Automation for tomorrow

Innovative automation solutions for the aviation industry

Corporate Sales USA and Canada
“The best of both worlds”
Committed to the world’s largest market

Lufthansa Technik Shenzhen
Building on success
A comprehensive MRO provider for Asia Pacific

Logistics
The digital warehouse
Smart, efficient and highly automated processes
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Lufthansa Technik Shenzhen has developed into a strong MRO provider for the Asia Pacific region.
“Fruitful and honest discussions”

The **A350 Community workshops** have become a fixed part of many airlines’ calendars by now. The third event of this unique industry-independent platform took place in Hong Kong in mid-January and was once again a resounding success.

The fact that a total of ten airlines sent representatives to take part in the third A350 Community workshop clearly demonstrates how important the now firmly established event has become for current and future operators of this advanced aircraft type. What contributed particularly to the three-day workshop’s success was the participation of five airlines that already operate the A350, namely Cathay Pacific, Singapore Airlines, Hong Kong Airlines, Finnair and Lufthansa. That is one third of the current operators.

And as another special highlight, the third A350 Community meeting was attended by pilots as well. Thanks to the input of Lufthansa’s technical pilot for the A350, for example, an entirely new approach could be employed during the workshop to establish a valuable and as yet unique link between maintenance and flight operations.

**Joint approach to eOperations**

The aircraft “talks a lot”, which is to say it generates large amounts of data. That is why the workshop session on eOperations attracted particular attention. The intensive discussions here showed that this is a “complex, hard-to-grasp issue”, even for airlines that already have experience with the A350. Cathay Pacific therefore gave participants an opportunity to engage in in-depth discussions about eOPS and exchange ideas on how best to approach the topic.

The success of the A350 Community proves that the initiators were on the right track with their concept of an industry-independent platform that enables an open exchange of ideas and aims to solve the challenges of day-to-day operations jointly. “We appreciated the honest discussions about the aircraft and the technical support it requires,” was the feedback of one participant. The presentation by Finnair about its A350 fleet’s operational reliability and role in staying competitive as well as the detailed insights by Honeywell about its in-service experience with the A350’s APU were shining examples of this.

At the end of a very informative and lively workshop, the participants already exchanged ideas and possible topics for the next event. The integration of more OEM presentations into the next workshop’s agenda is one of the issues the A350 Community team is already bearing in mind for the next workshop. According to current plans, the fourth A350 Community workshop will take place in October 2018 in Munich.

**Initiated by Lufthansa Technik**, the A350 Community was established with the main goal of enabling airlines worldwide to exchange their technical and operational experiences with their A350s and benefit from these exchanges.

www.a350community.com
Approval for ARJ21 MRO services

Lufthansa Technik Shenzhen // Chinese aircraft manufacturer COMAC (Commercial Aircraft Corporation of China) has officially approved Lufthansa Technik Shenzhen as their first MRO service provider in China for ARJ21 engine nacelles and components. Prior to the approval, the Lufthansa Technik subsidiary had successfully performed an on-site audit in December 2017. Located in the Chinese province of Guangdong, Lufthansa Technik Shenzhen had added the COMAC ARJ21 regional jet to its service portfolio in 2016. Since then, the company has carried out modifications to several shipsets of the regional jet’s engine fan cowl and thrust reversers. Lufthansa Technik Shenzhen is authorized by Middle River Aircraft Systems (MRAS), a subsidiary of General Electric, to carry out maintenance, repair and overhaul for ARJ21 engine nacelles.

Stay up to date!
Customer Newsletter // Lufthansa Technik’s online customer newsletter Connection Flash supplements our popular bi-monthly Lufthansa Technik Group Magazine Connection with first-hand news on innovative technologies and developments, new services and offers, and future events.

New home for Air Berlin Technik’s trainees

Lufthansa Technical Training // Lufthansa Technik is the new training organization for approximately a dozen young people who were working through training programs at Air Berlin Technik. As a consequence, all of Air Berlin’s aircraft mechanic and avionic trainees who began their training in 2015, 2016 or 2017 will have the opportunity to conclude their training programs in their desired professions. Lufthansa Technik and the United Services Trade Union ver.di came to this agreement after the new owner of Air Berlin Technik announced that it was not continuing the company’s training programs. With these new trainees, the total number of people in traditional or dual-study training programs with the Lufthansa Technik Group in Germany will rise to just under 600. Lufthansa Technik and Lufthansa Technical Training are currently working on the contracts and training contents needed for taking over the trainees in Dusseldorf and Frankfurt, and look forward to working with them.

Expanded cooperation with EVA Air

Total Component Support // Lufthansa Technik has concluded an exclusive contract with its long-standing customer EVA Air to supply components for the Taiwan-based airline’s new Boeing 777F fleet. The integrated supply of components for the freighter aircraft within the scope of Total Component Support (TCS*) includes the repair, overhaul and supply of line replaceable units. Lufthansa Technik’s inventories for the Asia Pacific region are kept in Hong Kong and Singapore. Customer services for the region, including engineering and logistics, are located in Hong Kong and in close proximity to EVA Air’s headquarters. “EVA Air is one of our key customers in Asia Pacific and we are delighted that the airline has entrusted us with the supply of material for its new Boeing 777 freighters, relying further on the experience and expertise of Lufthansa Technik,” says Burkhard Pfefferle-Tolkiehn, Vice President Component Services for Asia Pacific at Lufthansa Technik. In addition to the new contract, the Hamburg-based MRO provider is also responsible for supplying components for EVA Air’s fleet of Airbus A321, A330 and Boeing 777-300ER aircraft.
A380 heavy checks for Asiana Airlines

Lufthansa Technik Philippines // Asiana Airlines and Lufthansa Technik Philippines have signed a five-year agreement for base maintenance. From 2018 to 2022, Lufthansa Technik Philippines will be carrying out a total of 14 checks on the South Korean airline’s A380s.

“We are happy for this opportunity to further strengthen our long-term relationship with Lufthansa Technik Philippines,” says Dong Jun Shin, General Manager Aircraft & Supplies Purchasing of Asiana Airlines. “During previous checks on our A380s, Lufthansa Technik Philippines has shown sincerity and dedication to the campaign, which ultimately led to our decision on whom to award this contract.”

“At first, it was our expertise and proximity that led the customer to send four of their A380s to us,” says Elmar Lutter, President and CEO of Lufthansa Technik Philippines. “We are happy to continue our partnership, after completing those checks and earning their trust.” The first A380 under this contract is scheduled to arrive in Manila, on March 2018.

Connectivity for the Boeing 737 MAX

Lufthansa Technik // From mid-2018, Lufthansa Technik will start connectivity modifications on several Boeing 737 MAX aircraft of an undisclosed airline customer at its overhaul facility Lufthansa Technik Budapest. The five-day modification includes the installation of a broadband antenna on the aircraft’s external structure, together with cabling, hardware and software installation in the aircraft cabin.

Following the modification program, full base maintenance capability will be built up for the Boeing 737 MAX at Lufthansa Technik Budapest in the next months in a first step. Capability extension at further locations of the Lufthansa Technik network will follow. Lufthansa Technik already supports Boeing 737 MAX operators with component services.

Cooperation with Crane Aerospace & Electronics

Component Services // Lufthansa Technik and the American component manufacturer Crane Aerospace & Electronics have agreed on a cooperation covering component supply for Europe, the Middle East and Africa (EMEA) as well as Asia Pacific (APAC). Lufthansa Technik will support the urgent supply of a number of components to all customers in these regions on Crane’s behalf.

