-Aerospace is expanding its service capacities. The ground-breaking ceremony for the new building took place in June 2024.

To make the relevant and required know-how available to its employees, Liebherr relies on intensive training. For this reason, employees from Shanghai joined their colleagues at the Liebherr facility in Singapore where they participated in a combined product and process training.

By expanding the heat transfer equipment MRO network in the USA and Asia, Liebherr-Aerospace is shortening the overall Turn Around Time by eliminating transportation time, cutting down on cost and lowering its carbon footprint.

Expanding in the Middle East
Liebherr-Aerospace is enhancing its aftermarket service capacities with a new 2,400 sqm facility, planned to be put into operation in early 2026. The new service center at the Mohammed bin Rashid Aerospace Hub in Dubai South will cater to the Middle East's growing demand of aftermarket repair capacity for Liebherr products that are on board a wide variety of commercial aircraft, business jets and helicopters. The new facility will be an EASA Part 145 certified Service Center with focus on air management systems components repair.

The expansion of Liebherr's MRO capacities in Dubai is one of the key elements for continuous extension of its customer support and services portfolio in the Middle East region.

Consolidating presence in Occitania
Liebherr-Aerospace Toulouse SAS, Liebherr's center of excellence for environmental control and thermal management systems, has acquired two of its suppliers to reinforce its industrial capabilities and meet the growing needs of the aviation sector in context with the increasing aircraft production rates.

SIBI SAS, a subsidiary of the Industrial Family Group KEP Technologies, was acquired in December 2023 and integrated into the Liebherr Group under the name Liebherr-Aerospace Montauban SAS.

Shaking hands after the signature of the agreement for a new service center at the Mohammed bin Rashid Aerospace Hub in Dubai South: Mohammad Al Falasi, Deputy CEO of MBRAH (right) and Damon Seksaoui, General Manager Aerospace Division at Liebherr Middle East (left).

The company specializes in the industrialization and production of metal assemblies and is a key player in precision mechanics for the aerospace industry, particularly in the sheet metal sector, in machining of complex parts, welding, and assembly.

Only three months later, in March 2024, the company GIT Galvanoplastie Industrielle Toulousaine SAS was bought and also integrated into the Liebherr Group as Liebherr-Aerospace Coatings SAS. Based in Cugnaux, in the vicinity of Toulouse, the company specializes in surface treatment and the application of liquid paint on various materials for the aerospace industry.

Its industrial capacity and new cutting-edge processes enable Liebherr-Aerospace to support its growth and that of its customers.

26,400 sqm

(excluding acquisitions) are being created at Liebherr-Aerospace's new production and service facilities during the next years.

We are ready for defense!

The Airbus A400M is a transport aircraft, for which Liebherr supplies major systems and components.
© Jana Neumann

With its comprehensive industrial capabilities, Liebherr provides on-board systems and life cycle support for flying defense platforms needed for transport of troops and cargo, pilot training, air defense, or reconnaissance. The solutions provided by Liebherr ensure that defense aircraft can operate efficiently and effectively across a wide range of mission profiles. As a reliable partner to armed forces, Liebherr optimizes operational readiness with a comprehensive portfolio of tailored MRO solutions for aircraft components and systems, benefiting from its global MRO network.

Liebherr-Aerospace is an experienced partner when it comes to the development, manufacturing and servicing of landing gears, flight control and actuation systems, environmental control and thermal management systems, gearboxes and electronics for fixed wing and rotary wing defense aircraft. The systems and components are tailored to the special requirements of defense platforms in terms of reliability, safety and resilience, including equipment for specific applications such as cooling of on-board systems or utility actuation for loading bays and air refueling.

The scope of sustainment services includes technical support, comprehensive inventory solutions, parts management as well as certified repair services and covers the entire product life cycle. Services cover both Liebherr-designed components and third-party equipment under license, ensuring seamless integration.

Extended customer service is provided by the OEM-Defence Services joint venture, which coordinates more than 20 industrial partners worldwide. It provides maintenance solutions to reduce costs and improve fleet availability.

For today and tomorrow
Already today, many defense platforms rely on Liebherr products, such as

- air management systems for the A400M, C-390, Tiger Rafale, Super Puma or KT-1, incl. bleed, air-conditioning, ice-protection and pressure control
- cooling systems for various special mission aircraft
- flight control systems for the Eurofighter, A400M or NH-90, incl. electro-hydraulic actuators and fly-by-wire technology
- landing gear systems for Eurofighter, Tiger, M346 or AW149, as well as
- utility actuation for several air refueling platforms, cargo aircraft or helicopters, incl. door actuation, hydraulic power supply and gearboxes.

A complete list of defense programs can be found in the overview of program participation on pages 68–70.

Liebherr is ready to play a major role in the equipment and sustainment of next-generation aircraft systems. The preservation of industrial capacities and capabilities in the equipment industry sector is key for innovation and sovereignty in defense and security. In this context, Liebherr's contributions in the aeras of new build, off-set or sustainment services can be manifold, like design, development, manufacturing and servicing of own products, manufacturing in license, MRO services for third-party products, or being a partner in a sustainment network.

Discover more

The legacy for future generations

Liebherr-Aerospace & Transportation SAS considers it important to behave responsibly towards the environment, the society and its business partners. Legal requirements should not only be met, but ideally exceeded, and ways as well as means must continuously be sought to actively contribute to a more sustainable future.

The law plays a crucial role in fostering sustainability, providing a baseline that companies are obliged to meet. However, Liebherr views legal requirements just as the beginning. The dedication and commitment to corporate responsibility drives the company to exceed regulations and to continuously strive for growing positive impact.

Sustainability considers the value of humanity, the balance between work and personal life, and care for the environment. Liebherr-Aerospace & Transportation SAS prioritizes initiatives for the reduction of its carbon footprint and the preservation of natural surroundings. Ultimately, the engagement for action constitutes the legacy for future generations, compelling everyone to act with foresight and compassion.

Martin Wandel, Chief Operating Officer und Chief Sustainability Officer at Liebherr-Aerospace & Transportation SAS, says: “Liebherr embraces its responsibility towards the society, the environment and our business partners. Committed to a more sustainable future and compliant business behavior, we aim for long-term success and the well-being of future generations.”

As a globally positioned company, with worldwide operations and business relations, Liebherr understands the high expectations of its customers. One path to proof the OEM is meeting its customers’ sustainability requirements, is to answer the questionnaires of relevant sustainability rating platforms like CDP (Carbon Disclosure Project) or EcoVadis.

Silver medal for Liebherr-Aerospace & Transportation SAS
EcoVadis is the world’s leading provider for sustainability ratings and awarded Liebherr-Aerospace & Transportation SAS an overall score of 75 / 100 on its sustainability assessment report in 2025. This score not only placed Liebherr in the top 15 % of all companies assessed in the aerospace industry, but it also qualified the Original Equipment Manufacturer for the Silver Medal.

With this very positive result, EcoVadis recognizes the effort Liebherr-Aerospace & Transportation SAS places on best practices in the four areas that have been evaluated: Environment, Labor & Human Rights, Ethics and Sustainable Procurement. The third-party assessment consisted of a six-step extensive process that combined data gathered from Liebherr via questionnaires, but it also included public information identified via thousands of data sources, culminating with a thorough analysis by EcoVadis' experts.

IAEG Membership
Furthermore, Liebherr-Aerospace & Transportation SAS is part of the International Aerospace Environmental Group (IAEG). IAEG is an impactful organization that provides a global forum to collaborate on and share innovative environmental solutions for the aerospace industry.

Liebherr's membership underlines the importance of its commitment to sustainability and protection of the environment. IAEG, a non-profit organization of global aerospace companies, provides a platform for the exchange of knowledge and best practices. This enables its members to work together on solutions regarding the industry's environmental challenges.

News in brief

An excellent supplier

Aircraft manufacturer Deutsche Aircraft has honored Liebherr-Aerospace with the Best Performer Award for its contribution to the D328eco® program. The award underlines, among other things, Liebherr's outstanding performance and flexibility, timely delivery on key performance indicators and high-quality service and communication. Liebherr supplies the flap and spoiler actuation system as well as the air management system for the D328eco®, a 40-seat turboprop regional aircraft.

© Deutsche Aircraft

A great milestone

Liebherr-Singapore Pte Ltd overhauled and delivered the 3,000th heat transfer equipment at its MRO customer service facility in Singapore. After just more than two years, the company can proudly announce the achievement of this significant milestone ahead of schedule by more than six months. Since the start of the heat transfer equipment recoring services at Liebherr-Aerospace's service center in the Asia-Pacific region in September 2022, Liebherr-Singapore Pte Ltd has continuously invested in the further expansion of its local repair capabilities for these products.

All good things come in threes

Chinese aircraft manufacturer COMAC has presented Liebherr-Aerospace with three awards. Liebherr-Aerospace Lindenberg GmbH (Germany) received the "2024 Supplier of the Year Win-Win Cooperation Award" for outstanding support of the landing gear system on board the single aisle aircraft C919 and C909. In recognition of exceptional customer service support Liebherr-Aerospace Toulouse SAS (France) was awarded the "2024 Supplier of the Year On-site Support Excellence Award". And last but not least, Mr. Martin Eckart, working in the Landing Gear Department at Liebherr-Aerospace in Lindenberg, received the "2024 Supplier of the Year Outstanding Individual Contribution Award."

A win-win partnership

Liebherr-Aerospace Toulouse SAS and ISAE-SUPAERO (Institut Supérieur de l'Aéronautique et de l'Espace) have signed a contract for the joint industrial chair called CASTOR (Chaire pour l'aérodynamique des turbomachines radiales). Its purpose is to develop and optimize methods as well as tools for the design of turbomachinery wheels with improved aerodynamics and thus to contribute to the research for more efficient aircraft of the future.

© ISAE-SUPAERO / Louis Derigon

International teamwork

Dedication and hard work made it possible: An assembly team consisting of employees of Liebherr-Canada Ltd. in Laval and of the Original Equipment Manufacturer Liebherr-Aerospace Lindenberg GmbH in Lindenberg (Germany) delivered the 1,000th landing gear brace to the Airbus A220 final assembly lines in Mirabel (Canada) and Mobile, Alabama (USA).

A great collaboration

Bharat Forge Ltd. and Liebherr-Aerospace & Transportation SAS will collaborate to establish a state-of-the-art manufacturing facility in Pune (India), that is planned to be operational in 2025. The new facility will feature a ring mill that incorporates advanced forging and machining technologies to produce high-precision components, including landing gear components. The investment, led by Bharat Forge Ltd., underscores the commitment of the company to delivering world-class solutions for Liebherr and its global customer base.

Research and Development

Acoustic analyzing in an anechoic chamber
A component is ready for an acoustic test in the anechoic chamber of Liebherr-Aerospace Toulouse SAS (France). Measuring 7.5 m in length, 7.5 m in width and 8.0 m in height, this chamber is unique throughout Europe and enables Liebherr to measure the noise emissions of components under real conditions.

