



**Dear Reader,**

On April 4th, in São José dos Campos, our customer Embraer handed over the keys of the first E-Jet E190-E2 to their launch operator customer Widerøe from Norway. The aircraft

then went for a ferry flight to the bases of the airline in Bodø and Bergen where our Field Support Representatives from Toulouse (France) and Lindenberg (Germany) will support the Entry-into-Service for some time to quickly fix any operating snag that may occur. Liebherr-Aerospace is proud to be on board this new aircraft with the integrated air management system developed by Liebherr-Aerospace Toulouse and the flight control system developed by Liebherr-Aerospace Lindenberg.

Another Entry-into-Service took place this first quarter of the year with Korean Airlines that took delivery of their first Bombardier C Series aircraft. Our Field Support Representative from Liebherr-Aerospace Singapore supported this activity for two weeks on-site in Seoul.

In this issue you will learn about the on-going developments by Liebherr-Aerospace in the services area, mainly regarding heat exchangers and Used Serviceable Material (USM).

The repair services of heat exchangers are continuing to grow from our Liebherr-Aerospace Saline, Michigan (USA) facility. More than 2,500 heat exchangers have been repaired / re-cored since the start of the operation in August 2016. The facility is now running two

shifts. Meanwhile, we are progressively launching our world-wide network of licensed partners for the recurring activities of cleaning, testing and minor repairs.

We have launched our new activity “USM by Liebherr-Aerospace”, in the services area that will progressively allow us to better respond to the increasing request of our customers to purchase Liebherr Used Serviceable Material. The team in charge is located in Dubai (UAE). The used components are purchased from dismantled aircraft and re-certified to the Liebherr standards.

Airbus has recently disclosed its 2017 Suppliers’ Rating: Liebherr-Aerospace sustains its 2016 position by being ranked # 13 within the airlines community of Airbus operators out of the 43 SFE rated suppliers. This rating includes all the systems provided by Liebherr-Aerospace: air management, hydraulics, flight controls and landing gears as well as all related electronic controllers. This rating is consistent with the outputs of our own Customer Trust Rating Survey, about which you can read in more detail in this issue, and we thank our customers for their confidence.

You will also get to know our new colleagues who have joined recently our Customer Support & Services organization, the table of our coming training sessions, and much more!

Enjoy your reading!

A handwritten signature in black ink, appearing to read 'Charles Thoyer-Rozat'. The signature is stylized and cursive.

Charles Thoyer-Rozat  
Executive V.P., Customer Support & Services



## Personnel Changes



**Dennis Kretz** has been promoted to Team Leader of Customer Order Administration and of MRO Goods Receiving at Liebherr-Aerospace Lindenberg GmbH (Germany). Dennis has gained twelve years of experience within the Customer Service department in Commercial Support and Order Administration at different positions. In 2012, he was assigned

to coordinate an Order Administration Team. He mainly worked for Embraer landing gear programs. Now, Dennis' new responsibility is to manage two Order Administration Teams. Their main focus is on LRU and piece parts supply as well as the commercial administration of repair activities. Additionally, Dennis manages the MRO Goods Receiving Team which is responsible for the reception of all repair and overhaul orders. This includes acceptance and unpacking of goods as well as paperwork and hardware checks following order entry by the dedicated Order Administration Team.

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**Patricia Rhomberg** has been promoted to Teamleader of Commercial Support at Liebherr-Aerospace Lindenberg GmbH (Germany). This group consists of two Order Administration Teams and the Contract Management Team. Focus within the Order Administration Teams is on serving the customer base with spare supply and repair

activity. Whereas the Contract Management Teams' responsibility is the management of service contracts in order to enhance contractual compliance, as well as the management of the customer relationship.

Having graduated with a Master in Business Management and Economics with the focus on innovation and strategy, Patricia originally joined Liebherr-Aerospace Lindenberg GmbH as Project Coordinator within the Customer Service department in 2013. In 2017, she was promoted to Teamleader Pricing and has now taken over the role of Teamleader Commercial Support in March 2018.

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**Alisia Hummel** has been promoted to Contract Manager at Liebherr-Aerospace Lindenberg GmbH (Germany). Alisia has gained six years of experience within the Customer Service department at Liebherr at different positions. She previously worked on spares and repair orders mainly for major customers who signed service contracts with Liebherr-Aero-

space. Now Alisia's new responsibility as Contract Manager is to manage service contracts and customer relationship with airlines, MRO's and partners in order to ensure contractual compliance.