“Lufthansa Technik’s cooperation with Crane Aerospace & Electronics guarantees optimum urgent supply for our future joint customers,” says Eckhard Freimuth, Senior Manager Aerospace Industry Projects at Lufthansa Technik. Brian Barrett, Vice President – Aftermarket at Crane Aerospace & Electronics, adds: “I am convinced that Lufthansa Technik will be an ideal partner with Crane to provide excellent service and a worldwide network enabling our customers in EMEA and APAC to be supplied quickly with the components they need. Crane and Lufthansa Technik will continue to evaluate our customers’ needs and discuss further cooperation as required.”

The cooperation covers all the components and systems for the strongly growing fleets of the Boeing 737 (NG and MAX) and Airbus A320 (classic and neo) aircraft families, including, for instance, pumps, valves and wheel speed transducers.

New competence center for engines

Engine Services // The Engine Services division of Lufthansa Technik in Hamburg is gearing up for the future. With the opening of a new competence center for engine case repair and an X-ray center for engine components of all sizes, Lufthansa Technik is preparing for future engine types and a growing business in engine maintenance. State-of-the-art tools and equipment are the basis for the introduction of new repair procedures. At the same time, the variety of engine types overhauled here can be increased significantly, and turnaround time can be reduced to just three weeks. The division assumes that orders for this product will double over the coming three years.

The new X-ray center with its two systems can screen components flexibly, from the smallest engine blade up to future engine cases with a diameter of 3.5 meters – and do so digitally as well as in analog mode. Recurring inspection requirements can be stored and the inspections automated in the future. Planning for a second stage of construction in 2019 is already underway; it will extend capacity again.

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“The best of both worlds”

A larger local presence and access to the entire product range of a global group – Sahib Ajjam, Senior Director Corporate Sales at Lufthansa Technik for the U.S. and Canada, explains how broadly the MRO provider is positioned in the world’s biggest market and how it partners with its customers to maintain their competitiveness.
The food truck tour was an unusual highlight in your region last year. What was the feedback like?

Sahib Ajjam: "You guys rock!" was what one customer said when our food truck came through. That made me happy, because the tour enabled us to show the fun-loving and open-minded side of Lufthansa Technik in a completely relaxed and authentic atmosphere. We do have that quality – even if it isn’t how people would first think of us, as a German company.

How does that fit with the company’s image in North America?
The response to the food truck confirmed my impression that we have a good image in the North American market. When we have business meetings with the airlines, we are treated as equals – they know that we have an airline’s DNA. The growth of our North American presence shows that we have become increasingly flexible and competitive in response to this market and are deepening our roots here.

How do your customers experience these deeper roots?
In terms of production, I especially want to emphasize the expansion of the new component workshop by Lufthansa Technik Component Services in Tulsa, Oklahoma. The facility has doubled in size, providing for additional capabilities such as emergency slides and an expanded spectrum of avionics components. The number of local employees is expected to rise accordingly. Lufthansa Technik Component Services employs close to 600 staff at its eight locations throughout North America today. Opening a new component warehouse in Toronto and expanding the capabilities of the warehouse in Ft. Lauderdale are visible signs of our enhanced logistics network in the region, further increasing our performance and service portfolio.

What’s more, our new regional office located in Miami ensures a more efficient market approach for our customers in America. Here, our various sales representatives and other commercial and operational services, such as a 24/7 AOG desk and material trading, are now together under one roof.

What are the parameters that define Lufthansa Technik’s operating environment in North America?
The North American market has two sides: One is the large fleet of mature or aging aircraft that we are set up for. The other is that airlines are moving on to new models like the A320neo, 787 and 737 MAX, which we want to focus on in the future. These aircraft symbolize the two poles we operate between here – between proven and new technologies. Component and engine manufacturers – and even the major aircraft manufacturers Boeing and Airbus – are increasingly pushing into the aftermarket. On the one hand, we compete fiercely against these OEMs. On the other hand, we are now often strategic partners, especially in new technologies. One example is our joint venture with GE Aviation on GEnx-2B engines. Lufthansa Technik also is a member of the MRO network for Pratt & Whitney’s geared turbofan (GTF) and has recently launched a joint venture with MTU Aero Engines for GTF maintenance, repair and overhaul services.

Facts & Figures
+ New component workshop in Tulsa
+ Expanded warehouse capabilities
+ Proven and new technologies
+ Strategic partner to OEMs
+ Competitive power-by-the-hour support
+ Mobile engine services expanding
+ Global player for cabin modifications
+ Digital fleet solutions
We are a licensed facility for the overhaul of LEAP engines, as well as a licensed component repair center and exclusive global asset provider for all Honeywell components and the HGT 1700 APU on Airbus A350 aircraft, to name but a few.

**One of the key challenges of the U.S. market is the supply of materials. Why is that?**

Many airlines in the U.S. still have very large stocks of materials, especially for aging or mature aircraft. However, what feels like a safety net is really a significant burden and, in our experience, brings no competitive advantage. At the end of the day, these inventories are simply a financial burden and a lot of administrative work. Maintaining the modification status in line with the service bulletins inherently entails risk. And there are many rogue units with poor reliability.

Last but not least, the logistics required for these material flows, including warehousing and station provisioning, is actually not an airline’s core business.

**What solutions does Lufthansa Technik offer for this challenge?**

With our high in-house capability, we are competitive in single component maintenance. For the widely used narrow-body models, we achieve almost 100 percent at the level of the global Lufthansa Technik Group, and we want to achieve 80 percent for new aircraft models. That is significantly better than the competition. One important topic that we want to address more aggressively in the U.S. is surplus material support. However, beyond Single Component Maintenance, U.S. operators gain an even bigger cost advantage with power-by-the-hour contracts. We assume the risks from the airlines and manage their material, including logistics and repair cycles. In our portfolio, we call this Total Component Maintenance. The only thing more efficient than that is participation in the Lufthansa Technik components pool. This Total Component Support, with service level guarantees, offers economies of scale that otherwise only large fleets can achieve.

**What role do mobile engine services play in your region?**

We bring our ability to extend time on wing for engines intelligently and cost-effectively by means of targeted repairs on a smaller scale than for a major shop event. In addition to the mobile engine team at Air Canada in Montreal, we are currently establishing a local repair station in Tulsa as part of our mobile engine services. These mobile engine services will be available to customers in North America in the near future.

**Which base maintenance and aircraft modification services are attractive for the market?**

First, I want to mention our narrow-body overhaul facility Lufthansa Technik Puerto Rico. The facility has mastered the aftermath of hurricane Maria by returning to our top-of-the-class turnaround times within only a few weeks. That’s something we are really proud of. As of today we run five overhaul lines in Puerto Rico. Lufthansa Technik Shannon in Ireland is another key company in our network. As a specialist for the Boeing 757, 767 and now 787, this is where we overhaul these aircraft for our U.S. customers.

Additionally, we offer cabin modifications, which adds to our attractiveness for North American airlines. We have demonstrated this capability with wide-ranging modification programs for Lufthansa and other airlines. Cockpit modifications such as ADS-B, the integration of state-of-the-art connectivity solutions and the High-Density Solution for the A320 family are other highlights of our extensive aircraft modification portfolio.

**How do you see Lufthansa developing as a provider in the U.S. and Canada going forward?**

We are well positioned to deliver cost-effective services and added-value solutions in and for this region. In addition to the topics we already discussed, I’d like to mention our leading role in digital fleet solutions via our AVIATAR platform and underline our commitment to new aircraft like the 737 MAX and the A350. We are a good partner for our customers in the U.S. and Canada; with our extensive local support and personal commitment on the one hand, and the entire portfolio of our global group behind us on the other, our customers get the best of both worlds.