Preparing the future

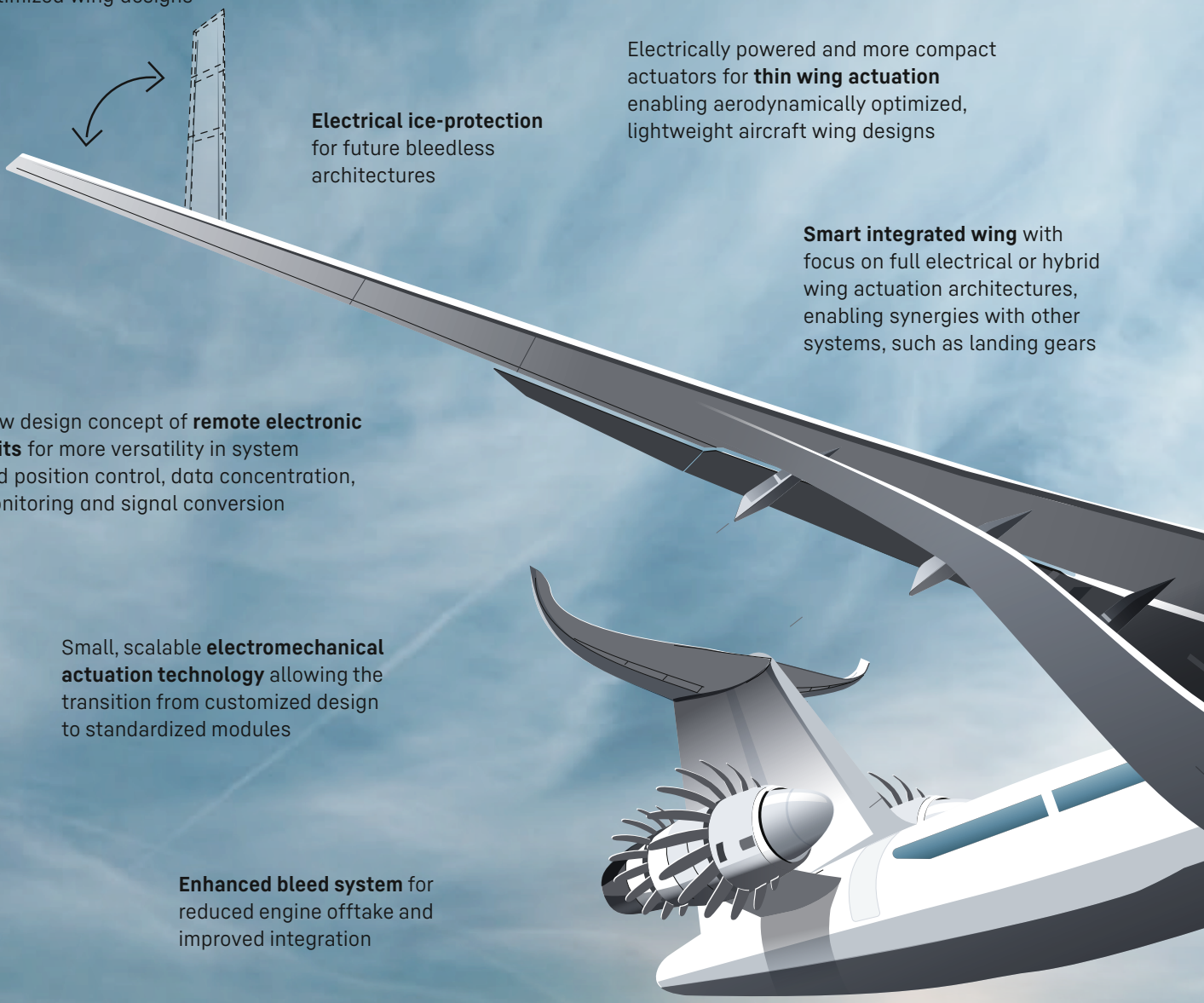
Wing folding mechanisms enabling aerodynamically optimized wing designs

Electrical ice-protection for future bleedless architectures

Electrically powered and more compact actuators for **thin wing actuation** enabling aerodynamically optimized, lightweight aircraft wing designs

Smart integrated wing with focus on full electrical or hybrid wing actuation architectures, enabling synergies with other systems, such as landing gears

New design concept of **remote electronic units** for more versatility in system and position control, data concentration, monitoring and signal conversion



Small, scalable **electromechanical actuation technology** allowing the transition from customized design to standardized modules

Enhanced bleed system for reduced engine offtake and improved integration

Products (e.g valves and sensors) embedding **electronics and digital communication** for next generation avionics architecture

Energy efficient **electrical environmental control system** using only ambient air from outside the aircraft (no engine off-take)

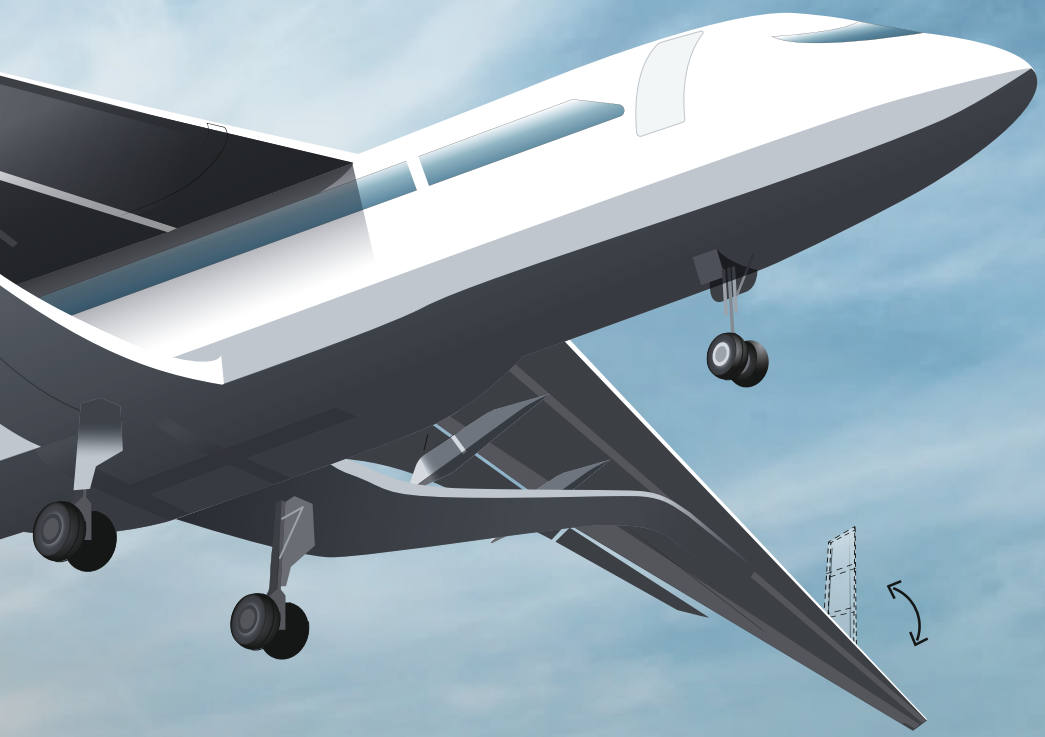
Less bleed air-conditioning system minimizing pneumatic energy needs

Advanced materials and manufacturing techniques, like **additive manufacturing**, driving significant weight reductions and more design flexibility

Fly-by-wire flight controls architecture and **high-voltage DC power** networks are key elements of more sustainable next generation aircraft systems

Highly efficient hydraulic power packs enabling de-centralized hydraulic power supply for different applications, featuring highly efficient electro-motor pumps

Cabin pressurization system, optimized for energy recovery and on-condition maintenance concept



Integrated flight control computers for increased operational reliability and reducing pilot's workload

Power conversion and **distribution**

Electro-hydraulic landing gear **actuation / steering**

Air quality: High and low temperature ozone converter and volatile organic compound filters

Decarbonization is key

Aviation connects: Millions of people travel across the globe every day. However, the industry faces several significant challenges like environmental impact and technological advancements. Yann Juaneda, Director Engineering R&T at Liebherr-Aerospace Toulouse SAS (France) and Sebastian Ziehm, Head of Program Management Technology Development at Liebherr-Aerospace Lindenberg GmbH (Germany), provide insights into how Liebherr is shaping the future of aviation, meeting the challenges of decarbonization, and what solutions the company is already offering.

Hydrogen test bench at Liebherr-Aerospace's test center in Toulouse (France)

What are the challenges for the decarbonization of aviation in general?

Yann: The challenges are multifaceted and range from the still limited availability and high costs of Sustainable Aviation Fuel to regulatory and policy frameworks to support the transition and the development and deployment of new technologies.

Decarbonizing aviation is rather complex and requires tight collaboration across the entire aviation ecosystem. This includes aircraft manufacturers, their supply chain, airlines, airports and finally the passengers. What we contribute as one of the system suppliers to this ecosystem is innovative, reliable and more sustainable technology for today's and next generation of aircraft. Fly Net Zero is the commitment of the entire aircraft industry to achieve net zero carbon by 2050 and the goals that we have set ourselves are very challenging.

Sebastian: The European Green Deal Framework and the Strategic Research and Innovation Agenda, which was initially released by ACARE in 2012 and updated by Clean Aviation in 2024, are setting the scene for the key objectives: Climate-neutral aviation by 2050, supported by 30% greenhouse gas reduction by 2030 vs. 2020 aircraft, 90% CO_2 net reduction when combined with Sustainable Aviation Fuel or hydrogen and zero CO_2 emissions in-flight for hydrogen-powered aircraft.

As Yann mentioned, transitioning to climate neutrality is not just about new aircraft – it requires re-inventing innovation, infrastructure, fuel supply chains, and certification frameworks, all under tight economic and environmental constraints. It is disruptive for the whole aviation ecosystem. Aviation contributes approximately 2.5% of global CO_2 emissions, and demand for air mobility is projected to double by 2050. This makes it one of the most difficult sectors to decarbonize due to long development cycles and stringent safety standards.

"Decarbonizing aviation is rather complex and requires tight collaboration across the entire aviation ecosystem."

Yann Juaneda
Director Engineering R&T
Liebherr-Aerospace Toulouse SAS

How is Liebherr tackling these challenges?

Sebastian: We consistently invest more than the industry-average in research and development activities in our fields of expertise, like landing gears, environmental control and thermal management systems as well as flight control, actuation and hydraulic systems. Our R&T projects are all about coming up with innovative technologies for new or improved products. These innovations will help our customers develop aircraft with less greenhouse gas emissions while remaining competitive.

Yann: We are involved in French, German and Europe-wide research projects to find solutions together with industry and academic partners. We are for example one of the many members of Clean Aviation Joint Undertaking (CAJU), the European Union's leading research and innovation program. The goal of CAJU is to develop an aircraft with a low carbon footprint during development, production and operation. In flight, it can be achieved with the effect of Sustainable Aviation Fuels or targeting zero CO_2 emissions when using hydrogen as an energy source.

We also work closely together with industrial partners under the Conseil pour la Recherche Aéronautique Civile. This is a French research and development program that focuses on decarbonization and safe aviation.

In Germany, the Luftfahrtforschungsprogramm, the German Aeronautical Research Program, is the main source of financial funds for our R&D activities.

In addition to our core products and technologies, we are of course also continuously improving our own facilities, production sites and processes. This includes, for example, model-based engineering, the manufacturing process and recyclability during the product life cycle, i.e. what we can reuse.

Which products is Liebherr-Aerospace focusing on?

Sebastian: Our present research focuses on several key areas including the development of next generation electric actuators, electric environmental control systems, auxiliary power generation systems, electrical-driven hydraulic power supply, and thermal and energy management for increasingly electrically-powered aircraft. The adoption of a more electric aircraft concept is a key strategy to enhance energy efficiency, thereby reducing fuel consumption and lowering CO_2 emissions.

Some examples: The concept of our new small electromechanical actuators' family allows the transition from customized design to customized assembly of standardized modules. Our design approach offers scalability for small installation envelopes, beneficial power-to-weight ratio and high reliability.

The remote control unit is a perfect match with these electromechanical actuators. It enables system and position control, data concentration, monitoring, and signal conversion.