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# Liebherr Adjusts its Capacity to Cope with Embraer E-Jet TBO Extension

Our Liebherr Customer Support and Services representatives are in continuous contact with the Embraer E1 E-Jet (E170/E175 and E190/E195) operators. Therewith, we are keeping close contact with the community's needs, requirements and expectations toward the support of the aircraft. Specifically of concern is the platform's landing gear system (ATA 32), for which Liebherr-Aerospace Lindenberg GmbH is the system OEM. Recently, the widely anticipated announcement by the Maintenance Review Board's (MRB) and Embraer's subsequent extension of the E190/E195 landing gear Time Between Overhaul (TBO) came into effect. Following the MRB's

recommendation, the in-service period for landing gear structural components was increased to 25,000 flight cycles or 144 months.

While upfront emphasis had been given to actively raise awareness, the now official publication of the TBO extension requires significant re-planning of our landing gear overhaul schedule. In support of the E190/E195 operators enjoying this extension, we strive to ensure the use of additional utilization gained from the TBO extension is maximized. The customers, who have signed a maintenance agreement with us, have been approached for the reorganization of their intervention dates for accomplishment of the fleet's landing gear overhauls. Importantly, we also aim to communicate and ensure, that those Embraer E-Jet operators who have not finalized their overhaul supplier selection process, keep a close eye on the planning horizon. Timely planning on behalf of the individual customer allows us to achieve a higher degree of flexibility and accuracy toward modeling the specific fleet scheduling in accordance with the customer's requirements and expectations. Therefore both, our customers and we, gain an enhanced level of commitment and security.

Please contact your Liebherr-Aerospace Customer Support representative for assistance, should you have any question regarding our overhaul landing gear services.



Liebherr is the system supplier of Embraer E-Jet landing gears

## USM by Liebherr: An Additional Material Service Solution

Liebherr-Aerospace is pleased to announce that, we will include Used Serviceable Materials (USM) as part of our services to customers.

We will source our systems and equipment from aircraft destined for dismantling. Our worldwide network of service centers will then release these units with appropriate airworthiness certification. Serviceable assets will be proposed to the market as alternatives to OEM parts in condition "New", to help our customers optimize their operational costs when procuring OEM quality services such as: replacements in case of high value repairs, exchanges and loans, stock leasing, pool access, stock replenishments, and outright purchase.

USM by Liebherr will be available across our worldwide network and will be centrally managed from our Liebherr-Aerospace's Dubai Service Center.

Joël Cadaux, Liebherr-Aerospace Customer Services' Director Marketing & Sales, explains: "Legacy and mature fleets customers consider procuring alternative solutions to support their operations in a cost effective manner, including optimization of inventories and maintenance. The usage of serviceable materials is widely accepted by our customers and represent a legitimate option. Our initiative in this domain is aimed at satisfying customers' demands in term of performance as part of our drive to innovate with privilege solutions to meet market's expectations."



## Improved CRJ700/900/1000 Air Cycle Machine

As the supplier of choice for the Bombardier CRJ 700/900/1000 air management system, Liebherr-Aerospace demonstrated its focus on continuous product support with the introduction of a Service Bulletin for the modification of the air cycle machine (ACM). The ACM is a critical component within the air management system that is responsible for processing high pressure, high temperature air

provided from the engines and “conditioning” it for distribution into the pressurized cabin for crew and passenger comfort.

This latest enhancement incorporates bearing, ventilation, and turbine design changes that result in reduced humidity and pollution ingress as well as a longer on-wing reliability performance.

In addition to production line installation on newly delivered aircraft, our Customer Services network has completed to date over 280 modifications for in-service aircraft. Furthermore, we are supporting complete new production component retrofits on in-service aircraft transitioning to our network operators. As this modification has been underway from 2016, there have been no confirmed failures of the enhanced ACM due to the design change.

Combined with this product effort, we have addressed the ACM maintenance program by collaborating with network operators to establish soft-time removal intervals. Such process is timed to allow maximum operational yield from the component whilst allowing the removal of the ACM before failure. The result of this approach has clearly demonstrated a significant reduction towards operator’s delays and interruptions to effect unscheduled maintenance while reducing the overall costs related to the air management system.



Liebherr is the system supplier of air management systems of Bombardier's CRJ aircraft.

