Technologies for vertical lift

High-tech on board

LIEBHERR

Aerospace

Our contribution – Your mission in our focus


© Airbus Helicopters

Safe flight in all weather conditions
Heat or cold, draught or humidity, rain or snow cannot stop you flying. Reliable heating, cooling and ventilation systems are indispensable to helicopter operation and mission fulfillment.

We develop, produce and support oil cooling and air management systems including air conditioning with air and vapor cycle technologies, bleed air, heating, cooling, distribution and temperature control.

These state-of-the-art systems are notable for their low weight, compactness and reliable performance.

© Airbus Helicopters

Safe landings on all grounds
Your mission requires to land your helicopter wherever needed. You need a reliable, shock absorbing and crashworthy landing gear allowing you to take on loads and passengers on all terrain.

We offer innovative, integrated landing gear systems, landing gear actuation, nose wheel steering, control electronics and cockpit panels for civil and defense helicopters from S to XXL.

© Leonardo Helicopters

Reliable systems when you need them most
Sometimes your mission requires special maneuvers and high precision flying. Your helicopter must be under control even in critical conditions for the safety of crew and passengers.

We have great experience in the development, manufacturing and integration of innovative flight control actuation systems, related hydraulic equipment and electronics for all types of helicopters.

We offer solutions ranging from conventional hydro-mechanical actuation up to full fly-by-wire actuation systems.

© Airbus Helicopters

When others rely on your performance
Saving lives is one of the most honorable missions. It is of utmost importance that you can concentrate on the emergency situation fully relying on your helicopter to work as expected.

We have exclusive development and manufacturing capabilities for helicopter gearboxes and transmissions for both high-speed and high torque applications.

Our product range includes complex gear components for main rotor gearboxes, tail rotor gearboxes and intermediate gearboxes.

Our products – Safety critical applications

Flight control and actuation systems
- Fly-by-wire main- and tail rotor servo controls
- Hydro-mechanical main- and tail rotor servo controls
- Hydraulic power supply
- Hydraulic system components: pumps / motors, manifolds, filter package units and reservoirs

Environmental control and thermal management systems
- Vapor cycle air conditioning systems and air cycle air management systems, including bleed air, heating, cooling, distribution and temperature control

Oil cooling systems
- Heat exchangers, valves and fans to manage the gearbox oil temperature

Gears and gearboxes
- Power transmission gearboxes
- Auxiliary power unit gearboxes
- Accessory gearboxes

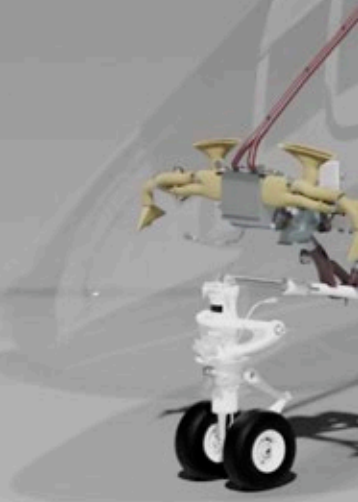
Electronic systems and components
- On-board electronics for control and monitoring
- Cockpit controls
- Power electronics
- Power conversion

Landing gear systems
- Landing gear systems, landing gear actuation, nose wheel steering, control electronics and cockpit panels
- Tail landing gears