Together with our small electromechanical actuator family concept, both the remote electronic unit, and the small electromechanical actuator are technology enablers for new functions needed with respect to future high aspect ratio, very thin wings. These functions can protect the wing structure against structural loads induced by gusts and flutter phenomena. Therefore, if the high aspect ratio wing is the aircraft manufacturers' choice to lower aircraft CO_2 emissions, and the indications for that are quite clear today, then we are well positioned with our Liebherr technology portfolio under development.

Yann: One of our projects consists of a more energy efficient electrical environmental control system. Instead of bleeding the air from the engines, the electrical environmental control system will use only air from outside the aircraft. This means that the engines will have more thrust available and that the system will include highly efficient electrically driven turbomachines.

Less bleed architectures are also making very promising progress from integration, reliability and efficiency standpoints if pneumatic energy remains the best aircraft compromise.

Sebastian: Last but not least, we are working intensively on advanced materials and manufacturing techniques, like additive manufacturing, to achieve significant weight reductions in our products while maintaining or improving their performance. It also enables new design freedom for complex geometries, contributes to material waste reduction, allows customization and is an enabler for reducing lead time e.g. for early prototypes in development.

In a nutshell, one can say that we are at the forefront of innovation, and that Liebherr plays a vital role in creating more efficient and more sustainable next-generation aircraft.

"Liebherr plays a vital role in creating more efficient and more sustainable next-generation aircraft."

Sebastian Ziehm
Head of Program Management Technology Development
Liebherr-Aerospace Lindenberg GmbH

E-WING® Research Center
of Liebherr-Aerospace in
Lindenberg (Germany)

Revolutionizing aviation

From eVTOL to CS-25, from commercial to defense aircraft, from fixed wing to rotary wing, from flight controls to utility actuation – Liebherr-Aerospace's module-based family of small electromechanical actuators serves many needs. The design concept offers scalability for small installation envelopes, beneficial power-to-weight ratio and high reliability.

Thomas Pfeilschifter, Business Development Manager Sales at Liebherr-Aerospace in Lindenberg (Germany), gets right to the point: "Innovation is embedded in our Liebherr-DNA. With over 60 years of experience in flight control system development and lifecycle support, we have earned a strong reputation as a trusted system provider. As the aerospace industry evolves, our expertise remains highly valuable to market participants seeking reliable and forward-thinking solutions."

“Innovation is embedded in our Liebherr-DNA.”

Thomas Pfeilschifter
Business Development Manager Sales
Liebherr-Aerospace Lindenberg GmbH

Liebherr has consistently combined its strength to develop customer-centric, cutting-edge solutions and to expand into new markets, and this philosophy continues with the Liebherr Versatile Control & Actuation System (LiVCAS®), a modular, scalable, versatile and lightweight solution. With LiVCAS, Liebherr leverages its extensive and in-service-proven expertise in flight control systems, electromechanical actuator technology and electronics.

The world’s first modular, scalable and certifiable plug-and-play solution
Developed by Liebherr-Aerospace based on market input, LiVCAS is customizable at system level, making it ideal not only for eVTOL applications but also for business jets and future more electric aircraft. It offers seamless integration into various aircraft architectures.

Thomas Pfeilschifter explains: “This modular approach offers significant advantages for our customers. By using prequalified, scalable modules, LiVCAS enables faster time-to-market while ensuring certifiability through proven aerospace experience with such systems. Cost efficiency is achieved through economies of scale of the multi-use modules, making it a competitive option. Early prototype needs can be served on short notice. Additionally, our deep-rooted experience in designing and qualifying flight control systems supports a smooth certification process, allowing aircraft manufacturers to allocate resources more effectively. At Liebherr, we like to say: Our experience – your benefit.”

Liebherr has already secured contracts for this ground-breaking concept on the Advanced Air Mobility (AAM) market. Adapting to the agility and fast-paced nature of this special market presents both, challenges and opportunities for Liebherr-Aerospace. The well-established processes and structures that have driven success in traditional aerospace programs must align with the rapid development cycles and uncertainties of this emerging sector without compromising safety. However, Liebherr views these challenges as opportunities. The demand for flexibility and speed is driving innovation, encouraging the company to rethink existing approaches, modernize internal structures, and adopt new ways of working. This transformation is not just about adapting to the AAM sector, it is about supporting the future of flight.

The first LiVCAS products have successfully passed laboratory testing and will undergo flight testing. These achievements show how Liebherr-Aerospace’s R&D investments are translating into valuable solutions revolutionizing aviation.

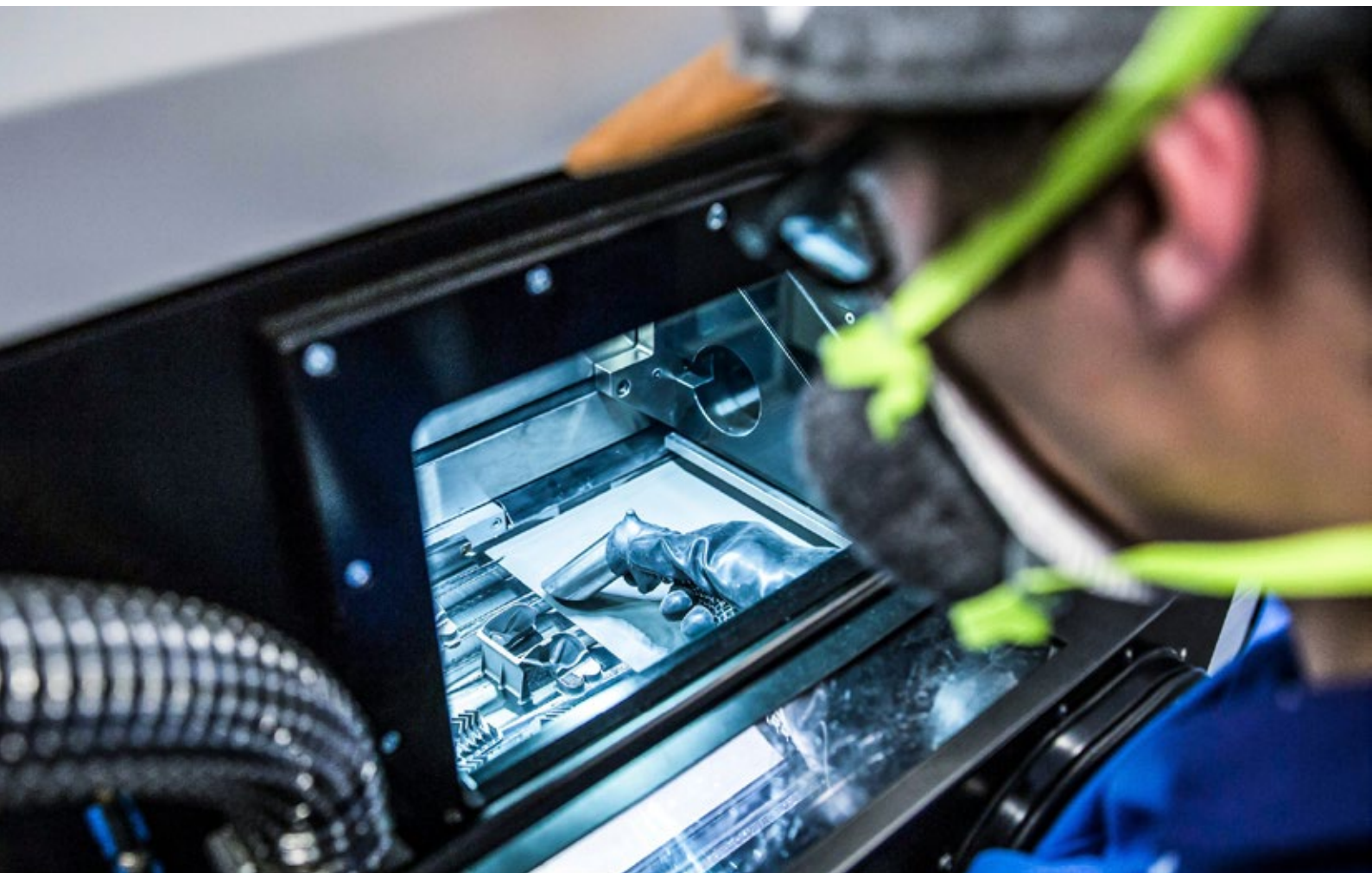
By being open-minded for change and by leveraging its expertise, the company is positioning itself at the forefront of this evolution and will remain a reliable supplier of innovative and proven flight control system solutions.

From the printer to the sky

Additive manufacturing, or AM for short, holds significant promise and plays an important role in both current and future aircraft. The components produced through this method are considerably lighter than conventionally manufactured parts, contributing to more environmentally friendly aviation. Today, aircraft equipped with AM components from Liebherr are already in operation.

Additive manufacturing has become an important technique in the aviation industry. New component functions can be added and the design as well as the integration of the parts is improved. Their reliability is increased because of the use of high-performance materials. AM also simplifies the manufacturing flow chart by removing process steps and minimizing material waste. Additive manufacturing enables the production of complex shapes and 3D printed components consist of fewer parts than conventional ones. This reduction in weight leads to lower CO_2 and NO_x emissions.

Liebherr started with AM already back in 2010 and since then, has continuously made significant investments evaluating and testing it, which makes the company one of the pioneers in the aviation industry. Whereas its facility in Lindenberg (Germany) handles R&D of AM manufactured titanium components for landing gears, flight controls and hydraulic systems, the facility in Toulouse (France) masters nickel based and aluminum alloys for air management systems such as heat transfer equipment, valves and turbomachinery. The company started with small, simple, non-critical parts before moving on to components that are more complex.



2017

Valve block
An Airbus A380 took off for the first time with a titanium valve block from a Liebherr-Aerospace 3D printer. The manifold is suitable for a 5,000-psi application. It is part of the spoiler actuator and fulfills several important functions on board the A380, when it comes to maneuvering the airplane, for example, and braking after landing.

2018

Bleed valve component
Liebherr produced and qualified a 3D printed nickel alloy bleed valve component. The valve is part of the bleed air system that takes air from the engine and directs it to the air-conditioning system of the aircraft.

Heat exchangers
Heat exchangers are a core business of Liebherr-Aerospace. Since 2018, the company is working on the potential of AM for complex design and material capabilities. AM heat exchangers are especially used to cool down very hot fluids. 3D printed heat exchanger components by Liebherr are in development for entry-into-service on a business jet platform in 2026.

2019

Proximity sensor bracket
Liebherr-Aerospace started serial production of 3D printed components. The company successfully certified and delivered a printed proximity sensor bracket for the Airbus A350 nose landing gear. The bracket holds the sensors that are crucial for detecting and monitoring the position of the landing gear during landings and takeoffs.

2022

Flex shaft
Liebherr integrated a 3D-printed flex shaft into the Airbus A350 high lift system. The unit had been approved by Airbus as well as by the European Union Aviation Safety Agency EASA for serial production. The flex shaft is used in the high lift system of the Airbus A350, where it is integrated into the active differential gearbox of the flap system. The flex shaft transmits the rotary movement to a position sensor and compensates for an angle and axis misalignment between gearbox and sensor. The component is more complex and represents the next step towards applications in highly integrated systems in aviation.

Lower cargo door actuation valve
Liebherr was selected to develop and supply the lower cargo door actuator and valve for the Airbus A350. The complex manifold is the first 3D printed hydraulic component by the company for the Airbus' A350 fleet and the first hydraulic component to be supplied in series production. The manifold is part of the lower cargo door actuation system that ensures that the cargo door opens and closes reliably. The successful qualification of the component is expected at the end of 2025.