## C Series Entry Into Service at Korean Air

In January 2018, Korean Air became the first operator in Asia to fly the Bombardier C Series. Field Service Representative Kal Wai Leong from Liebherr-Aerospace Singapore supported the Entry-into-Service (EIS) for two weeks in Seoul. Kal Wai, together with the major suppliers and Bombardier representatives, supported the airline’s engineering and operation teams daily from the first to the

last flight. He made use of the opportunity on-site to share the information of our components from air management and landing gear systems. Hyo Suk Han from the Aircraft Engineering Team, Maintenance Engineering Department, commented that "Liebherr have been done well for all of the EIS works of CS300 of Korean Air."



# Worldwide Network for Heat Exchanger Cleaning

In 2016, Liebherr-Aerospace started its new repair center for the cleaning, repair and re-core of heat exchangers with the opening of a new facility in Saline, Michigan (USA). In 2018, the next step is being taken: The development of a worldwide network for cleaning and servicing heat exchangers in association with local licensed partners. The plans are already well advanced, as Joël Cadaux, Director Business & Services – Customer Support & Services, Liebherr-Aerospace & Transportation SAS, Toulouse (France), explains. “Saline operations started very successfully, and there was in the meantime an increasing interest from the operators in an offer for qualitative local services. This includes cleaning the heat exchangers close to the aircraft operators’ maintenance centers in order to shorten the service times and optimize spares inventory.”



Liebherr-Aerospace is currently setting up a worldwide network for this in association with a dozen of selected partners, under a license agreement. The partners will meet the Liebherr-Aerospace

technical qualification criteria and are positioned at geographical key locations, for example, in the Middle East, India and Brazil. In the UK, Liebherr-Aerospace is working with its long-standing co-operation partner, Avia Technique, a member of the SK AeroSafety Group. The company has already been cleaning and testing heat exchangers for three years, for customers including EasyJet. “We are looking forward to working more closely with Liebherr-Aerospace in this field as a qualified partner in the Heat Exchanger Cleaning Network”, emphasized Robert Sims, SK AeroSafety Operations Director.

## Faster service and expertise worldwide

Every four years, or approx. every 12,000 flying hours, the heat exchangers, which are part of the air management system, must be inspected, cleaned and maintained – depending on the ambient conditions and the frequency of use of the aircraft, the intervals must be reduced to avoid pollution clogging. Generally, a thorough cleaning of the components using high-pressure, ultrasonic and immersion bath cleaning processes is enough. This is followed by a leakage and pressure test and minor repairs done locally. After this, the heat exchanger is ready for re-use. If the inspection reveals major cracks or irreversible clogging, the heat exchanger is completely overhauled by the specialists at Liebherr-Aerospace in Saline. In this way, all the partners and aircraft operators benefit from the experience of the Liebherr experts. “The Heat Exchanger Cleaning Network means that we can roll out our servicing operation from Saline into the whole world, so that we will be able to offer our customers even faster and efficient support in the maintenance of their aircraft”, says Joël Cadaux confidently.

## Events

# Liebherr-Aerospace Will Attend the Following Events:

**April 23-26, 2018**

All Operators Conference & Tradeshow  
Orlando, Florida, USA



**June 19-20, 2018**

Aviation Electronics Europe  
Munich, Germany



**April 25-29, 2018**

ILA Berlin Air Show  
Berlin ExpoCenter Airport  
Germany



**July 16-22, 2018**

Farnborough Airshow  
Farnborough, United Kingdom



# Air Systems Training for Indian Students

On January 24th and 25th, 2018, trainers of Liebherr-Aerospace Toulouse SAS gave a familiarization course on air systems in Bangalore to Indian engineering students on behalf of EUROSAE in partnership with the Government of Karnataka Province of India, the French Aeronautics and Space Institute and Dassault System India.

EUROSAE is a subsidiary of two major French aerospace engineering schools with the mission to deliver to engineers, technicians and executives a postgraduate training aiming at up-dating their professional knowledge and skills.

The goal of the training was to introduce future engineers to Liebherr's embedded systems. Topics included the operation and dimensioning of air bleed and conditioning systems, cabin pressurization, and leak detection loops.

This training course, organized with the help of Liebherr-Aerospace's Indian office, is part of the development strategy of Liebherr-Aerospace's activities in India. It was a great success with the 23 students attending the two-day course, and a great opportunity to demonstrate the expertise of Liebherr-Aerospace to local aeronautical actors.