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The food truck tour was consistently met with enthusiasm.

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Sahib Ajjam
Senior Director
Corporate Sales USA & Canada
Phone +1-305-677-5199
sahib.ajjam@lht.dlh.de
With a focus on modern aircraft, Lufthansa Technik offers a continuously expanding range of local products in the U.S. market, from component services to landing gear overhaul to AOG services.
Las Vegas-based Allegiant Air is the United States’ ninth largest commercial airline. One of the world’s most innovative carriers, it is devoted to linking travelers in small cities with limited or no air service to top leisure destinations. Serving a network of more than 400 routes with scheduled and charter flights, management and employees can look back at an unrivalled string of consecutive profitable quarters – testimony to the company’s strong all-around performance. At the beginning of February 2018, Maurice J. Gallagher, Jr., chairman and CEO of Allegiant Travel Company, announced the result of the fourth quarter of 2017: “We are proud to have produced another profitable year and our 60th consecutive profitable quarter. Our positioning for the next 60 quarters is equally exciting.”

Allegiant Air plans to have an all-Airbus fleet by the end of 2018. The fleet of MD-80s still in service is currently being phased out and replaced with Airbus A319 and A320 aircraft. Although the acquisition of used aircraft is a core part of the company’s strategy, there have been exceptions to the rule. In May 2017, Allegiant Air took delivery of its first-ever new aircraft, an Airbus A320. Beginning in 2014, Lufthansa Technik was contracted to provide a broad spectrum of services for the fast-growing airline. The MRO provider then commenced its basic agreement by providing aircraft maintenance services, engineering and troubleshooting.

**Broad support spectrum**

In response to the introduction and rapid build-up of the A320 fleet, Lufthansa Technik’s scope of support broadened considerably. Currently, the MRO provider offers a wide spectrum of flexible services, ranging from component services – based on capabilities offered through Lufthansa Technik Component Services in Tulsa – to landing gear overhaul by Hawker Pacific Aerospace. In 2016, the company signed a contract covering engine overhaul for the entire A320 fleet. In accordance with
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In addition, basic engine overhaul service is complemented by mobile engine services. Lufthansa Technik’s dedicated Airline Support Team (AST®) has already performed a number of different jobs, including engine module swaps. Four of these on-site events are currently planned for 2018.

Aircraft transition checks are another contracted support element. The Allegiant philosophy of keeping costs low, both internally and for passengers by purchasing used aircraft makes transition checks and the associated modification work a necessity. Upon request, these checks will be performed at Lufthansa Technik Puerto Rico or at Lufthansa Technik’s Shannon branch.

“We are grateful for Lufthansa Technik’s flexibility and dedication to assisting with a smooth fleet transition. Their support and hard work has been vital to maintaining the high standard of quality and service we expect for each of our aircraft,” said Scott Sheldon, Executive Vice President, Chief Operating Officer and Chief Financial Officer of Allegiant.

Successful growth strategy

Today, Allegiant Air operates 59 A320 family aircraft. By the end of 2018, when the last 32 MD-80s are phased out, this figure will have increased to 82. Matthias Zimmermann, the responsible Director Corporate Sales USA and Canada of Lufthansa Technik, expects this growth to continue: “Allegiant is a highly successful airline with a focused business strategy aimed at controlled growth. I am looking forward to this development, as Lufthansa Technik is prepared to do everything in its power to ensure a smooth, safe and trouble-free growth.”

Allegiant Air
+ Founded: 1997
+ Headquarters: Las Vegas, USA
+ Fleet: 59 A320 family aircraft, 32 MD-80 (end 2017)
+ Domestic network: 122 cities, more than 400 routes
The aviation industry is on the cusp of the fourth industrial revolution. What is needed to secure its future is an increase in efficiency, speed and productivity – and thus a significantly higher degree of automation. However, the special conditions of this industry make it necessary to adopt a new approach. By combining innovative measurement, automation and imaging technology with in-depth aviation experience and a close proximity to research, 3D.aero was founded to offer the system intelligence needed to bring about the necessary changes.

“Conventional automation concepts are often difficult or even impossible to transfer to the aviation industry,” explains Tomas Domaschke, CEO and Co-founder of the young start-up. “Small batch sizes, high component precision and a large variety of different processes require entirely new approaches and special skills.”

Merging in-depth knowledge of aircraft maintenance and sensor-based automation, 3D.aero was founded as a joint venture of two market leaders: Pepperl+Fuchs as a pioneer and innovator in the areas of industrial sensor technology and process automation, and Lufthansa Technik as the world’s leading manufacturer-independent maintenance company for the civil aviation industry.

Michael Ernst, Project Manager Innovation Management and Product Development Engine Services at Lufthansa Technik, points out the strategic benefit for the MRO provider: “Lufthansa Technik has made it a goal to continuously improve the maintenance processes for engine components for its customers. And automation plays an important role in this – from automated inspections to component measuring and repairs.”

A milestone in automation

With the AutoInspect process, 3D.aero has already reached a milestone in the development of automated process chains in aircraft maintenance. What started out as a research project by the engine repair department at Lufthansa Technik resulted in a solution that automates energy-intensive multi-stage inspection processes and combines them into a single process step. Today, the automated inspection of defective combustion chambers is ready for routine use in the repair cycle (see following page).

Furthermore, the industrialization phase will also be used to examine whether the process can be transferred to other engine parts or other business segments of Lufthansa Technik. Besides working on AutoInspect and automated repair procedures, 3D.aero is currently involved in industry-wide research projects. Possible uses of automated procedures include on-wing engine inspections, the capture of major structures and other applications relating to digitalization in aircraft manufacturing.

3D.aero will operate as a modern start-up and have flat hierarchies, with the young team consisting mainly of Pepperl+Fuchs employees and graduates of the Institute for Aircraft Production Technology at Hamburg University of Technology.

Tomas Domaschke
CEO and Co-founder
Phone +49-621-776-4604
info@3d-aero.com

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AutoInspect reaches shop level

Lufthansa Technik has started the industrialization of the automatic crack inspection procedure “AutoInspect”. It is an important step on the way to a fully automatic repair process. Meanwhile, the procedure has received regulatory approval by the aviation authorities.

From automated inspection to component measurement to repairs – automation and the use of robots play an increasingly significant role in maintenance processes at Lufthansa Technik, especially when it comes to aircraft engines. As early as 2015, Lufthansa Technik developed an automated crack inspection procedure for engine components (AutoInspect), and in 2016 the company added an automated process chain for the repair of engine components (project AutoRep). The results of these two successful research and development projects were subsequently combined and the transfer to operative use began in mid-2016.

During phase one of the industrialization process in early 2017, the automated inspection procedure received regulatory approval by the aviation authorities. Since
then, the concept system developed as part of the research and development project AutoInspect has been in productive use, resulting in improvements to both ergonomics and inspection productivity. Moreover, users have been able to identify further potential and contribute to the system’s ongoing development through suggestions for improving it.

To ensure that production processes are not interrupted during further development, the existing system was mirrored at the start of industrialization, i.e. a “twin” was produced at the Institute for Aircraft Production Technology at Hamburg University of Technology that is identical except for just a few components. For instance, the original control system, which consisted of several software components, was replaced with a professional, industrially mature control system. Furthermore, a new tool changer and a second robot for non-contact optical measurement based on white light interferometry were developed, tested and prepared for transfer to Lufthansa Technik. The use of the second measuring robot will reduce process time from previously nearly seven hours to about four hours per inspection.