2024

Bleed air mixers
Liebherr integrated a bleed air mixer into a civil single aisle aircraft. The unit had been approved for serial production. The air mixer allows to reduce temperature stratification after the precooler. This ensures that the temperature of the air flow exiting the heat exchanger is homogeneous. The required complex shape can only be achieved by using AM.

2026

Air-conditioning valve
A complex three-way valve that supports temperature control of the air preparation system for a business jet is expected to be certified in 2026.

Customer Service

Right down to the last screw
Liebherr-Aerospace supports its customers throughout the entire product life cycle and offers a comprehensive range of services. Thanks to a global network with numerous locations and service partners, customer support is never far away, and services can be provided individually and quickly. From maintenance, repair and overhaul right down to the last screw.

Premier collaborations for better customer experience

Excellence in customer service is a primary objective of Liebherr-Aerospace. To further expand its customer service capabilities, Liebherr has entered into agreements with various customer service providers and operators. This strategic move allows the OEM to continuously improve its service offering, ranging from health management solutions including predictive maintenance to MRO. The aim is to provide customers with even faster and more flexible support, ensuring that repairs and maintenance are carried out swiftly and more sustainably. Here is an overview of the latest strategic moves.

Strategic agreement on heat transfer equipment repairs
Liebherr-Aerospace and GMR Aero Technic have signed a service agreement for the maintenance, repair and overhaul of Airbus A320 heat transfer equipment. It represents a significant step forward in advancing and strengthening MRO capabilities for the Indian aviation sector and supports the Indian government's "Make in India" initiative.

Under this agreement, GMR Aero Technic, India's leading MRO services provider, will collaborate with Liebherr-Aerospace to offer heat transfer equipment servicing during aircraft maintenance checks with the goal to ensure aircraft performance and airworthiness.

Collaboration in Brazil
Liebherr and Azul Linhas Aéreas jointly develop heat transfer equipment maintenance workshops in Azul's hangars in Campinas and at Pampulha airport in Belo Horizonte (Brazil) for the airline's Airbus A320 fleet. Until 2029 – with the option of the agreement's renewal – Liebherr provides technical support, access to technical publications, training, supply of spare parts, tools, and equipment necessary to perform tests, cleaning, and repairs of the equipment.

By building the workshops, Azul can offer more cost-effective customer service by saving on transportation logistics, insurance and customs costs, among others.

A key partnership to enhance maintenance efficiency
Liebherr-Aerospace and Air France Industries KLM Engineering & Maintenance have signed a five-year Heat Exchanger Maintenance Services Agreement.

The re-coring services provided by Liebherr for the heat exchangers includes the replacement of the matrix and takes place at the workshops of Liebherr-Aerospace's center of competence for environmental control and thermal management systems in Toulouse (France).

The agreement covers the ongoing maintenance needs of the Airbus A320ceo/neo and A220 heat exchanger products of the Air France KLM Group's aircraft portfolio and that of its customers. By leveraging Liebherr-Aerospace's specialized expertise, the partnership aims to optimize maintenance turnaround times and to ensure the continued airworthiness of the fleet.

Fast response and shorter turnaround times
Liebherr-Aerospace and EGYPTAIR MAINTENANCE & ENGINEERING inked a three-year agreement covering the maintenance of heat transfer equipment on board the Airbus A320ceo/neo fleet of EGYPTAIR. The contract also covers the Airbus A320ceo/neo fleets of other airlines, which are presently supported by EGYPTAIR MAINTENANCE & ENGINEERING. The goal: Customers shall benefit from fast response and shorter turn-around-times as well as Liebherr's Original Equipment Manufacturer experience.

The re-coring and major repairs will take place at the workshops of Liebherr Aerospace Saline, Inc., in Michigan (USA), already for several decades Liebherr's center of excellence for heat transfer equipment MRO services in the Americas.

With its advanced facilities in Cairo, EGYPTAIR MAINTENANCE & ENGINEERING will be responsible for executing major non-welding repairs, performing minor repairs, and conducting all test procedures to ensure the highest standards of quality and reliability.

A further step to expand the worldwide service network
Liebherr and AAR CORP. inked a contract that covers MRO services on Liebherr products at AAR locations as well as a power-by-the-hour back-to-back service for several operators. Liebherr grants license rights to the American aftermarket solutions company to maintain, repair and service Liebherr-Aerospace products for a period of ten years. The services are carried out at AAR's Component Services facilities on Liebherr's flight control, environmental control, and thermal management components. The general terms agreement includes also a power-by-the-hour contract for several AAR partner companies.

Predictive maintenance
Data and digital technologies to improve aircraft maintenance and performance: This is the basis and goal of Digital Alliance, a group consisting of various representatives of the aviation industry. Liebherr has joined the alliance, complementing and strengthening the members' existing analytics capabilities.

The collaboration between Airbus, Delta TechOps, GE Aerospace and Liebherr aims to improve the accuracy of predictive maintenance recommendations, to reduce operational interruptions and costly "no fault found" scenarios. Liebherr-Aerospace integrates its set of predictive maintenance algorithms and other trend monitoring applications into the alliance. Liebherr's data are thus made available for airlines using Skywise, the platform operated by Airbus, to which around 11,700 aircraft were connected in late 2024.

With Liebherr-Aerospace's predictive maintenance solutions covering a wide range of Airbus aircraft, airlines benefit from health management. Planned or unexpected maintenance activities are optimized and aircraft availability will increase. Liebherr's in-depth knowledge ranging from environmental control and thermal management systems to flight controls and landing gears will naturally complement and strengthen the alliance's existing capabilities.

Trend-setting health management
Liebherr and Asia Digital Engineering (ADE) collaborate in order to enhance predictive maintenance capabilities. Based on this collaboration, ADE benefits from Liebherr-Aerospace's set of predictive maintenance algorithms and further trend monitoring applications. Combined with advanced technical support, these bring added value to the maintenance of the full scope of Liebherr products, i.e. bleed, air management, and flight control components on board Airbus A320/A321 aircraft.

ADE's own digital fleet management platform ELEVADE is Asia's first commercially available aircraft health management system. Built as a comprehensive ecosystem, it streamlines real-time aircraft health monitoring, encompassing a large fleet of Airbus aircraft and will be continuously fed by Liebherr-Aerospace's health management predictors, which are tailored to the products developed by the European Original Equipment Manufacturer. The tool helps to manage and monitor the health status of aircraft and manages, analyzes and predicts unexpected issues in real time.

Did you know?

7

facts and figures on customer service

Products from Liebherr-Aerospace fly every day: From environmental control and thermal management, flight controls and actuation to landing gears as well as on-board electronics for civil and defense aircraft. For this, the company provides comprehensive customer service support for the entire product life cycle. Thanks to a global service network, the company can respond swiftly and pinpoint to customer inquiries. These seven facts illustrate what this means in figures.

More than

60 years

of experience in maintenance, repair and overhaul for civil and military customers have been accumulated so far

Around

75,000

repairs and maintenance

operations are carried out every year

More than

1,000

employees

are part of the global network and dedicated to supporting the customers locally

Liebherr products are on board around

30,000

aircraft.

They are operated by more than **2,700** aircraft operators

24/7/365

Aircraft on Ground (AOG)

support and access to all information and services are available, thanks to a digital service platform

7 stations

in Asia, Europe, the Middle East as well as in North and South America offer a wide range of services and act as regional focal points for the customers

Customer service network

incl. Offices

Sao José dos Campos | Brazil
Montreal | Canada
Shanghai | China
Toulouse | France
Lindenberg | Germany
Bangalore | India
Singapore
Dubai | UAE
Saline, Michigan | USA

Ready for the booming air cargo market

After the air cargo market had to cope with a steep decline in business due to the COVID-19 pandemic, the situation has changed for the better: Air cargo services are in demand again, cargo volumes increase, and investments are made in cargo infrastructure and technology. Airlines react with expanding their logistic capabilities and their fleet. A very promising environment for companies like LHColus, a Brazilian provider of aeronautical engineering consulting services and Liebherr who have signed some time ago a Sole Distribution Agreement for LHColus' quick passenger to freighter conversion solution.

Liebherr Aerospace Saline Inc., service center of Liebherr-Aerospace in America, is the exclusive international distributor of the quick passenger to freighter conversion solution – also known as Class F Quick Change - developed and certified by LHColus Technologia Ltda in São José dos Campos (Brazil). Liebherr is responsible for the global distribution of the kit, excluding Brazil, through its worldwide customer services network, that provides sales and technical support.

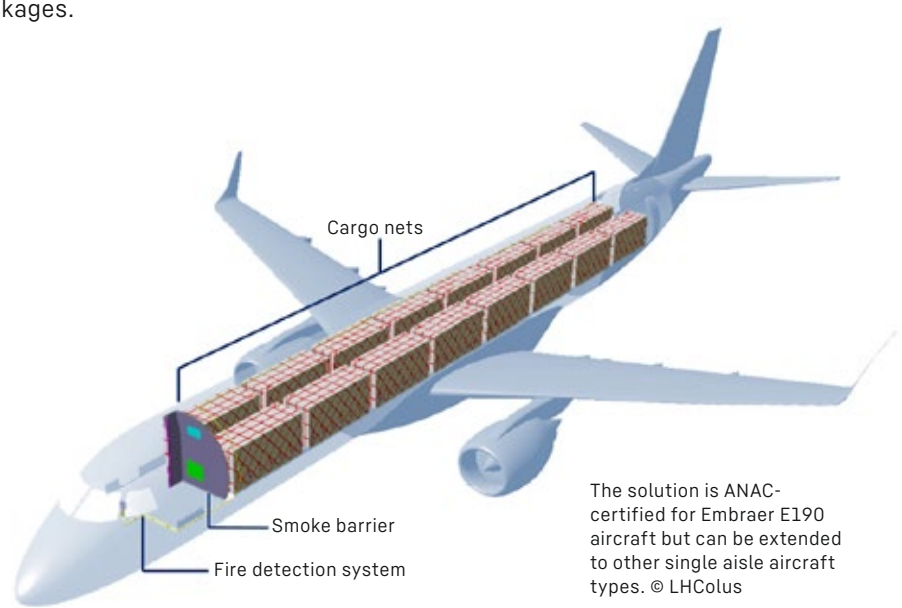
The Class F Quick Change Solution

The Class F Quick Change is implemented by means of a simple, fast, and fully reversible modification on the aircraft. After its certification by ANAC, the Brazilian National Civil Aviation Agency, the solution's efficiency and reliability had been field-proven with a sizeable Embraer E190 fleet operating for over two years in Latin America. More than 18,000 flight hours have been already accumulated and over 15.3 million (e-commerce) packages equivalent to 33,300 tons of payload have been transported. The solution is currently being certified by the FAA, the U.S. Federal Aviation Administration, for Embraer E190 aircraft and can be extended to other single aisle aircraft types.

In a simplified approach, the conversion requires the removal of all main cabin seats to make room for aluminum frames and independent fire-proof and smoke-contained cargo nets. The cargo is monitored by two fully independent IR cameras, which are designed to detect any heat sources, alerting the pilots in the cockpit.

The system also features a smoke barrier to isolate the main cabin from the front galley or cockpit area (a mandatory requirement) and cargo placards, which are used to indicate the maximum load height. The overhead bins remain in the aircraft during Class F operations and can be used for cargo (non-dangerous goods) packages.