Main rotor actuator

Auxiliary power unit gearbox

Landing gear control panel



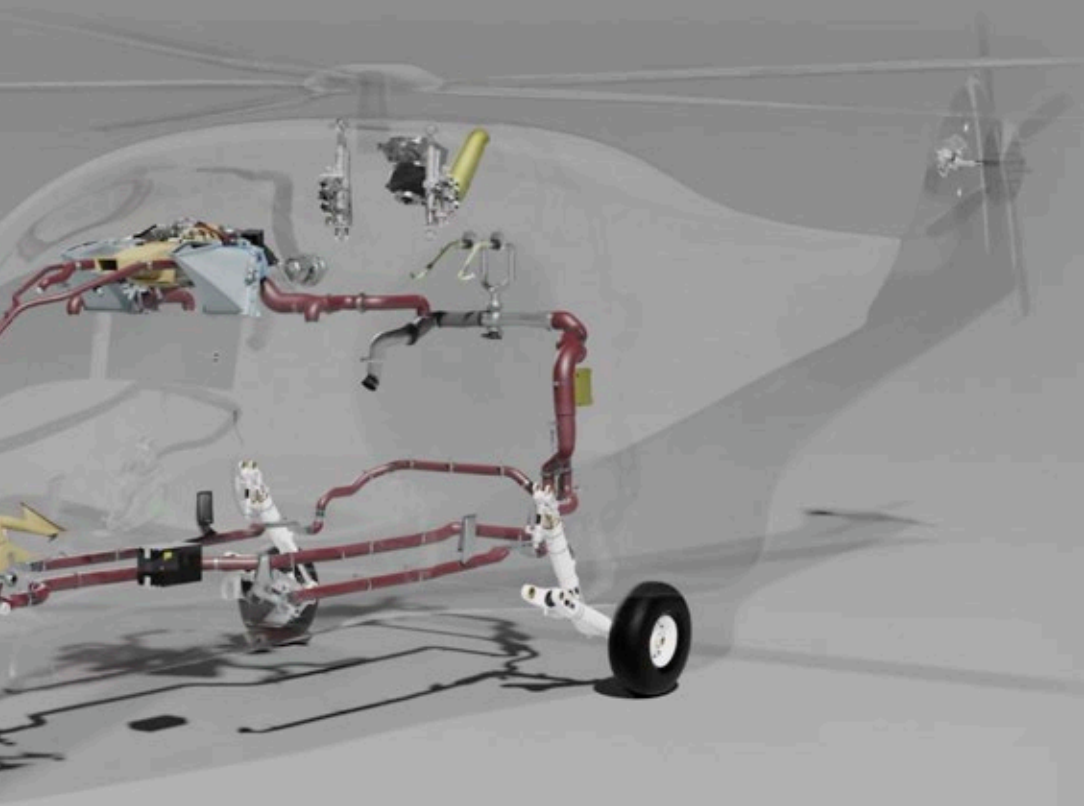
High pressure vapor cycle unit

Heating modulating valve

Main rotor drive components

Hydraulic power supply

Tail rotor actuator



Tail rotor gearbox

Air conditioning pack

Oil cooling system

Landing gear system

Flight control computer

Our capabilities – The complete product life cycle

3

Entry into service

We provide reliable maintenance services structured around quality, price and lead time to offer our customers the best operating conditions.

During product entry into service we ensure transfer of in-depth knowledge about components and systems.