The task of automating the recognition of cracks in engine components was realized through a groundbreaking combination of interacting sensor, data processing and actuator technologies. The optical measurement method of white light interferometry is used in the process – a world premiere. In order to digitize a component at the required resolution in the micrometer range (µm), it was necessary to develop intelligent processes, algorithms and control sets for the robot and image processing. Each scan of a single combustion chamber generates around 130 gigabytes of raw data, which is processed almost in real time.

Robust for industrial use

Now the newly developed inspection procedure is being made as robust as required for industrial use. In addition, the procedure is being rolled out for other combustor parts from engines of the CFM56 and CF34 families. Once this task is complete, the second phase of industrialization will be concluded. In phase three, the algorithms used to evaluate the scan data will be improved to simplify transfer to the automated repair. Beyond that, the overall inspection performance is being improved further with the plan of obtaining approval as an alternative procedure for fluorescent penetrant inspection (FPI). In mid-2018, the automated crack inspection and repair procedures are scheduled to be brought together in a single process chain.

Lufthansa Technik has made it a goal to continuously improve the maintenance processes for engine components for its customers. And automation plays an important role in this – from automated inspections to component measuring and repairs.

Michael Ernst
Project Manager Innovation Management and Product Development Engine Services
Phone +49-621-776-4604
michael.ernst@lht.dlh.de
Maintain to fly

With Maintwise, Lufthansa Technik offers aircraft operators a customer-specific and holistic maintenance concept. It enables the operator to maximize aircraft availability and minimize maintenance costs.

In today’s market, every airline faces a trade-off between conflicting targets. In order to be able to make sound strategic decisions, reaching the most effective mix of targets like aircraft availability, cost, stability, flexibility and technical quality is essential. In this complex environment of conflicting targets, Maintwise supports customers to find the best suitable maintenance concept for their operations.

Lufthansa Technik’s Mointwise consulting service assesses the customer’s situation by identifying customer concerns and collecting relevant information concerning the maintenance concept. In a second step, maintenance concept engineers determine which optimization criteria match the customer’s targets and restrictions. Different concepts are simulated and evaluated, taking into account ground time requirements, feasibility of implementation, required man hours as well as the risk of operational disruptions and other criteria. Based on the analysis results, Lufthansa Technik proposes possible maintenance concept scenarios and compares their economic benefits. Ultimately, the customer can choose the most suitable concept for implementation.

Lufthansa Technik’s dedicated team of maintenance concept engineers has a profound understanding of airline and MRO processes. True to the product’s objective “Maintain to fly”, Maintwise focuses on optimizing maintenance concepts so that customers can get the most out of their operations. Maintwise tools and methods help to process large amounts of data and information from the customer’s assets to find feasible maintenance concepts for the customer. Previous projects have shown the value of Maintwise. With proven concepts tailored to customer-specific needs, Maintwise by Lufthansa Technik generates the optimal maintenance solution.

For every fleet size

Maintwise is available for every airline, fleet size and maintenance work scope. Our approach includes a close collaboration with the customer’s own experts during the project. With a project duration of three to five weeks, customers can benefit from Maintwise in a minimum amount of time.

Three questions to Freya Schmitz, Maintenance Concept Engineer of Lufthansa Technik

What are the most important features of Maintwise?

Freya Schmitz: The product considers both airline targets and MRO needs, with inputs into Maintwise coming from flight scheduling, maintenance planning and engineering. It is customer-specific and holistic. Customer-specific targets and framework conditions and the whole aircraft life cycle are an integral part of the development of each individual maintenance concept.

What type of customer profits most from the new product?

Basically every customer can benefit from the service. Start-up airlines or those with a new fleet profit from our entry-into-service maintenance concept. Carriers wanting to reduce technical ground times or lower their MRO costs can also make use of the product. Airlines adapting to changing requirements, such as new routes, a growing fleet or the switch from block maintenance to phased maintenance are also likely to profit substantially from a new maintenance concept.

What economic gain can customers using Maintwise expect?

The financial benefit depends on numerous factors. In previous optimization projects, different gains were generated for different customers. One project enabled the customer to have an additional long range flight leg per day for a fleet of 23 aircraft, resulting in significant additional revenue. In other projects we were able to lower maintenance costs by reducing man-power required for maintenance by ten percent or saving one C-check over the aircraft lifecycle. Maintwise can also enable an operator to switch to more profitable routes and focus operation on high-revenue days.

Maintwise allows the customer to optimize his maintenance with respect to five different criteria.
The aircraft cabin has a huge impact on customer perception. At the same time, airlines need to have a distinct cabin in order to bind customers and to comply with their demands for comfort and safety. Therefore it comes as no surprise that more and more airlines try to combine a unique design with comfort and safety in a cost-efficient setup. With SPAIRS (Service Provider for Aircraft Interior Refurbishment Solutions), Lufthansa Technik offers its customers a global production network to meet these requirements, be it the repair of aircraft interior parts (EASA Part-145) or manufacturing (EASA Part-21/G) of these parts for aircraft modifications. In close cooperation with the Aircraft Modification department in Hamburg, SPAIRS focuses on minor changes, allowing the integration into the aircraft without STC.

Delivery with EASA Form 1

Drawing from decades of experience and based on the renowned Lufthansa Technik quality, SPAIRS provides a competitive platform for series production and one-off requests.

Cabin SPAIRS for you

With SPAIRS (Service Provider for Aircraft Interior Refurbishment Solutions), Lufthansa Technik offers its customers a global production network for interior parts. It provides a highly competitive platform for series production and one-off requests.
platform for series production and one-off requests, such as interior parts, panels or upholstery parts. The services offered include material assembly (kitting) and certification. All parts – both in the 145 and 21/G area – are delivered with an EASA Form 1. SPAIRS is a modular product, also comprising options such as consulting and organization support as well as packaging and logistics services.

**Vast interior parts spectrum**

The product portfolio covers the entire aircraft cabin, comprising a vast spectrum of interior parts such as panels, seats, upholstery parts and others. Customer wishes can be varied. Often not the entire cabin must be repaired or overhauled, instead individual parts or cabin elements must be repaired or floor panels and sidewall panels are repaired or exchanged. Toilets and kichens are modified, upholstering is exchanged. “Our task is to understand what customers hope to find in our products, but not necessarily expect. We want to enthuse the customer with surprising product features the customers and cause a highly positive response,” says Thorsten Peters, SPAIRS Sales Manager in the Material Solutions Teams and the point of contact for SPAIRS-related matters.

With the new SPAIRS product, customers get access to a large Lufthansa Technik shop network, covering the majority of the parts spectrum in the cabin. It is specialized in the repair, development and production of cabin modifications.

“Aircraft Interior Parts” in Hamburg is a strong team of 33 specialists in a position to develop one-off solutions for the market. Six locations within the Lufthansa Technik product division Aircraft Base Maintenance, complemented by a large network of suppliers, are available to meet the requirements of the customers and exploit the potential provided through an attractive cabin.

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**Customer advantages**

+ All-round competence
+ Just-in-time production
+ Vast spectrum of parts
+ Experienced team
+ Handling of single specimens
+ Lufthansa Technik quality
+ Certification included

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SPAIRS Team
Phone +49-40-5070-67904
spairs@lht.dlh.de

www.lufthansa-technik.com/spairs
The digital warehouse

The logistics of the future must be smart, efficient, digital and highly automated. Lufthansa Technik Logistik Services has therefore launched a targeted program aimed at automating, digitalizing and interconnecting core warehousing processes.