With the Class F Quick Change Solution, a passenger aircraft can be converted into a cargo aircraft within a very short timeframe. © LHColus



The solution is ANAC-certified for Embraer E190 aircraft but can be extended to other single aisle aircraft types. © LHColus

Digital Transformation

Green, quick, efficient
The autonomous transport system is a reliable helper and supports internal logistics at Liebherr-Aerospace in Lindenberg (Germany). It delivers boxes and pallets from A to B, allowing employees to concentrate on other important tasks.


LIEBHERR REP.
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AGILOX

New opportunities with AI

The countless possibilities of artificial intelligence (AI) have become indispensable. It offers numerous chances and can play a key role, especially in overcoming challenges in the aviation industry. Nicolas Canouet, Head of the DataLab Center of Excellence and AI Coordinator at Liebherr-Aerospace & Transportation SAS, gives insights into how the division is bundling the possibilities of AI and how customers can benefit from it.

Nicolas, how relevant is the topic of AI for the aviation industry in general?
The aerospace industry is currently facing numerous challenges, for example to increase the production rate, or the question of how we can make the industry more sustainable. We need to adapt to this business environment with agility in order to be reliable, resilient and perform well for the benefit of our customers. Against this background, AI is an essential technology that can help us to better overcome these challenges.

Is there a special AI concept or guideline that needs to be considered?
We of course adhere to the legal regulations, in particular the Artificial Intelligence Act, the first standardized regulation for the use of AI in the European Union, which entered into force on August 1, 2024.
It provides clear requirements and obligations regarding the specific use of AI and outlines principles to be followed: respect fundamental rights, ensure safety, transparency and accountability.

In which areas at Liebherr-Aerospace is AI increasingly being used? What role does it play and what can it do for the company?
We leverage AI across three key areas: operational efficiency, new services and product innovation.
In the area of operational efficiency, we use AI for industrial planning, as well as to optimize logistics chains and supplement knowledge management. This streamlines processes and improves decision-making.

“Artificial intelligence enhances our cognitive capabilities, enabling us to work smarter, solve complex problems more effectively and make better decisions.”

Nicolas Canouet
Head of the DataLab Center of Excellence and AI Coordinator
Liebherr-Aerospace & Transportation SAS

In the second area of new services, AI contributes to diagnostic support and predictive maintenance. This means that maintenance or upcoming repairs can be identified at an early stage and carried out more effectively. This improves our service quality and minimizes aircraft downtime.

In the area of product innovation, we are working on embedding AI into our components as well as systems to create new functions.

Initially, we developed our expertise primarily through activities that are very closely linked to the product. These include, for example, predictive maintenance, AI technologies that could be directly embedded in the product or through techniques that support product design.

We are now focusing on integrating AI directly into the core of our internal processes in order to optimize industrial performance. For example, we are using AI to optimize new purchasing strategies or to plan workflows in production.

What are the benefits of AI for our customers?
Our customers can, for example, directly benefit from our AI expertise with our predictive maintenance offering. Necessary maintenance work can be identified at an early stage, allowing our customers to plan better and avoid operational interruptions.

What challenges arise when dealing with AI and how do you deal with them?
From a technical perspective, I would say that the two major challenges are safety and frugality. These two characteristics are crucial for the safe and sustainable use of AI solutions within the company and for the integration of AI solutions into aircraft systems.

What is planned for the future in the area of AI?
The future of and with AI is difficult to predict, especially when it comes to long-term developments. However, one thing is clear: AI has great potential for change – both in terms of the company and the workplace. It is therefore important to define a framework for how we want to use AI in the company and how we support our employees in embracing this change.

Nicolas Canouet
He is Head of DataLab Center of Excellence at Liebherr-Aerospace & Transportation SAS, headquartered in Toulouse (France), which is one of the 13 product segments of the Liebherr Group. In addition, he is also responsible for the DataLab at Liebherr-Aerospace Toulouse SAS since 2017. He and his team support the company in all data and AI-related projects. For him, AI holds a great fascination because it can expand human potential.

History

Where it all began:
The foundation stone for the Aerospace and Transportation product segment of the Liebherr Group was laid in 1960 on this meadow in Lindenberg (Germany).

65 years and going strong

The Liebherr Group has been an integral part of the high-tech industry for many decades. In 1960, the company entered the aviation business and laid the foundation for today's Liebherr-Aerospace & Transportation SAS. Time to take a look into the past.

Products from the Liebherr Group can be found in many places: cranes help to erect the most impressive buildings in the world, mining trucks transport enormous payloads and refrigerators keep our food fresh.

Since Dr. h.c. Hans Liebherr founded the company in 1949, it has evolved to a leading global technology Group with 13 product segments. One of these segments has been in existence for 65 years in 2025: aerospace and transportation systems. What were the company's beginnings in aviation and what has happened over the past decades?

1960–1970

Entry into the aviation industry

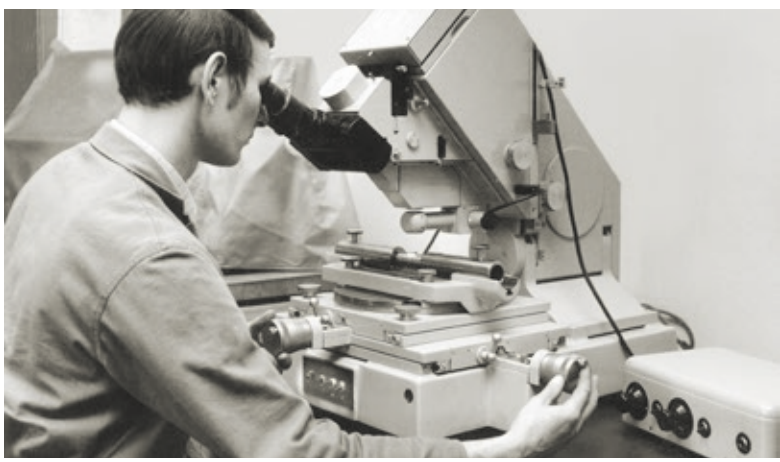
In the year 1960, in the south of Germany, in the Allgäu town of Lindenberg, Liebherr-Aero-Technik GmbH established itself as a successful company for the manufacturing and servicing of landing gears and hydraulic equipment, but did not develop or manufacture its own products from the start. This changed when Hans Liebherr decided to develop the company from a licensee into an Original Equipment Manufacturer, a so-called OEM. The starting signal to become a solution provider for complete systems for the aviation industry.

© Airbus SAS

1970–1980

New technologies and market expansion

As an OEM and through cooperation with partner companies, Liebherr developed new products opening new markets. The company added flight control systems and air management systems to its product portfolio. A separate department for electronic hardware and software was established to strengthen technological independence. This led to the development of advanced technologies such as fly-by-wire flight controls.



1980–1990

Establishment as a trusted partner

At the beginning of the 1980s, Liebherr had achieved some important goals: it had entered numerous international cooperations and brought its own developed products onto the market. For the first time most of the revenue was generated through participation in civil programs instead of defense programs. Liebherr was selected to provide the flight control and air-conditioning system for the Airbus A320. As the aircraft sold exceptionally well, the production rate of the A320 went up, which also significantly increased the pace of production at the suppliers. In order to meet the new requirements, Liebherr optimized the efficiency of its industrial set-up, and invested considerably in modern machining centers.

To strengthen its air management product portfolio, first shares of Toulouse based ABG Semca were acquired.

The company expanded its customer base both in the West, i.e. in the USA and Latin America as well as in the East, in countries such as Indonesia, Israel, China and Singapore.

At the end of the decade, the decision was taken to build up own landing gear development capabilities.

1990–2000

Growing and expanding

Liebherr pursued its planned strategy of global growth. Besides the organic growth, major acquisitions were adding capabilities, like Feinmechanische Werke Mainz (Germany) for hydraulic actuation and the Friedrichshafen factory site of ZF (Germany) for excellence in gear cutting.

By mid of the 1990s ABG Semca was fully acquired by Liebherr and renamed Liebherr-Aerospace Toulouse SAS.

Liebherr-Aerospace also expanded its customer service: service facilities were established in the USA, Singapore and Shanghai (China).

In 1997, Liebherr decided to step into the railway market by acquiring Alex. Friedmann GmbH, which had manufactured air-conditioning systems for rail vehicles among other things. This strategic move laid the foundation for the establishment of Liebherr's transportation branch in Korneuburg, near Vienna (Austria), now Liebherr-Transportation Systems GmbH & Co KG. Know-how was supplied by Liebherr-Aerospace Lindenberg for the product area of hydraulic actuation systems and by Liebherr-Aerospace Toulouse for the air cycle air-conditioning technology.

2000–2010

Becoming a global player

A new production facility was opened in Brazil and customer service stations were set up or expanded close to customers all over the world.

Within just a few years first flights and entries-into-service of numerous aircraft programs took place. Liebherr employees delivered as usual top performance, contributing to the company's success not only as an OEM, but also as an important player in the aftermarket.

In the second half of the decade, railway activities were strengthened with the acquisition of Bombardier-Transportation Mannheim GmbH in 2006 (now Liebherr-Transportation Systems Mannheim GmbH), and the divisional control company was renamed Liebherr-Aerospace & Transportation SAS in 2009.

2010–2020

Major technological milestones

The 2010s were booming: With rapidly growing aircraft fleets Liebherr had expanded both its production facilities and customer service stations. A new logistics center and a new manufacturing building were inaugurated in Toulouse (France) and Campsas (France), and a customer service logistics center was opened in Dubai (UAE). In Saline (Michigan / USA), the company built a new customer service center to expand its heat transfer equipment repair capabilities. With the opening of a regional office in Bangalore (India), Liebherr increased its presence in emerging markets.

Over the years, some major technological milestones were reached: Liebherr was selected by Boeing Commercial Airplanes to supply the folding mechanisms for the wing tips of the Boeing 777X.

A 50:50 joint venture was established with Rolls-Royce called Aerospace Transmission Technologies GmbH in Friedrichshafen (Germany) to develop manufacturing capability and capacity for the power gearbox for Rolls-Royce's new highly efficient UltraFan® engine.

Reduced greenhouse gas emissions as well as fuel burn reduction can be achieved with Liebherr's electrical environmental control system that completed successfully its first flight on board the Airbus A320 Flight Lab in 2016.

The year 2017 saw a world première: On March 30, Airbus successfully flew Liebherr's 3D-printed spoiler actuator valve block on a testbed A380. It is the first 3D printed primary flight control hydraulic component flown on an Airbus aircraft.

2020–2025 and beyond

Preparing the future of mobility

Today, Liebherr-Aerospace & Transportation SAS is a first-tier provider of on-board solutions for civil and defense aviation, rail transportation and commercial vehicles. With its products, solutions and first-class services, Liebherr contributes to a more sustainable transport. Digital transformation is in full speed for the development and manufacturing of products, as well as for services. And artificial intelligence has found its way into first applications.

In an increasingly challenging context, Liebherr accepts its responsibility towards the society, the environment and its business partners. The company aims for long-term success as a partner of its customers and the well-being of future generations.

Most products and solutions are not visible at first sight, yet are indispensable for safe, comfortable and efficient aircraft operation. Every second, an aircraft takes off worldwide with Liebherr technology on board. Here's to the next 65 years!

People

Ready for an exciting journey?
Liebherr-Aerospace & Transportation SAS offers numerous opportunities for a dynamic and varied career. At numerous locations worldwide, employees work on the development, production and maintenance of the next generation of innovative and sustainable solutions for the aerospace and transportation industry.

Curious? The interview with Victoria Santacruz is also part of the Liebherr Group's 2024 annual report.