2

Manufacturing

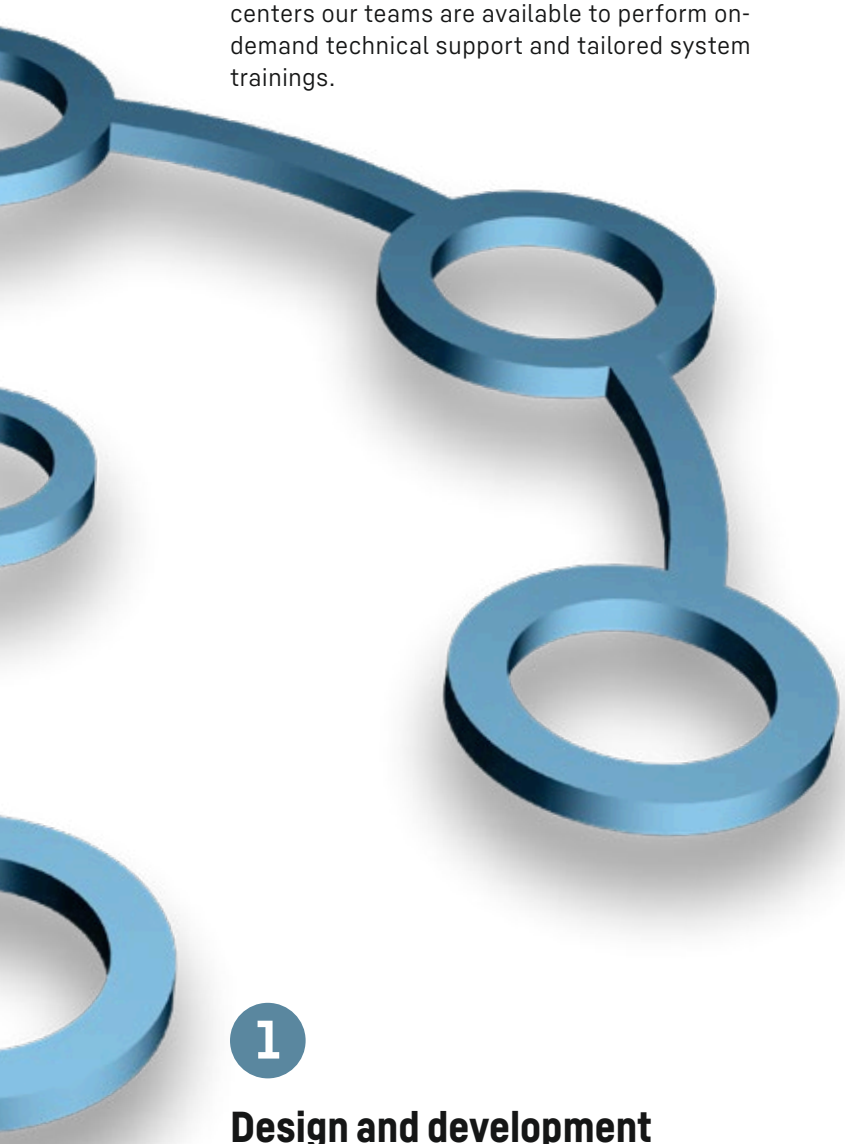
We expand and improve our manufacture and production methods for the future while maintaining necessary machinery, tools, means and skills to be able to support helicopter operations long after production has stopped.

In our manufacturing process, characteristics such as flexibility, efficiency, quality, reactivity and also sustainability are mandatory: each site commits to ambitious targets of reducing environmental impact.

4

Operations

As long as helicopters are flying with our systems, our customer service offers an extensive product support: we analyze reliability, manage configuration and modifications, provide spare parts and handle repairs for our whole range of products. In our worldwide network and service centers our teams are available to perform on-demand technical support and tailored system trainings.



1

Design and development

Our customer support and engineering design teams are paired to combine innovative ideas with field experience to develop a cost optimized system that meets your demands and the competitive environment. Using our system knowledge, gathered through millions of hours of real life data, we create equipment that is easy to test and maintain, that is reliable and exceeds your expectations.

5

Enhancement

Our in-service engineers work continuously on innovative repair solutions and product enhancements to reduce maintenance costs and meet new airworthiness requirements.

As a Design Organization Approved (DOA) company, we can use the wide range of test capabilities from our OE facilities to quickly develop and implement our enhancements.

6

Next generation

The long life of an helicopter represents years of accumulated experience and knowledge of systems and equipment performance.