The Munich Airport is particularly suitable as pilot location for such a program, as it combines strong growth and a modern infrastructure with the fact that new aircraft types such as the Airbus A350 are stationed there. Process automation is one of the key points in focus. Many intra-company transports result in long walking distances for employees, a time-consuming, labor-intensive and costly process. Since 2015, the company has been using the automated storage rack system AutoStore, enabling it to increase the number of warehouse admissions and retrievals while reducing the required amount of warehouse space by more than 50 percent. Now a new component is added: the automated guided vehicle Agilox. Unlike AutoStore, the goods themselves become mobile: The system brings them directly to the employees’ workplace and thus ensures further process automation. The Agilox system was introduced in Munich last December, with the option to extend its use to other locations following successful evaluation.

Optical character recognition

Close attention is also paid to data volumes. The incoming goods department has to enter a vast amount of data – more than 10,000 documents – every day. The data transfer, i.e. reading, checking and entering the data, takes a great deal of effort and is prone to errors. That is why the input screens will soon be filled in automatically rather than manually. For this purpose, a document analysis system based on optical character recognition (OCR) will be used, complemented by an intelligent content analysis element on the basis of IBM Watson. The technical evaluation has already taken place. The new standard for Lufthansa Technik is thus defined and will be implemented by mid-2018.

Increased transparency

Another focal point is making optimal use of available storage space, since this offers great savings potential. Large, bulky aircraft parts take up a lot of room and often have to be moved around. At the same time, all storage rebookings must be entered manually in the administrative system. Thanks to the use of the localization platform GSE 4.0 (Ground Support Equipment) that was developed in-house, large components in stock can be located automatically without the need for re-entry in the system. This reduces the administrative effort while increasing transparency in the warehouse. Once the pilot project in Munich has been completed successfully, it will be assessed whether the system can be transferred to other Lufthansa Technik Logistik Services locations.

The company’s digitalization program also includes the use of digital assistants such as smart wearables. Lufthansa Technik Logistik Services is currently testing Proglove’s smart data glove. It features an integrated 2D scanner – employees no longer have to hold a mobile scanner. This means their hands remain free, cumbersome data entry is eliminated and the efficiency during check-in and follow-up processes is increased. Currently, an enhanced glove featuring an integrated display is in development, with pilot applications being scheduled for the first half of 2018.

Speedy implementation

However, core logistics processes are not only being digitalized in Munich. Other locations such as Frankfurt and Hamburg are also carrying out digitalization projects. To keep realizing new ideas at short intervals and with great speed, Lufthansa Technik Logistik Services relies on agile project management. Implementing a group-wide innovation culture at all hierarchical levels also plays an important role. Furthermore, Lufthansa Technik Logistik Services relies on targeted cooperations with modern start-ups so that the company can benefit from their ways of thinking and their unbureaucratic, flexible approaches.

Dr. Harald Kolbe
Head of Digital Innovation
Phone +49-40-5070-64084
harald.kolbe@ltls.dlh.de

Innovation by Lufthansa Technik
A glove with an integrated scanner much facilitates data acquisition.
Engineer with heart and soul

As a senior engineer for aircraft structures, Thorsten Koch is an important interface between manufacturer, maintenance company and aircraft operator. Thanks to his extensive know-how, he is able to ensure a smooth exchange and economic solutions.

Thorsten Koch describes himself as an “engineer with heart and soul”. And when he talks, you can tell how much he enjoys his job as Senior Aircraft System Engineer for Aircraft Structures at Lufthansa Technik in Frankfurt. System engineers monitor the reliability of a system – in his case, it is the aircraft structure. He cooperates closely with aircraft operators and manufacturers so that they can identify problems early on and find solutions to those problems together. Are there any recurring faults? What impact do they have on the safety and comfort of passengers? “We make sure that the systems are working in line with pre-defined parameters and observe trends,” he says.

Expert for composite materials

Thorsten Koch studied mechanical engineering with a focus on lightweight construction, structures and fiber-reinforced composites. Afterwards, he became a research assistant at Technical University of Darmstadt, where he spent four years working on a composite research project before moving on to more practical endeavors. “I grew up near Frankfurt Airport, so I’ve always been fascinated with aviation,” he recalls. In 2006, after scoring points with his knowledge of composite materials, Koch joined the Aircraft Engineering department at Lufthansa Technik as a structural engineer for the A320. Three years later, the department was restructured and the role of senior engineers introduced. “We enable and promote exchange between experts of the same discipline – also across different aircraft types,” Thorsten Koch explains when asked what this position entails. That means he is one of the single points of contact for structure-related problems and matters that can affect different types of aircraft.

Sustainable and efficient solutions

“Safety, reliability, efficiency and comfort – in that order – of our customer fleets are our mission,” describes Thorsten Koch his work. Often, system engineers are the first to notice and identify a problem – and then customers expect quick solutions. The system engineer and his colleagues prepare a risk assessment in order to evaluate both airworthiness and cost-effectiveness. “Then we develop a sustainable solution together with all involved parties and recommend the best course of action.”

As of recently, Koch is well and truly involved in the support of the A350, after already accompanying the aircraft type during key stages of its development and all the way to its entry into service over the past eight years. “We’re currently in the stabilization and expansion stage with Lufthansa’s A350 fleet,” he says.

Thorsten Koch spends a major part of the day working at his desk, attending meetings and coordinating work with others, but he also likes to take a look at the problems directly. “It’s great to be so close to the hangars as we can gain a lot of experience that way. And this experience is one of our major strengths.”
Thorsten Koch and his colleagues work together closely with manufacturers, authorities and customers. “Over the years, we have built up a relationship of trust,” he says. And that benefits all sides. “After all, design flaws increase the costs tenfold when it comes to production and hundredfold when it comes to operation.”

Pooling know-how

The Lufthansa Technik Group also pools the composite know-how that exists across different departments:

Experts from workshops, hangars and offices in a variety of divisions meet up regularly to talk about their experiences and try to establish joint standards. He notes: “The last few years have been quite busy. But I’m in a really good place with my job at the heart of Lufthansa Technik’s engineering. I enjoy being able to influence things and maintain my network.” That is why he wants to continue down this path and remain close to both engineering and operations. “I look forward to how things will develop. Lending a hand to start-ups is just as exciting to me as helping established, major customers on their way.”

Safety, reliability, efficiency, and comfort – in that order – of our customer fleets are our mission.

Thorsten Koch
Engine wash for modern engines

Lufthansa Technik’s proprietary Cyclean® Engine Wash is fit for the future. This state-of-the-art engine core cleaning system is now available for the next generation of engines.

In 2017, Lufthansa Technik introduced two new engine types to its Cyclean® Engine Wash portfolio – Pratt & Whitney’s PW1100G and CFMI’s LEAP-1A. In January 2018, the portfolio was increased further with capabilities for the PW1500G and LEAP-1B. For each of those four engine types, specific spray adapters have been developed and built that have already passed their practical test with flying colors: Engine washes with the new adapters have been successfully performed for launch customers in Europe as well as in North America. Therefore, as of February 2018, all four engine types can be cleaned at all Cyclean® stations worldwide.

The patented technical features of the Cyclean® system enable highly efficient engine cleaning. By injecting vaporized hot water directly into the core engine, a Cyclean® engine wash can be performed in less than one hour at any location at an airport, since an engine run after the wash is no longer required. Cyclean® thus brings substantial time and cost efficiencies, with both operating and maintenance costs reduced. Complementing Lufthansa Technik’s portfolio of engine services, the Cyclean® system provides operators with an efficient way of making the optimum use of the life cycle of their engines as well as consistently reducing their fuel costs.