A courageous career move

Victoria Santacruz has taken a huge and bold step: at just 19 years old, she moved from Ecuador to Germany to complete her apprenticeship as an industrial mechanic at Liebherr-Aerospace in Lindenberg. She is now in her last year of training and based on her very good performance and grades she is about to take her final exams already after two and a half years. In this interview, Victoria tells us what the biggest challenges were for her, what tasks she has as an apprentice and what she misses most about her home country.

How did your path lead you to Germany?
I was in my final year of high school in Ecuador when I applied and was accepted for the apprenticeship at Liebherr. I wanted to see something new after school and this was a great opportunity for me. I had a year to prepare myself for the language, the culture and, of course, the job.

My father is also an industrial mechanic, and I had known Liebherr all my life, because the company also exists in Columbia, near Ecuador. I was very keen to seize this opportunity.

What was it like for you in Germany at the beginning and what did you have to get used to?
The language is very difficult and was definitely the biggest challenge right from the beginning. I didn't know that there was a local dialect here and when people greeted me, I often didn't understand them. That was new for me. But it is also a very beautiful language.

I also thought that people in Germany are cold and unfriendly. But it's completely different: they are very nice, and you can speak your mind openly – even to your boss. I think that's really great.

What does a typical day in your apprenticeship look like? What tasks do you have?
As an industrial mechanic, I operate various machines. I'm very good with CNC lathes and milling machines. Depending on the production processing step, I set up the machines, prepare the tools and I'm very familiar with the machine controls and the different materials.

I go to vocational school once a week. There I learn everything about industrial mechanics and automation and what is involved in filing, turning and milling.

How is it working with your instructors?
Right from the start, they are really nice and very patient – especially when it comes to language barriers. They teach us everything: from filing to milling and everything we need to know about the individual machines. In the third year of my apprenticeship, I met my master craftsman, with whom I also get on very well and from whom I learn a lot. He really helps me with my technical and personal development.

What do you miss about your home country?
I miss my family the most. But also the food, although I think German food is also very good. Nevertheless, I would still like to stay in Lindenberg after my apprenticeship, because Liebherr is a very good employer.

In her training as an industrial mechanic, Victoria operates various machines.

Shaping the future of young professionals

Getting to know each other: At the start of the program, all trainees from Liebherr-Aerospace & Transporatation SAS met with those responsible for the trainee program and managing directors for a kick-off at the Liebherr-Aerospace Toulouse site.

Starting a career raises many questions: Which career path suits your passions and strengths? How do you build a strong professional network? What opportunities and prospects does the company offer? And how can potential be fully utilized? This is where Liebherr's Global Trainee Program comes in and offers young talents the unique opportunity to get to know the company from different perspectives, take charge of projects and expand their professional network.

The Liebherr Group's Global Trainee Program started for the second time in fall 2024. For 18 months, participants can gain valuable practical experience in various departments. Experiences that help them to sharpen their overall view of Liebherr and improve their decision-making and organizational skills as well as their confidence in dealing with people and projects. Valuable qualities that are very important for later career orientation – especially if one aspires to a management position.

The program also offers the opportunity to gain international experience. This is often combined with a stay in another Liebherr division. This allows trainees to dive into international markets and gain insights into other product segments and their processes.

"During the exchange with colleagues from different areas and Liebherr divisions, you get a completely new understanding of the big picture and how the different departments work together in detail, but above all across the entire Group," says Celine Baldauf. She is one of seven trainees at Liebherr-Aerospace & Transportation SAS. Since the start of the program, she has already gained insights into three different departments: from Corporate Communication and Corporate HR Marketing to the Market and Competition Strategy department.

Together with the other trainees, Celine was selected after a multi-stage selection process. Four trainees are from Liebherr-Aerospace Lindenberg GmbH (Germany) and three from Liebherr-Aerospace Toulouse SAS (France). Each of them has a different professional background. For this very reason, great importance is attached to the fact that the trainees themselves can choose and actively participate in deciding, which departments they would like to visit during the program – depending on their interests and professional orientation and the relevant development steps towards their target position.

"We also attend seminars that shed more light on individual topics and thus promote our professional and personal development. For example, we receive intercultural training, learn how to resolve conflicts and how to communicate convincingly," says Celine Baldauf. "Throughout our time as trainees, each one of us has an experienced mentor at our side who continuously guides and supports us at every stage of the program."

Karina Sinz is head of the training center at Liebherr-Aerospace Lindenberg GmbH and accompanies the trainees at the site in Lindenberg. "The program offers young people the ideal introduction to an international and future-oriented professional life and sets the course for a successful long-term career," she explains. "In order to ensure the best possible support for the trainees, the mentors and I stay in close contact with them, offering guidance and assistance throughout the program and promote their strengths and prepare them specifically for future challenges."

With its wide range of opportunities and practical experience, Liebherr's Global Trainee Program lays a solid foundation for a successful and dynamic career. Trainees gain valuable skills and become an important part of a company that values innovation, collaboration and long-term growth.

Celine Baldauf is one of seven trainees at Liebherr-Aerospace & Transportation SAS.

Celine Baldauf will soon be heading to Newport News in the US-state of Virginia for her stay abroad. There she will gain new insights in the marketing as well as the logistic departments at Liebherr Mining Equipment Newport News Co. "I'm really looking forward to this stay. Every Liebherr company is different, when looking at the tasks as well as the organization, of course. That's what makes the program so exciting and varied."

Participation in programs

Commercial Aircraft

Airbus

Airbus A220
- Integrated Air Management System
- Landing Gear System

Airbus A300-600
- Cabin Pressure Control System
- High-Lift System
- Krüger Actuator
- Latching Actuator
- Landing Gear Door Actuators
- Nose Landing Gear
- Upper Cargo Door Actuator

Airbus A310
- Cabin Pressure Control System
- High-Lift System
- Krüger Actuator
- Nose Landing Gear

Airbus Single Aisle Family ceo/neo
- Air Chillers
- Air-Conditioning System
- Avionics Cooling System
- Cargo Heating System
- Cockpit Static Inverter
- Engine Bleed Air System
- eRudder Actuator
- Fuel Tank Inerting System – CSAS (except A319CJ)
- High-Lift System
- High Pressure / Power Transfer Unit Manifolds
- Integrated Flight Control Computers
- Rudder Servo Control
- Safety Valve

Airbus Long-Range Family ceo/neo
- Air Chillers
- Air-Conditioning System
- Auxiliary Power Unit Gearbox
- Avionics Cooling System
- Engine Bleed Air System
- Cargo Heating System
- Cockpit Static Inverter (A330)
- Cargo Door Actuator
- Crew Rest Humidification System
- Fuel Tank Inerting System – CSAS
- High-Lift System
- Landing Gear Door Actuation
- Rudder Servo Control (Airbus A340 Enhanced)
- Spoiler Actuation
- Spring Strut

Airbus A350
- Flap Active Differential Gearbox
- Load Sensing Drive Strut
- Lower Deck Cargo Door Actuator
- Moving Damper
- Nose Landing Gear
- Slat Actuation

Airbus A380
- Air / Hydraulics Cooling System
- Cargo Heating System
- Engine Bleed Air System
- High-Lift System
- Pneumatic Distribution System
- Reservoir Air Supply Cooler
- Spoiler Actuation
- Supplemental Cooling System

Airbus BelugaXL
- Air-Conditioning System
- Conditioned Air Supply System (a subsystem of the fuel tank inerting system)
- Engine Bleed Air System Components
- High-Lift System
- Landing Gear Door Actuation
- Spoiler Actuation

ATR

ATR 42 / 72
- Integrated Air Management System

AVIC

MA700
- Valve Actuator

Boeing

747-8
- Air-Conditioning System
- Engine Bleed Air System

777-200LR
- Fuel Tank Pressure Regulating Valves

777 / 777X
- Main Gear Steering System

777X
- Folding Wing Tip Actuation
- High-Lift Actuators
- Power Drive Unit and Hydraulic Motor for Leading Edge Actuation System

787
- Nose Wheel Steering Remote Electronic Unit

COMAC

C909
- High- and Low-Pressure Ducting
- Integrated Air Management System
- Landing Gear System incl. Braking System, Wheels, and Tires

C919
- High- and Low-Pressure Ducting
- Integrated Air Management System
- Landing Gear System

De Havilland

Q400
- Cabin Pressure Control System

Deutsche Aircraft

D328eco
- Flap and Spoiler Actuation System
- Integrated Air Management System

Embraer

E-Jet E1
- Landing Gear System incl. Braking System, Wheels, and Tires

E-Jet E2
- High-Lift System
- Integrated Air Management System
- Nose Wheel Steering Control Module
- Machining of Main Landing Gear (E175 E2)

Embraer 135 / 145
- Cabin Pressure Control System
- Flap System
- Nose Landing Gear

General Atomics AeroTec Systems

Dornier 228 New Generation
- Flap System
- Landing Gear Actuators
- Nose Wheel Steering System

HAL

Dornier 228
- Flap System
- Landing Gear Actuators
- Nose Wheel Steering System

Mitsubishi Heavy Industries

CRJ700 / 900
- Integrated Air Management System
- Low-Pressure Ducting

CRJ1000
- Command-by-Wire Rudder Control System
- Integrated Air Management System
- Low-Pressure Ducting

Participation in programs

Business Jets

Bombardier Aerospace

Challenger 300 / 350 / 3500
- Flap System
- High- and Low-Pressure Ducting
- Integrated Air Management System

Global Express / G5000 / G5500
- Cabin Air Humidification System
- Integrated Air Management System
- Nose Landing Gear Shock Strut

G6000 / G6500 / G7500 / G8000
- Integrated Air Management System

Dassault Aviation

Falcon 50EX / 900 / 2000 / 2000EX
- Air-Conditioning System
- Cabin Pressure Control System
- Engine Bleed Air System

Falcon 6X
- Integrated Air Management System
- Cabin Air Humidification System

Falcon 7X / 8X
- Cabin Air Humidification System
- Engine Bleed Air System

Falcon 10X
- Integrated Air Management System
- Landing Gear Actuation and Steering Components

Embraer

Legacy L500ER
- Fuel Tank Pressurization System

Legacy 650
- Cabin Pressure Control System
- Flap System
- Nose Landing Gear

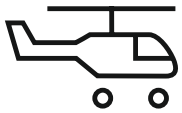
Lineage
- Landing Gear System incl. Braking System, Wheels, and Tires

Praetor 600
- Fuel Tank Pressurization Valve

IAI

Gulfstream G200
- Cabin Pressure Control System Components
- High-Lift System

Vertical Lift



Airbus (Helicopters)

H120
- Environmental Control System Components

H125
- Environmental Control System Components
- Gears for Main Gearbox

H130
- Air-Conditioning System

H135
- Gears for Power Transmission Gearboxes
- Hydraulic Power Supply
- Main and Tail Rotor Servo Controls

H145
- Gears for Power Transmission Gearboxes
- Hydraulic Power Supply
- Main and Tail Rotor Servo Controls
- Tail Gearbox

H155
- Environmental Control System

H160
- Heating Valve
- Main Rotor Servo Control
- Tail Rotor Actuator
- Tail Rotor Gearbox

H175
- Heating Valve
- Tail Rotor Actuators

H225
- Environmental Control System Components
- Heating System

AVIC HAIG

AC 312 / AC 332
- Environmental Control System
- Heating and Ventilation

Eve Air Mobility

EVE-100
- Primary Flight Control Actuators

Leonardo (Helicopters)