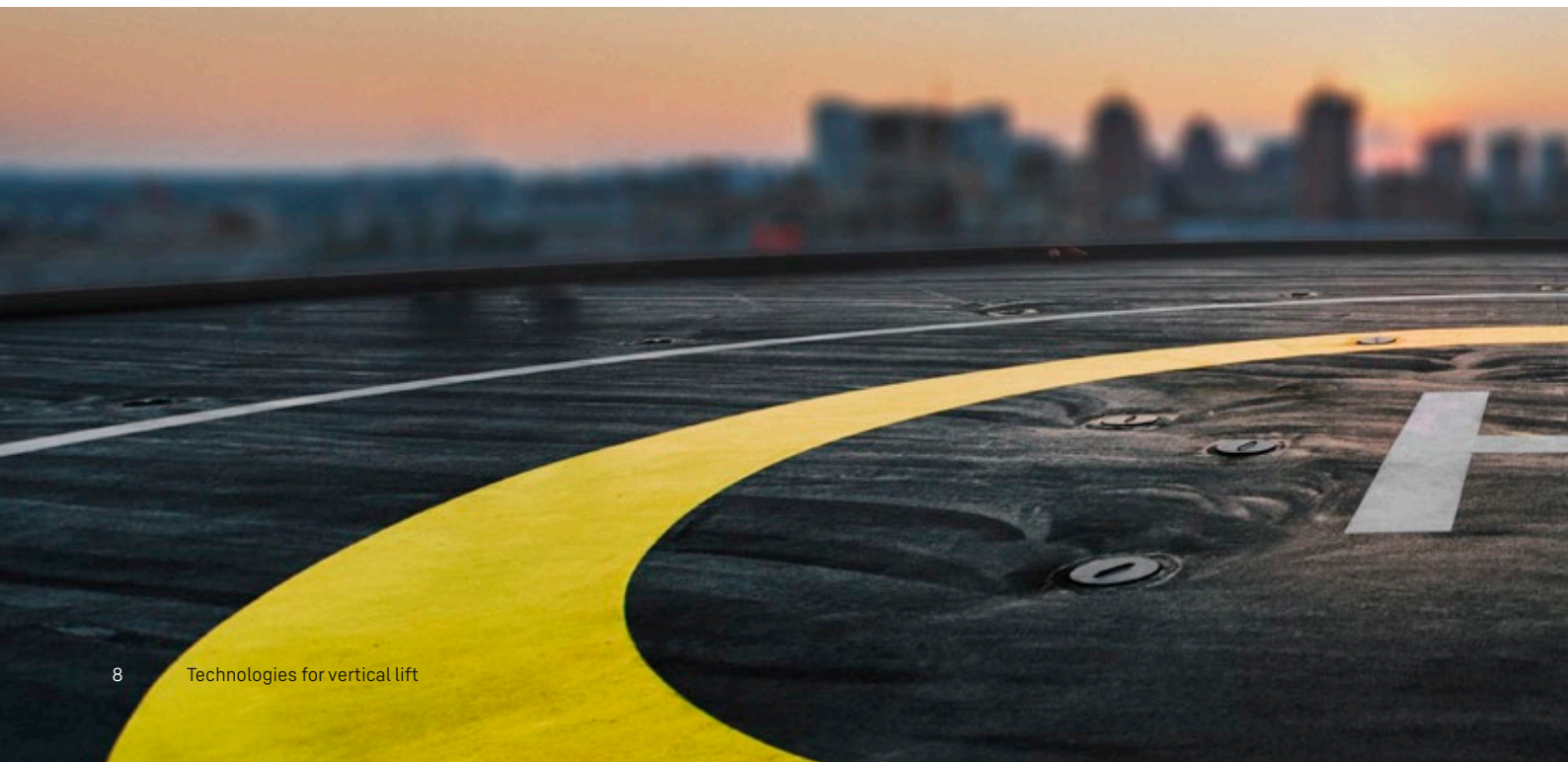
We channel this knowledge, compiled with innovative technologies, to push the boundaries of our future services.

Future technologies – Innovation for more efficiency

3D printed parts
Already in 2017, we received the authorization by the German Federal Aviation Office (Luftfahrtbundesamt, LBA) to produce components using additive manufacturing. Additive manufacturing enables the design and production of high-strength lightweight structures, which cannot be manufactured using conventional production methods.

Hydraulic power packs
A solution for an optimized system architecture is the application of decentralized hydraulic power generation by electrical Hydraulic Power Packs (HPP). The HPP is sourced by electrical power and provides locally hydraulic power at the system / place where it is needed, e. g. for extension and retraction of landing gears and braking.
The integrated design supports easy modular assembly in the helicopter.

sEMA
The small electromechanical actuator (sEMA) specifically addresses the emerging AAM (Advanced Air Mobility) sector. It can also be applied on smaller aircraft, business jets and helicopters. Liebherr's product approach offers scalability for small installation envelopes, a favorable power-to-weight ratio and high reliability.