How many airlines are using Cyclean® today?
Oliver Winter: Today, more than 60 airlines in North America, South America, Europe, the Middle East, Asia and Oceania wash their engine fleets using the Cyclean® system.

Does the measured performance improvement support the Cyclean® concept?
When we look at engine condition monitoring data (ECM) of various engine types, we see significant and long-lasting benefits from Cyclean® washes such as an increased EGT margin as well as fuel flow reduction. Besides that, our customers also report an increased average on-wing time for engines that are frequently washed using Cyclean®.

Which future developments do you envisage for Cyclean®?
Our design engineers are spending a lot of research and development effort to increase the customer benefits of engine washes. This includes new technical features in the currently available Cyclean® system as well as Cyclean 2.0, a completely new approach of washing aircraft engines by using materials such as CO₂ dry ice pellets. The first internal evaluation washes have just started, and we are excited to be working on the future of engine washing.
Mobile maintenance for GE Passport

**Lufthansa Technik AERO Alzey** will provide mobile maintenance support for the GE Passport integrated propulsion system (IPS), which is scheduled to enter service on Bombardier’s Global 7000 aircraft in 2018.

In support of the GE Passport engine, Lufthansa Technik AERO Alzey will be responsible for dispatching mobile repair teams to locations outside the USA. Customers within the United States will be provided support by GE Aviation’s own repair station in Strother, Kansas. Lufthansa Technik AERO Alzey’s mobile repair teams will have ten dedicated technicians to support GE Passport operations. The team will also manage spare engines, tooling, fan blisks, and leased assets for the Passport engine outside the USA.

Training at GE’s Customer Technical Education Center in Cincinnati, Ohio, has been completed, and the team is currently supporting Global 7000 flight test operations in Wichita, Kansas. This latest agreement builds on the strong partnership between GE and Lufthansa Technik AERO Alzey to support customers with CF34-powered Challenger jets outside of North and South America. The Lufthansa Technik subsidiary has been a member of GE’s Authorized Service Center network for CF34-series engines since October 2014.

“GE Aviation and Lufthansa Technik AERO Alzey have worked collaboratively for years to provide superior engine service to our customers,” said Brad Mottier, Vice President and General Manager of GE Aviation’s Business & General Aviation and Integrated Systems organization. “GE is pleased to expand this relationship for GE Passport, our newest and most advanced business jet propulsion system. The Lufthansa Technik AERO Alzey team’s technical acumen, focus on turnaround time, and dedication to customers makes them a trusted and valued partner for the CF34-series and now on GE Passport.”

“Lufthansa Technik AERO Alzey was the first independent MRO provider for the CF34 engine. Since 1992, we have proven to be more than just a reliable partner to GE and our common customers,” said Mark Johnson, CEO of the company. “We are proud to be asked again, 25 years later, to support the latest GE engine model, the GE Passport from the very first day on.”

The GE Passport engine powers the Bombardier Global 7000 aircraft.
Building on success

*Lufthansa Technik Shenzhen* has developed into a comprehensive MRO service provider for the Asia Pacific region. The wide range of products and services includes component repairs, composites repairs (Airframe Related Components, ARC®), logistic services and engine part repairs. Mobile engine services such as the Airline Support Team (AST®) are continuously being expanded.
Initially founded for the sole purpose of providing regional repairs of difficult-to-transport thrust reversers, Lufthansa Technik Shenzhen has developed into a multi-product service facility. When the company celebrated its fifteenth anniversary last year, CEO and President Detlev Jeske announced great plans for the future, and the development during the last months have supported the claim: More part numbers and an extended portfolio of mobile services add up to achieving the goal. “Lufthansa Technik Shenzhen follows the path of a continuous expansion of its range of products by adjusting accurately to the requirements of the customers in the region. This way we are offering the profound know-how and up-to-date technology of the Lufthansa Technik Group in the Asia Pacific region,” Jeske says.

**Component capability build-up**

The component area is characterized by a steady build-up of capabilities. For 2018, A350 components such as thrust reverser actuator, hydraulic pumps and batteries are being on the list. At the end of March 2018, the linear actuator for the A320 ram air turbine will be added to the portfolio, making a first step into the electromechanical area. In addition, Lufthansa Technik Shenzhen has managed to achieve a number of important commercial goals. With the support of engineers from Hamburg and a focus on the development of high-level repairs, material costs have been brought down, while reducing the shop time required for repair in parallel.

**Airframe Related Components**

By the end of 2017, the capability build-up in the Airframe Related Components (ARC*) business included several new components. Among others, radomes of the A380 and the A330 aircraft, the GE9x-2B fan cowl and the entire nacelle of the PW4168 including inlet cowl, reverser, fan cowl and plug will join the portfolio. And the A320neo nacelle capability will be built up during 2018 as well.

**Mobile engine services**

The capability of Lufthansa Technik Shenzhen in the area of mobile engine services has grown considerably. In 2017, the team from Shenzhen has performed 45 on-site inspections and repairs in the region, including work on CFM56 and IAE V2500 engines. Tooling for the V2500 is now complete, enabling the team to provide more products on the engine type. Within 2018, Lufthansa Technik Shenzhen will build up capability for the PW1100, starting with entry-into-service-support of this new engine type.

**Partner of the OEMs**

The introduction of the Boeing 787 and the Airbus A350 has entailed a generation of new engine types. These engines require MRO providers to become true specialists which are licensed by the original equipment manufacturer – such as Lufthansa Technik Shenzhen. The company not only possesses full MRO services capability but also features its own component pool and full access to OEM pooling worldwide, offering customer’s exchanges and leases at realistic prices. Warranty support is provided as well. Last year, Lufthansa Technik Shenzhen was already able to demonstrate its competence by repairing Boeing 787 inlet cowl and thrust reversers for an Asian customer.

**Logistic services**

Lufthansa Technik Shenzhen offers transport management solutions for multiple international customers from the aviation and MRO industry. Special capabilities include transportation of engines and Airframe Related Components. In addition, Lufthansa Technik Shenzhen provides customized warehousing and stocking solutions. As an Authorized Economic Operator (AEO) according to customs regulations, the company assists clients on all aspects pertaining to customs matters.

With a carefully stepped approach to expansion, Lufthansa Technik Shenzhen is continuing its path as a German-Chinese success story straight from the textbook. The future extension of the in-house capability will focus on attractive technologies and products to establish unique capabilities in Shenzhen.
Many options for Bombardier business jets

The »nice HD« IFE and cabin management system offers additional options and upgrades for several current and classic Bombardier business aircraft types. Now there are even more possibilities for passengers to access all the cabin, communications and entertainment devices.

Lufthansa Technik’s »nice HD« system is the acknowledged industry standard for high-quality in-flight entertainment and cabin management systems (IFE/CMS) on business aircraft. It offers passengers an easy and simple way to control cabin functions such as lighting, use several audio and video entertainment features and remain productive with Internet connectivity. First installed and certified in 2003, the »nice« and »nice HD« system is used on over 700 aircraft today. Now an array of additional options and upgrades for Bombardier Challenger 350/650, Learjet 70/75 aircraft and the Challenger 300 create an even more enjoyable infotainment experience.

A world of new options

The array of new options spans the whole spectrum of »nice HD« features. One example is the modification of the aircraft interfaces to welcome passengers with customized screens. Other options enable users to watch their favorite Blu-ray movies on a high-definition display or play their own audio and video files from personal devices. Cameras installed at the top of the tail or in the glare shield in the cockpit window provide panoramic views. These are just a few of the new equipment options. And while global broadband connectivity is available ex-factory for the current Bombardier jets, it can now also be integrated in Challenger 300 aircraft to turn their cabins into an office in the sky.