AW 09
- Heating and Ventilation

AW109
- Heating and Ventilation

AW139
- Environmental Control System
- Landing Gear System

AW169
- Environmental Control System

AW189
- Environmental Control System
- Landing Gear System

Turkish Aerospace

T625
- Environmental Control System
- Oil Cooling System

Volocopter

VoloCity
- Pilot- / Interface Control Computer

Participation in programs

Defense Aircraft

Airbus

A330 MRTT
- ARBS Ruddervator Control System

A400M
- Aileron, Elevator, Rudder Servo Control
- Air-Conditioning System
- Cabin Pressure Control System
- Door Ramp Actuation System
- Engine Bleed Air System
- Fuel Tank Inerting System CSAS Components
- Nacelle Anti-Ice System
- Power Control Unit
- Spoiler Servo Control
- Ventilation Control System
- Wing Anti-Ice Valves
- Wing Tip Brake

Eurodrone
- Air Systems
- Landing Gear System
- Hydraulic System

Eurofighter / Typhoon
- Airbrake Actuator Servo Control
- AMAD Gearbox
- Engine-Driven Hydraulic Pump
- Filter Package Units
- Nose Landing Gear
- Nose Landing Gear Retraction Actuator
- Main Landing Gear Side Stays
- Primary Flight Control Actuators
- Fly-by-Wire Technology

SIRTAP
- Cooling Sub-Components

Boeing

KC-46
- Fuel Pressure Regulating Valves
- Refueling Hose Drum Drive System

MQ-25
- Tailhook Actuator

Cobham

Cobham Mission Equipment
POD
- Hose Drum Drive System

Dassault Aviation

Mirage 2000
- Air-Conditioning System
- Cabin Pressure Control System
- Engine Bleed Air System

Rafale
- Air-Conditioning Components
- Cabin Pressure Control System
- Engine Bleed Air System Heat Transfer Equipment

Embraer

ALX
- Cabin Pressure Control System

C-390 Millennium
- Air-Conditioning System
- Cabin Pressure Control System
- Engine Bleed Air Valves
- Refueling Hose Drum Drive System
- Wing Anti-Ice Valves

Tucano
- Air System Components

FAdeA

IA-63 Pampa III
- Air-Conditioning, Heating, and Ventilation Components
- High-Lift Actuation Components
- Primary Flight Control Components
- Landing Gear Components

HAL

Jaguar
- Cabin Pressure Control System

Tejas
- Cabin Pressure Control System

IAI

Elta
- Environmental Control Unit

Korea Aerospace Industries

KT-1
- Cabin Pressure Control System
- Engine Bleed Air System

Leonardo (Aircraft)

C27-J
- Cabin Pressure Control System

M-346
- Main Landing Gear System
- Nose Landing Gear System
- Nose Wheel Steering System

MELTEM III-MMI
- Anti-ice system
- Auxiliary Cooling System
- Cabin Pressure Control System

Northrop Grumman

Litening
- Environmental Control Unit for POD

Rafael

Litening
- Environmental Control Unit for POD

Saab

Arexis
- Environmental Control Unit for POD

Thales

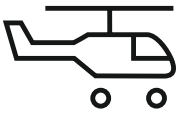
Damocles / Talios
- Environmental Control Unit for POD

RECO NG
- Environmental Control Unit for POD

MELTEM II
- Environmental Control Unit

Participation in programs

Defense Helicopters



Airbus (Helicopters)

H135M
- Gears for Power Transmission Gearboxes
- Hydraulic Power Supply
- Main and Tail Rotor Servo Controls

H145M
- Gears for Power Transmission Gearboxes
- Hydraulic Power Supply
- Main and Tail Rotor Servo Controls
- Tail Gearbox

H225M
- Environmental Control System Components
- Heating System

NH90
- Actuation Control Computer
- Auxiliary Power Unit Gearbox
- Environmental Control System Components
- Fly-by-Wire Main and Tail Rotor Servo Controls

Tiger
- Gears for Tail Gearbox
- Air-Conditioning System
- Main and Tail Rotor Servo Controls
- Tail Landing Gear

UH-72A Lakota LUH
- Gears for Power Transmission Gearboxes
- Hydraulic Valve Block / Reservoir
- Main and Tail Rotor Servo Controls

HAL

ALH / LUH
- Heating Components

Korea Aerospace Industries

KUH-1 Surion
- Environmental Control System Components

LAH
- Environmental Control System

Leonardo (Helicopters)

AW149
- Environmental Control System
- Landing Gear System

AW169
- Environmental Control System

T129
- Environmental Control System

Engines and Nacelles

Rolls-Royce

Pearl 700
- Pneumatic Component Package

Trent 7000
- High-Pressure Non-Return Valve

UltraFan®
- Power Gearbox*
- Temperature Control Valve

* by Aerospace Transmission Technologies GmbH – a joint company of Liebherr-Aerospace and Rolls-Royce

Spirit AeroSystems

- Thrust Reverser Actuation System for Rolls-Royce Pearl® 10X Engine

Satellites

Thales Alenia Space

Space Inspire
- Thermal Management Components

Liebherr-Transportation Systems

A breath of fresh air
The heating, ventilation and air-conditioning systems by Liebherr that are installed in the DT5 fleet of Hamburger Hochbahn have been equipped with new software and hardware measures and tested on board the trains. The objective: to make them even more energy efficient.

Naturally cool

In recent years, the rail industry has made significant strides towards making mobility more environmentally friendly. Liebherr-Transportation Systems has been working intensively to implement more climate-friendly alternatives compared to conventional refrigerants and to adapt heating, ventilation, and air-conditioning (HVAC) systems accordingly. Three technologies stand out in particular: the use of alternative refrigerants such as CO_2, propane, and Liebherr's proven air-cycle technology.

Energy efficient cooling with CO_2
What initially sounds contradictory is actually a climate-friendly alternative to conventional refrigerants: CO_2, also known as R744. It not only has a very low greenhouse effect compared to conventional refrigerants, but it is also particularly energy-efficient in temperate climate zones and can heat very efficiently in heat pump operation. Moreover, the refrigerant is non-toxic and non-flammable. Since carbon dioxide occurs in large quantities in nature, it is cost effective compared to synthetic refrigerants.

"With the start of serial production of HVAC systems using CO_2 as a refrigerant in 2024, we have reached a major milestone on the road to more sustainable mobility," reports Reinhard Aigner, Coordinator of Research and Technology at Liebherr-Transportation Systems in Korneuburg (Austria). He has been intensively involved for many years with air-conditioning systems and how they can become more environmentally friendly. "Our HVAC systems are one of the first solutions of their kind to be used in rolling stock applications."

Maximum cooling performance with minimal energy consumption thanks to propane
Another major milestone for Liebherr is the start of serial production of propane-based HVAC units. The natural refrigerant, also known as R290, enables more sustainable cooling and, in terms of pressure, is very similar to the previously used refrigerant R134. It provides a low greenhouse potential as well as maximum cooling performance

with minimal energy consumption. This system also guarantees rail vehicle operators a reliable product solution with low downtime. The technical concept takes into account all relevant safety requirements.

Cooling with natural ambient air
A completely climate-friendly solution is Liebherr's air-cycle technology. The trick: it uses only natural ambient air for cooling – no refrigerant is needed.

"With our air-cycle technology, ambient air is compressed, cooled, and expanded again to achieve the desired cooling effect," explains Reinhard Aigner. "Since the system consists of only a few components and the cooling circuit does not require pressure testing and evacuation after restoration, the air-based air-conditioning system is simple and cost-effective to maintain. Additionally, the system is characterized by low operating costs and, due to efficient partial load control, low energy consumption."

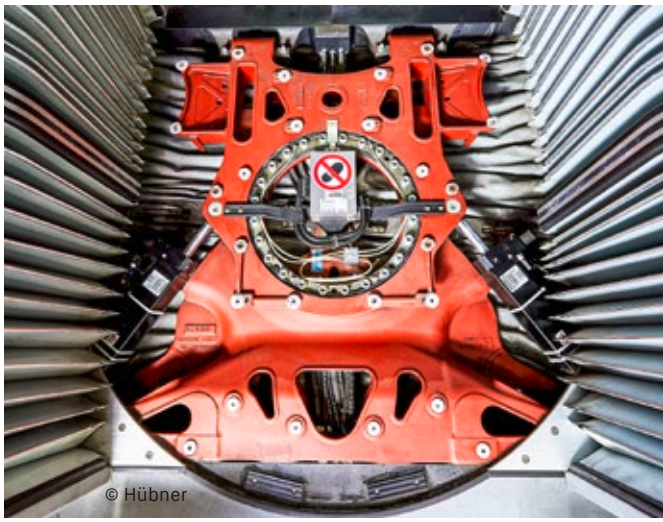
Originally developed by Liebherr for the aviation industry, the air-cycle technology has been used for decades in aircraft air-conditioning systems. Given the significant advantages over conventional vapor cycle systems, Liebherr was one of the first companies to start using this technology in rail vehicles. The goals in both industries are the same: economy and passenger comfort.

“For passengers to reach their destinations safely and comfortably”

Liebherr-Transportation Systems in Korneuburg (Austria) manufactures hydraulic systems for railway vehicles and buses in a workspace of around 11,000 m². The company has developed a new generation of hydraulic articulation dampers, which will be used in bus articulation systems produced by Hübner. Dieter Pflanzer introduces the dampers.

“The dampers are able to withstand up to 500 bar of pressure, which is a remarkable feature!”

Dieter Pflanzer
Liebherr-Transportation Systems GmbH & Co KG
Liebherr-Transportation Systems Marica EOOD


© Hübner

Mr. Pflanzer, how are these new dampers used?
Hübner integrates these types of dampers in articulated buses. We have developed the dampers and they are installed in the so-called articulation system as a complete unit. The articulation system connects the front and rear part of the bus and includes the joint with two Liebherr dampers and the folding bellows. Our dampers ensure that the articulated bus can manage cornering and straight travel safely and comfortably.

This requires the damping to continually adjust depending on the driving situation. The adjustment is performed by the articulation control using a proportional valve on the damper.

What in particular is required of these articulation dampers?
They must withstand high pressure of up to 500 bar. They also have to function smoothly and, above all, safely under tough operating conditions for many years.

The dampers are assembled in Korneuburg. Which are the biggest production challenges and how big are the planned quantities?
The production line comprises various machines, test devices, a paint line and the final inspection point. Several thousand dampers have been produced up to now at our Korneuburg site. To ensure the shortest possible manufacturing times, streamlined and precisely coordinated production procedures are essential for an annual production rate of 6,000–10,000 units. We constantly monitor quality and productivity, and continuously improve as we work. With these kind of quantities, any additional action could impact production.

Thus, on an articulated public bus, there is a very good chance that the articulation system is stabilized by Liebherr dampers?
Correct. Almost all notable articulated buses operate using articulation systems from Hübner and these are almost all fitted with Liebherr dampers. For passengers to reach their destinations safely and comfortably, the dampers are essential components in an articulated bus.

Dieter Pflanzer
He has already worn several hats at Liebherr: After studying Mechanical Engineering Management at TU Wien (Vienna University of Technology), Dieter Pflanzer started at Liebherr-Transportation Systems in Korneuburg (Austria) as a project leader. After 2018 onwards he was Head of the Hydraulics Business Unit. Since April 2023, he has been Director Operations of Liebherr-Transportation Systems Marica EOOD (Bulgaria) as well as Director Operations at Liebherr-Transportation Systems GmbH & Co KG in Korneuburg. From July 1, 2025 onwards he is Managing Director at Liebherr-Transportation Systems GmbH & Co KG.