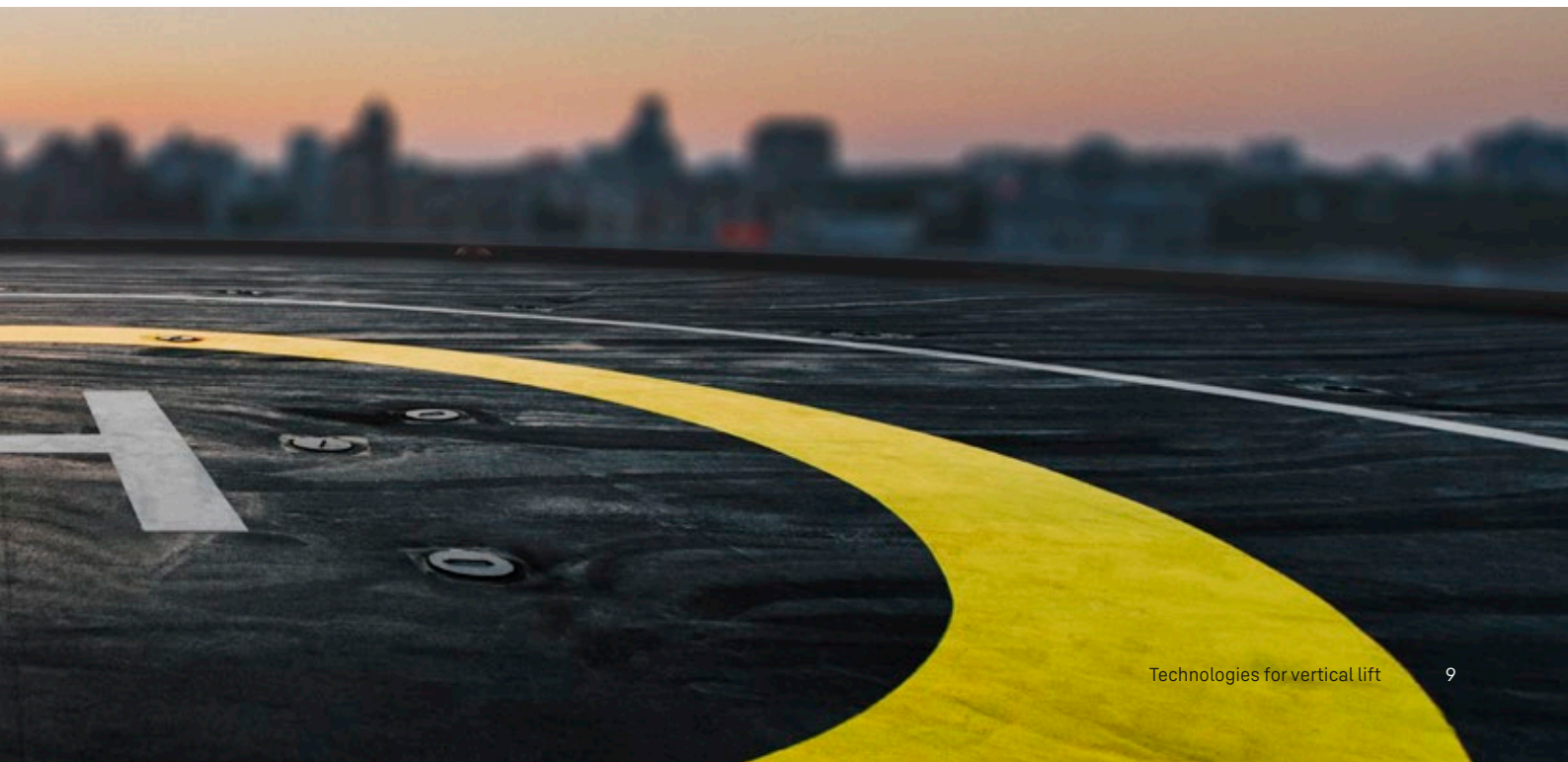


Universal control systems
We have developed a universal Remote Electronic Unit (REU) for different applications. Less weight, faster final assembly, more flexibility: The ingenious concept of our REU offers plenty of advantages, thanks to digitization.