Simplicity of installation

All the upgrades can be installed worldwide and with minimal downtime. Software, installation manuals and approvals can be delivered online or provided by mail. The open architecture allows for system changes and upgrades without expensive rewiring. In this way, the catalog of additional options is much more than just “nice to have” – it creates a new experience throughout the entire flight.

Customer Services Innovation
Hotline US +1-844-334-2224
Hotline EU +49-40-5070-63673
csi@lht.dlh.de

www.nice-system.com/nice-upgrades
Meet us at...

18 – 20 March 2018 | Cairo, Egypt
**MRO Africa**

The MRO Africa is the annual event for the MRO industry in Africa. Representatives of African airlines meet up with experts in maintenance issues, and the latest industry trends are shown. Lufthansa Technik will be present with its own trade fair booth.

10 – 12 April 2018 | Orlando, USA
**MRO Americas**

The MRO Americas conference and exhibition is one of the world’s leading international events for the MRO industry. With airlines, MROs, suppliers, OEMs, regulators and industry experts in attendance, it offers unparalleled networking opportunities.

10 – 12 April 2018 | Hamburg, Germany
**Aircraft Interiors Expo**

The global market leader for the world’s aircraft interiors industry, Aircraft Interiors Expo is the launch pad for cabin programs showcasing tomorrow’s designs, in-flight entertainment, connectivity and passenger services.

17 – 18 April 2018 | Cairo, Egypt
**Aviation Africa**

Focusing on all aspects of the aviation industry, participating in Aviation Africa is an opportunity to network with African airlines, airports, aviation authorities, industry & aviation professionals from Africa and the rest of the world.

17 – 19 April 2018 | Shanghai, PR China
**ABACE**

ABACE (Asian Business Aviation Convention & Exhibition) is a premier event for the Asian business aviation community. It brings together business leaders, government officials, manufacturers, corporate aviation department personnel and other people involved in business aviation.

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**Connected to the future**

Selected »nice HD« upgrade options for Bombardier business jets

- **For Challenger 350 and 650**
  Another drive for you – additional Blu-ray player:
  The »nice HD« Media Center provides an additional Blu-ray disc drive to enable simultaneous viewing. It also offers additional storage capacities for movies, music or pictures.

- **For Learjet 70/75**
  Your personal media access – AVOD software for Media Center: The Audio and Video on Demand software opens up a world of possibilities for you. The AVOD functionality delivers individually controlled movie, audio and picture streams to your seat.

- **For Challenger 300**
  The pilot’s view – glare shield and fin cameras: With a camera installed at the glare shield in the cockpit, the flight crew’s view is shown on the cabin display. The wide-angle camera at the top of the tail provides a panoramic view of the sky and landscape ahead.

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**Options for »niceview« moving map**

A truly innovative in-flight infotainment system can make all the difference for the travelers on board. »niceview« takes passengers on an adventure and puts them in the captain’s seat. The moving map system allows cockpit views, an impressive presentation of the earth with a 3D aircraft image at the current geographic location along with the plane’s flight path or other exceptional perspectives and virtual flights. Departure, cruise flight and approach can be witnessed in life-like 3D views. »niceview« is an integral part of Lufthansa Technik’s »nice HD« in-flight entertainment and cabin management system for business jets. It is available in standard, advanced and fully customized packages.

The »niceview« options offer a broad range of individual features such as customized screens and paint schemes, high-resolution maps and the integration of global points of interests – for a truly enjoyable and entertaining experience.
World of services

Our range of products and services can be tailored for commercial and private fleets of every mix, kind and age.

Total Support Services
Total Support Services are the first choice for any customer wanting to enjoy cost-efficient and reliable flight operations and focus on his core business at the same time.
- Total Operational Support (TOS®)
- Total Technical Support (TTS®)
- Total Base Maintenance Support (TBS®)
- Total Material Operations (TMO®)
- Total Component Support (TCS®)
- Total Engine Support (TES®)
- Total Landing Gear Support (TLS®)
- Aircraft Leasing & Trading Support (ALTS®)

Single Services
Single Services and shop load events such as letter checks, engine overhauls or repairs of single components are at the core of a unique assembly of products and services.
- Aircraft Services
- Component Services
- Engine Services
- Landing Gear Services
- VIP & Special Mission Aircraft Services

Special Services
Lufthansa Technik offers a product portfolio reaching beyond traditional MRO services from the manual.
- Composite Repairs (ARC®)
- Engine Parts & Accessories Repair (EPAR)
- Maintenance Management Services (MMS)
- Logistics and training
- AOG services
- Surface treatment

Original Equipment Innovation (OEI)
Lufthansa Technik has successfully established a line of cabin products.
- Cabin management and IFE systems
- Aircraft and cabin equipment
- Connectivity
- Patient transport solutions

Digital Services
Lufthansa Technik provides innovative digital platforms to support technical operations.
- AVIATAR
- manage/m®

Please follow this link for the complete MRO service portfolio and more details about Lufthansa Technik’s solutions for fleets of any size.
www.lufthansa-technik.com/services
**Boeing**

- **737 CL/NG**
- **737 MAX**
- **747**
- **757**
- **767**
- **777**
- **777X**
- **787**
- **MD-11**

**Products and services**

**Boeing 737 CL/NG**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CFM56-7B
- Completion

**Boeing 737 MAX**
- Component Services
- Further services in preparation
- Engine Services: LEAP-1B (in preparation)

**Boeing 747**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: JT9D, PW4000, CF6-80C2
- Completion

**Boeing 757**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: RB211-535
- Completion

**Boeing 767**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: PW4000-94, CF6-80C2
- Completion

**Boeing 777**
- Line Maintenance
- Base Maintenance
- Component Services
- Completion

**Boeing 777X**
- in preparation

**Boeing 787**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services*
- Completion
  *schedule to be defined

**MD-11**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CF6-80C2, PW4000-94

**Bombardier**

- **Bombardier C Series**
- Line Maintenance
- Component Services
- Engine Services: PW1500G

**Regional Aircraft**

- **Bombardier Q400**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: PW100, PW150

- **CRJ**
- **Bombardier CRJ**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: GE CF34

- **Embraer**
- 135/145, 170/175, 190/195
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: GE CF34

**Business jets**

- **Airbus Corporate Jets**
- **ACJ**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CFM56, V2500-A5
- Completion

- **BBJ**
- **Boeing Business Jet**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CFM56-7B
- Completion

- **Bombardier**
- Challenger, Learjet, Global Express.
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CF34

- **Embraer**
- Legacy, Lineage.
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CF34

**Bombardier Q Series**

- **Q-Series**
- **Bombardier Q400**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: PW100, PW150

**Bombardier CRJ**

- **CRJ**
- **Bombardier CRJ**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: GE CF34

**Embraer**

- **135/145, 170/175, 190/195**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: GE CF34

**Embraer Legacy, Lineage.**

- **Legacy, Lineage.**
- Line Maintenance
- Base Maintenance
- Component Services
- Engine Services: CF34
Let’s talk about solutions

Senior Director Corporate Sales USA and Canada
Sahib Ajjam
p +1-305-677-5199
sahib.ajjam@lht.dlh.de

Senior Director Corporate Sales Latin America and Caribbean
Jörg Femerling
p +1-305-379-2604
joerg.femerling@lht.dlh.de

Senior Director Corporate Sales Europe
Georgios Ouzounidis
p +49-40-5070-5295
georgios.ouzounidis@lht.dlh.de