The world with Liebherr

At dizzying heights
When it comes to erecting tall buildings or constructions, cranes from Liebherr are the ideal performers. Just like the LR 1800-1.0 crawler crane, which can lift weights of up to 800 tons and whose hook height can reach 202 meters. Not bad conditions for installing wind turbines, for example.

Interview with the family shareholders

In 2024, Liebherr marked its 75th anniversary with numerous celebrations enjoyed by employees around the world. You have attended many of these events yourselves. What are your favourite memories?

Jan Liebherr: The celebrations surrounding the 75th anniversary all exuded a unique atmosphere of togetherness. The pride and enthusiasm of our employees was plain to see. One highlight was the historical film which we had produced ourselves – a compelling retrospective looking at our company over the decades. The friendly atmosphere, musical performances by talented individuals from within our ranks, and lots of face-to-face chats made the anniversary a truly unforgettable experience for me.

Philipp Liebherr: The thing I'll remember most is the strong sense of team spirit, which was palpable at the events all over the world. The variety of the festivities and the deep connection between our employees and the company made a lasting impression on me. The conversations with our teams have proven the level of passion and dedication that sustains our Group.

What were your other highlights from the 2024 business year?

Jan Liebherr: 2024 was an eventful year with lots of milestones. As well as marking the 75th anniversary of the Group, we had the chance to celebrate 50 years of Liebherr in Canada and Brazil. The return of the customer days in Ehingen (Germany) was a very joyful affair. These events are always a valuable opportunity to speak face-to-face with our customers from all over the world. We also exemplified our innovative prowess at various exhibitions, including Intermat in Paris (France), MINExpo in Las Vegas (USA) and IFA in Berlin (Germany). Another major success was, of course, the record-breaking order from Fortescue, a truly historic event for the company.

Philipp Liebherr: The events and exhibitions this past year were real highlights for me, too. These occasions once again proved just how essential direct customer contact is for our business, even now. An important milestone for me was the work that began on expanding production capacities in Campsas (France). This represents an important investment in the future of our aerospace segment. I'd also like to mention the contract to develop the flight control computer for Airbus. And, in another successful move, we sold far more than 100,000 refrigerators in India.

You just mentioned the major contract with Fortescue, the global technology, energy and metal group. What significance does this contract have for Liebherr?

Jan Liebherr: This contract is a really significant milestone for us in many respects. Firstly, it cements our long-term partnership; secondly, it shines a light on our innovative prowess and our commitment to a sustainable future for the mining industry.
The mining industry is on the brink of a profound transformation; in Fortescue, we have a partner by our side who is undoubtedly driving this transformation forward. The target of running net-zero operations by 2030 is ambitious – and it calls for groundbreaking technological advancements. This is where Liebherr comes into play: we are not just talking about decarbonisation of the industry, but actually taking action by developing concrete solutions and putting them into practice.
The collaboration spans several of our product segments and presents us with new technological and operational challenges. At the same time, it offers us a unique opportunity to put our innovative strength to the test and to show that Liebherr is ready to help shape the future of the mining industry. The contract reinforces our aspiration to blaze a technological trail by developing sustainable solutions for the entire sector.

What is your assessment of the Group's business figures?

Jan Liebherr: We are really satisfied with the business figures. Overall, we are registering positive revenue development and a solid operating result for 2024, and that's in spite of the challenging market environment. This year, we have continued to grow steadily and have bolstered our stability as a Group. That's what matters to us.

Philipp Liebherr: Our diversified positioning has proven its worth yet again: 2024 was largely shaped by strong incoming orders, though there were marked differences between the product segments.

The number of employees in the Group has grown once again, with the workforce totalling some 54,000 people by the end of 2024. How does Liebherr make sure it remains an attractive employer? What initiatives or programmes are there for developing and retaining talented individuals in the long term?

Jan Liebherr: We offer our employees ambitious and varied tasks, give them responsibilities, and nurture entrepreneurial spirit. This establishes a motivating work environment and encourages lasting identification with the company.

Philipp Liebherr: Our employees also have the opportunity to develop themselves. Our talent management programme features a comprehensive range of options – from trainee programmes to targeted leadership development schemes. This ensures we can still attract highly qualified experts and that we retain the talent we already have for a long time.

Lastly, let's take a quick look at the current business year: what are your predictions for 2025?

Jan Liebherr: For the first half of 2025, we are expecting market development to continue on the same trajectory it is on currently, whereas the second half of the year may present a slight upturn. Our principles remain unchanged: we are committed to innovation, quality and strong partnerships.

Philipp Liebherr: Our goal is to keep growing. Despite a challenging market environment, we are optimistic for the business year ahead. Our broad diversification and future-oriented approach have proven invaluable and remain the basis for our ongoing success.

This text is only an extract from the interview. You can find the full interview in our online annual report:

→ go.liebherr.com/98a1x3

A giant leap towards sustainable mining

A historic milestone for the mining industry: at MINExpo 2024 in Las Vegas (Nevada, USA), Liebherr and global technology, energy and metals group, Fortescue, sealed a deal for developing and delivering a fleet of zero emission machines that will also be largely autonomous, signifying the dawn of a new era of mining.

It was a truly remarkable moment. Last September, during the world's largest exhibition for the mining industry – MINExpo – Liebherr and Fortescue announced a significant expansion of the partnership between the two companies. Together, they are committed to having a comprehensive and large scale zero emission mining ecosystem operational by 2030.

With a contract that includes the supply of 475 Liebherr machines, and is worth an enormous €2.5 billion, this deal not only marks the largest single order in Liebherr's over 75-year history, but also sends a strong signal for the future of the industry. The two companies are committed to producing mining equipment no longer reliant on fossil fuels that also provides the performance, efficiency and reliability expected of heavy-duty machinery. The innovations developed as part of this contract will support both companies as they work towards their respective 2030 decarbonisation targets.

"At MINExpo, we wrote a new page of Liebherr history and are proud to be able to make an important contribution to the decarbonisation and autonomisation of heavy-duty machines," explains Dr Jörg Lukowski, executive vice president, sales and marketing, at Liebherr-Mining Equipment SAS.

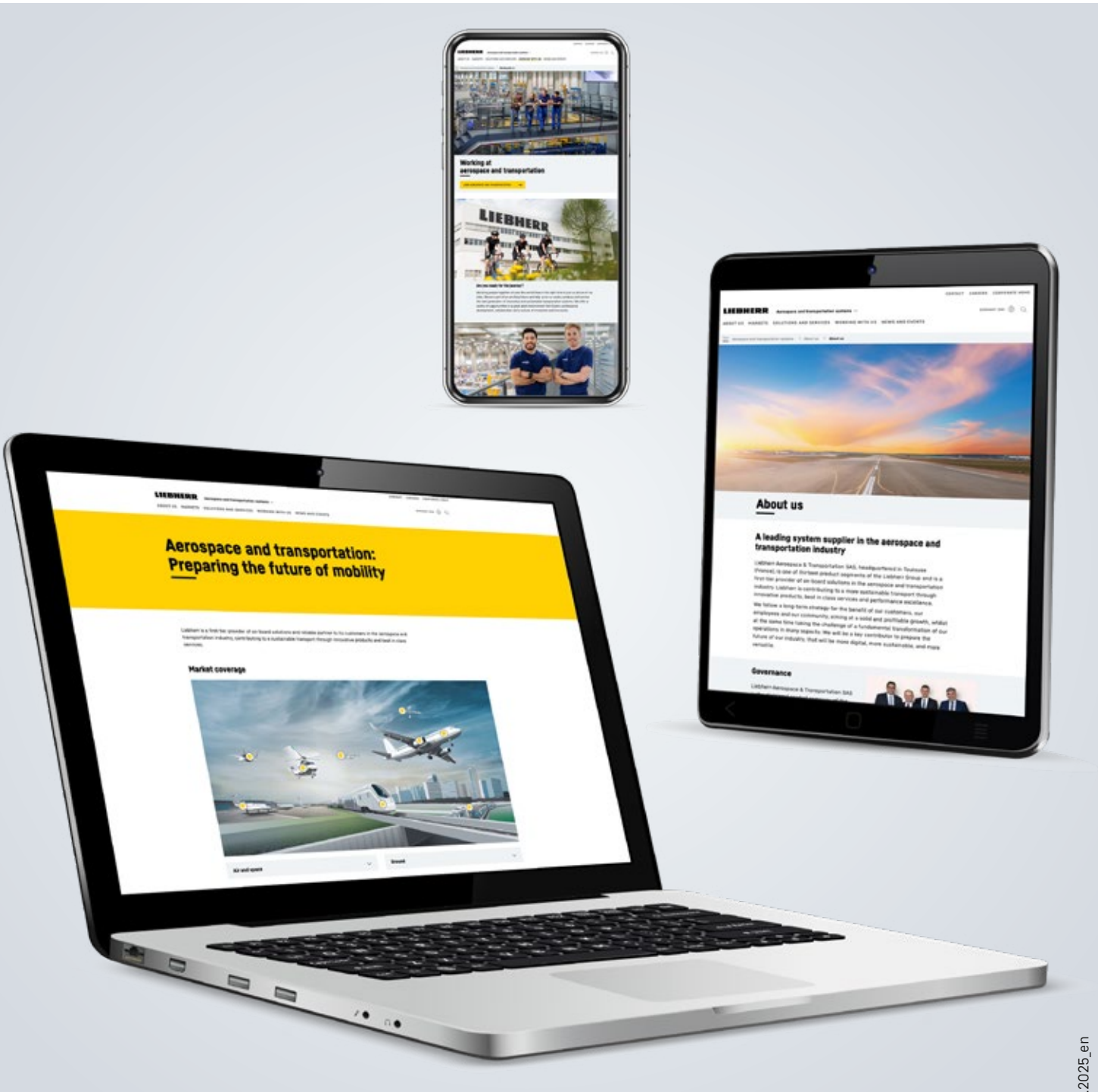
Blazing a trail for the mining industry
The partnership between Liebherr and Fortescue is driving two key trends in the mining industry: decarbonisation and autonomy.
"The technology we're developing with Fortescue will put us well on our way to becoming one of the first providers in the mining market to combine a zero emission drive and a fully autonomous transport solution in one mining truck. This will support our customers on their path to decarbonisation," says Dr Lukowski.

The planned fleet of machines for Fortescue, consisting of 360 battery-powered mining trucks, 55 electric excavators and 60 dozers, will operate entirely without fossil fuels. One highlight of the collaboration is the zero emission and autonomous T 264 Battery Electric mining truck, which is equipped with a battery power system developed by Fortescue Zero, Fortescue's technology arm. This technology has been specially designed to handle the extreme demands of mining: long operating times and moving heavy loads in challenging environments.

Fully autonomous operation
Liebherr and Fortescue are also developing a comprehensive Autonomous Haulage Solution that will enable machines to be operated completely autonomously. The Autonomous Haulage Solution also includes an Energy Management System that coordinates the charging assignments for the battery-electric trucks.
"This combination of zero emission drive technology and autonomy is unique on the market and reflects Liebherr and Fortescue's leading role when it comes to technological progress," explains Dr Lukowski. These machines will not only offer a reduction in carbon emissions, but also considerable efficiency gains. Autonomous machines can minimise downtimes and optimise the use of resources, while zero-emission drives make it easier to meet global environmental targets.

Heading for a new era
As an industry that has long relied on fossil fuels, this partnership paves the way for a new era of more sustainable and efficient mining.
"We are committed to meeting the technological needs of our customers while actively contributing to the reduction of global carbon emissions," says Dr Lukowski in summary. "With this partnership with Fortescue, Liebherr is showing that innovation and sustainability can go hand in hand – and that the future of mining has already begun."

A brand-new look



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