Participants of the familiarization course in India

# Regional Technical Workshops 2018 – Airbus Family

You are a fleet, reliability, maintenance, system, component, or airworthiness engineer? You deal on a daily basis with the operation or maintenance of Liebherr systems on your Airbus aircraft? You are interested in the latest reliability updates and on-going improvement activities? You want to become more familiar and get trained on our Liebherr systems? You seek for new solutions and services to further improve the performance of your Liebherr systems? You like to share your daily experience and best practices with your peers and our specialists? If any or all of these questions make sense to you, then our 2018 Regional Technical Workshops are made for you!

Four regional sessions are being organized this fall: Save the date, registrations will open soon !

- Toulouse (France): week of October 1st
- Singapore: week of October 15th
- Shanghai (China): week of October 22nd
- Saline, MI (USA): week of November 12th



## Events

### 2018 Training Calendar: Book Your Sessions

Type	ATA Chapter	Date (2018)	Location
<b>Airbus</b>			
Single Aisle (SA)	ATA 21/36 Engine Bleed Air System & Air Conditioning System Level I, II, III	September 18 to 20	Toulouse
	ATA 21 Environmental Control System (old System)	On request	Toulouse
	ATA 36 Engine Bleed Air System (A320neo) Level I, II, III	April 17 September 21	Toulouse
	ATA 27 High Lift System and Rudder Level III	April 16 September 17	Lindenberg
Long Range (LR)	ATA 21/36 Engine Bleed and Environmental Control System Level I, II, III (A330)	April 10 to 12 November 6 to 9	Toulouse
	ATA 21/36 Engine Bleed & Environment Control System (A340-500/600)	On request	Toulouse
	ATA 27 High Lift System, Rudder and Spoiler Level III	April 17 September 18	Lindenberg
	ATA 27/32 High Lift & Nose Landing Gear System	April 19 & 20 June 19 & 20 August 28 & 29 September 20 & 21 December 11 & 12	Lindenberg
A380	ATA 21 Supplemental Cooling System Level I, II, III	On request	Toulouse
	ATA 36 Engine Bleed Air & Pneumatic Air Distribution System Level I, II, III	On request	Toulouse
	ATA 29 Hydraulic Cooling System Level I, II	On request	Toulouse
	ATA 27 High Lift System and Spoiler Level III	April 18 September 19	Lindenberg
	ATA 27 Flight Control Components Level III	On request	Lindenberg
A400M	ATA 27 Flight Control Components Level V	On request	Lindenberg
	ATA 52 Door Ramp and Actuation System Level III	On request	Lindenberg
	ATA 52 Door Ramp and Actuation System Level V	On request	Lindenberg
	ATA 36 Bleed Test Set GSE Level IV	On request	Customer facility
SA/LR/A380/747-8	ATA 36 Bleed Test Set GSE Level IV	On request	Customer facility
<b>Boeing</b>			
747-8	ATA 21/36 Engine Bleed & Environmental Control System Level I, II, III	April 24 to 27	Toulouse
<b>Bombardier</b>			
CRJ1000	ATA 27 Rudder System Level III	On request	Lindenberg
CRJ700/900/1000	ATA 21/30/36 Integrated Air Management System Level I, II, III	May 15 to 17 November 20 to 22	Toulouse
C Series	ATA 32 Landing Gear System Level III, IV	June 11 & 12 October 11 & 12	Lindenberg
	ATA 32 Landing Gear Servicing Level IV On Aircraft	On request	Customer facility
	ATA 21/30/36 Integrated Air Management System Level I, II, III	June 5 to 8 October 16 to 19	Toulouse
Global 7000/8000	ATA 21/30/36 Integrated Air Management System Level I, II, III	On request	Toulouse
<b>COMAC</b>			
ARJ21	ATA 32 Landing Gear System Level III, IV	August 22 & 23	Lindenberg
	ATA 32 Landing Gear Servicing Level IV On Aircraft	On request	Customer facility
	ATA 21/30/36 Integrated Air Management System Level I, II, III	On request	Toulouse
C919	ATA 32 Landing Gear System Level III, IV	On request	Lindenberg
	ATA 32 Landing Gear Servicing Level IV On Aircraft	On request	Customer facility
	ATA 21/30/36 Integrated Air Management System Level I, II, III	On request	Toulouse
<b>Embraer</b>			
E170/E175	ATA 32 Landing Gear System Level III, IV	June 5 & 6 December 4 & 5	Lindenberg
	ATA 32 Landing Gear Servicing Level IV On Aircraft	On request	Customer facility
E190/E195	ATA 32 Landing Gear System Level III, IV	June 5 & 6 December 4 & 5	Lindenberg
	ATA 32 Landing Gear Servicing Level IV On Aircraft	On request	Customer facility
E-Jet E2	ATA 27 High Lift System Level III	October 23	Lindenberg
	ATA 21/30/36 Integrated Air Management System Level I, II, III	On request	Toulouse
KC-390	ATA 21/30/36 Integrated Air Management System Level I, II, III	On request	Toulouse
<b>Sukhoi Civil Aircraft</b>			
Superjet 100	ATA 27 Flight Control System Level III	September 3 & 4	Lindenberg
	ATA 21/30/36 Integrated Air Management System Level I, II, III	September 5 to 7	Toulouse
	ATA 27 Level IV Rigging On Aircraft	On request	Customer facility
<b>Leonardo Helicopters</b>			
AW109, AWT129, AW169, AW189	Environmental Control System (please contact Leonardo Helicopters for coordination)	On request	Customer facility