Senior Director Corporate Sales Middle East and Africa
Richard Haas
p +49-40-5070-3053
richard.haas@lht.dlh.de

Vice President Corporate Sales Americas
Frank Berweger
p +1-305-379-1222
sales.americas@lht.dlh.de

Vice President Corporate Sales EMEA
Robert Gaag
p +49-40-5070-68406
sales.emea@lht.dlh.de

Vice President Corporate Sales Eastern Europe and CIS
Dmitri Zaitsuiev
p +49-40-5070-5404
dmitri.zaitsuiev@lht.dlh.de

Our local country representatives

Americas

Canada
Stefan Kramarczik
p +1-438-969-9409
stefan.kramarczik@lht.dlh.de

Chile
Carlos Sotomayor
p +56-2-2573-7770
carlos.sotomayor@lht.dlh.de

Europe, Middle East and Africa

BeNeLux
Rudi Preud’homme
p +32-2-752-8690
rudi.preudhomme@lht.dlh.de

Italy
Emanuela Marabese
p +39-02-58571483
emanuela.marabese@lht.dlh.de

Dubai
Ziad Al Hazmi
p +971-4-4057-557
ziad.al-hazmi@lht.dlh.de

Turkey
Fulya Türköz
p +90-212-465 55 57
fulya.tuerkoez@lht.dlh.de

United Kingdom, Ireland & France
Dan Hepworth
p +44-7812-091112
daniel.hepworth@lht.dlh.de

Asia Pacific and Australia

Australia
Lars Moeslein
p +61-475-943-334
lars.moeslein@lht.dlh.de

India
Reshma Singh
p +91-11-2568-7713
resshma.singh@lht-services-india.com

Malaysia
Lem Sze Keng
p +601-2381-5362
sze-keng.lem@lht.dlh.de
### Contacts

**Vice President Corporate Sales Asia Pacific**
Gerald Steinhoff
p +65-6733-5539
seni.asia@lht.dlh.de

**Senior Director Corporate Sales Southeast Asia and Indian subcontinent**
Zang Thio
p +65-6733-9081
zang.thio@lht.dlh.de

**Head of Corporate Sales VIP & Special Mission Aircraft Services**
Wieland Timm
p +49-40-5070-2548
wieland.timmm@lht.dlh.de

**Head of Corporate Sales Lessors & Banks**
Andreas Kehl
p +49-40-5070-4780
andreas.kehl@lht.dlh.de

**Line Maintenance Worldwide**
Michael Struck
p +49-69-696-69660
linemaint.agmts@lht.dlh.de

### Affiliates and Corporations

- **Lufthansa Technik AERO Alzey**
  Phone +49-6731-497-0
  sales@aero.com
  www.aero.com

- **Lufthansa Technik Brussels**
  Phone +32-2-752-8660
  sales.bru@lht.dlh.de
  www.lufthansa-technik.com/belgium

- **Lufthansa Technik Budapest**
  Phone +36-1-296-3000
  sales@lht.hu
  www.lht-budapest.com

- **Lufthansa Technik Component Services**
  Phone +1-954-440-7014
  sales@lht-component-services.com

- **Lufthansa Technik Component Services Asia Pacific**
  Phone +65-6737-4450
  sales-asia@lhtdhl.de
  www.lufthansa-technik.com/ltcsap

- **Lufthansa Technik Intercoast**
  Phone +49-4191-809-100
  sales@intercoast.de
  www.lht-intercoast.de

- **Lufthansa Technik Landing Gear Services UK**
  Phone +44-20-8589-1941
  sales@ltlg.com
  www.lht-landinggear-uk.com

- **Lufthansa Technik Logistik Services**
  Phone +49-40-5070-5331
  sales@lht-dhl.de
  www.lht-ls.com

- **Lufthansa Technik Maintenance International**
  Phone +49-69-696-14910
  sales@ltmi.com
  www.lufthansa-technik.com/tmi

- **Lufthansa Technik Malta**
  Phone +356-2560-4000
  sales@lht-malta.com
  www.lht-malta.com

- **Lufthansa Technik Middle East**
  Phone +971-4-299-4443
  lht-dxb@lht.dhl.de
  www.lufthansa-technik.com/lh-middle-east

- **Lufthansa Technik Milan**
  Phone +39-02-585714-24
  customersupport@lht-milan.com
  www.lht-milan.com

- **Lufthansa Technik Philippines**
  Phone +63-2-855-9311
  sales@ltph.com.ph
  www.lht-philippines.com

- **Lufthansa Technik Puerto Rico**
  Phone +1-787-230-7700
  info@lht-puertorico.com
  www.lht-puertorico.com

- **Lufthansa Technik Services India**
  Phone +91-22-935-37409
  sales-services-india@lht-dhl.de
  www.lufthansa-technik.com/india

- **Lufthansa Technik Shannan**
  Phone +86-61-370-000
  sales@lht-shannan.com
  www.lufthansa-technik.com/lht-shannan

- **Lufthansa Technik Shenzhen**
  Phone +86-755-2777-5925
  sales@lht-shenzhen.com
  www.lht-shenzhen.com

- **Lufthansa Technik Sofia**
  Phone +359-2-4601-777
  sales@lht-sofia.com
  www.lht-sofia.com

- **Lufthansa Technik Shannon**
  Phone +86-505-365-512
  sales@lht-shannon.com
  www.lht-shannon.com

- **Lufthansa Technik Technical Engineering & Training**
  Phone +49-69-696-2751
  sales@ltt.com
  www.lht-technical-engineering.com

- **Lufthansa Technik Vostok Services**
  Phone +7-495-981-5850
  lvitvostok@lht.dhl.de
  www.lufthansa-technik.com/vostok

- **Lufthansa Technical Training**
  Phone +49-69-696-2751
  sales@lht.de
  www.lht.aero

- **Lufthansa Bombardier Aviation Services**
  Phone +49-30-8875-4600
  sales@lbas.de

- **Lufthansa LEOS**
  Phone +49-69-696-6222
  sales.leos@dlh.de
  www.lufthansa-leos.com

- **Airfoil Services**
  Phone +603-6145-3612
  info@airfoil.com.my
  www.airfoil-services.com

- **Avionic Design**
  Phone +49-40-87777-0
  info@avionic-design.de
  www.avionic-design.de

- **Ameco Beijing**
  Phone +86-10-6456-1122
  ext 4100/4101
  sales@ameco.com.cn
  www.ameco.com.cn

- **BizJet International**
  Phone +1-918-832-7733
  bizjet@bizjet.com
  www.bizjet.com

- **Hawker Pacific Aerospace**
  Phone +1-818-765-6201
  sales@hawker.com
  www.hawker.com

- **Heico Aerospace**
  Phone +1-954-961-9800
  sales@heico.com

- **IDAIR**
  Phone +49-40-5070-69416
  sales@idair.aero
  www.idair.aero

- **INAIRVATION**
  Phone +43-2644-21111
  contact@inairvation.aero
  www.inairvation.aero

- **Ihumics**
  Phone +49-40-5070-61361
  info@ihumics-consulting.de
  www.ihumics-consulting.de

- **N3 Engine Overhaul Services**
  Phone +49-3628-5811-0
  sales@n3eos.com
  www.n3eos.com

- **Spairliners**
  Phone +49-40-5070-66499
  info@spairliners.com
  www.spairliners.com

- **XEOS**
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  info@3d-aero.com
  www.3d-aero.com

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Lufthansa Technik AG, marketing.sales@lht.dlh.de
Call us: +49-40-5070-5553

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