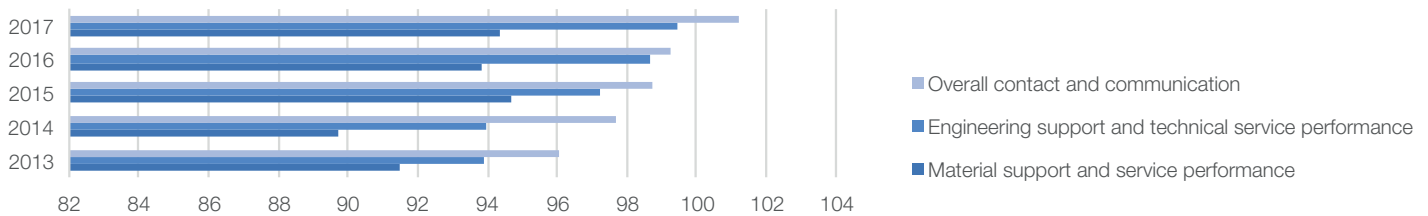
# The Voice of the Customers: a Consolidated Level of Confidence

Since 2013, Liebherr-Aerospace have launched a Customer Trust Rating survey to measure our customers' satisfaction on a regular basis.

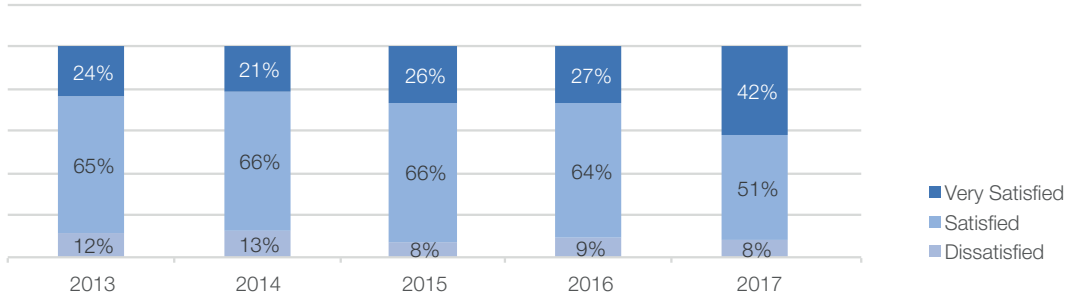
This survey is dispatched to a panel of nearly 2,000 customers, including airlines and Maintenance and Repair Organizations (MRO). The questionnaire is available in five languages to facilitate the customer response, thus reflecting the proximity created with our overall network.

It is an opportunity to receive feedback on the product support solutions and services we continuously adjust to meet the expectations and requirements in term of aftermarket and to monitor the success of our initiatives.

## Satisfaction results per area



## Liebherr-Aerospace overall satisfaction



The analysis of the results allows us to focus on room of improvement and consolidate the latest initiatives. The positive outcome of the 2017 survey is that we received a greater level satisfaction from our customers, corresponding to a higher level of trust and confidence in our long term partnerships, which is in line with the core values of our Liebherr Group.

We thank all our customers for their renewed confidence in our product and service solutions.

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