Fly-by-wire flight controls
With the NH90 helicopter program, we introduced the first full authority fly-by wire flight control system, which entered the stage of series production. Developments by Liebherr progressed even further into a "fly-by-light"-system installed in the ACT-FHS technology test bed based on an H135 and operated by the German National Research Center (DLR).

Improved cabin comfort
Improved temperature regulation through Vapor Cycle Systems (VCS) using a jet pump with variable nozzle area and with bizonal mode to serve best all sections of the cabin. Improved power efficiency by new compressor technology like a VCS scroll compressor with double capacity (asynchronous technology) or with variable speed capability (synchronous technology).

Electrical landing gear
Liebherr has developed solutions for electro-mechanical actuation (EMAs) for helicopter landing gears. These solutions do not require hydraulic power supply. Further, Liebherr's linear and rotatory EMAs allow for customization and efficient integration into the various helicopter platforms.



Our legacy – On board in all market segments

Airbus

H120
- Environmental control system components

H125
- Environmental control system components
- Gears for main gearbox

H130
- Environmental control system

H135 / H135M
- Gears for power transmission gearboxes
- Hydraulic power supply
- Main- and tail rotor servo controls

H145 / H145M
- Gears for power transmission gearboxes
- Hydraulic power supply
- Main and tail rotor servo controls
- Tail gearbox

H155
- Environmental control system

H160
- Heating valve
- Main rotor servo control
- Tail rotor gearbox
- Tail rotor actuator

H175
- Heating valves
- Tail Rotor Actuators

H225 / H225M
- Environmental control system components
- Heating system

NH90
- Actuation control computer
- Auxiliary power unit gearbox
- Environmental control system components
- Fly-by-wire main- and tail rotor servo controls

Tiger
- Gears for tail gearbox
- Environmental control system
- Main- and tail rotor servo controls
- Tail landing gear

UH-72A Lakota LUH
- Gears for power transmission gearboxes
- Hydraulic valveblock / reservoir
- Main- and tail rotor servo controls

AVIC HAIG

AC312 / AC332
- Environmental control system
- Heating and ventilation

HAL

ALH / LUH
- Heating components

Korea Aerospace Industries

KUH-1 Surion
- Heating components

LAH
- Environmental control system

Leonardo (Helicopters)

AW09
- Heating and ventilation system

AW139
- Environmental control system
- Landing gear system

AW149 / AW189
- Environmental control system
- Landing gear system

AW169
- Environmental control system

T129
- Environmental control system

Turkish Aerospace

T625
- Environmental control system
- Oil cooling system

Our experience – Reliable partnerships with customers worldwide

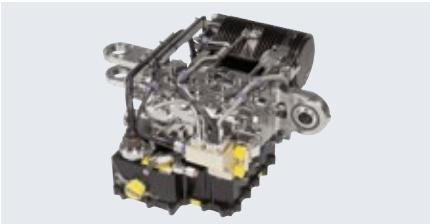
System supplier

We are a world-wide approved solution provider and integrator for the aerospace industry in the field of flight control and actuation systems, environmental control and thermal management systems, landing gears, gears, gearboxes as well as on board electronics. We participate in various civil and defense aircraft programmes as well as in research & technology developments.

System solutions

We offer complete system solutions and components according to the individual needs of aircraft manufacturers and -operators. With the certified disciplines of development, production, qualification, integration and customer services, we combine innovative practices and high modularity to fully fit the customers' requirements.

Solutions for aerospace



Aircraft control in flight
- Primary flight controls
- Secondary flight controls
- Main- / tailrotor actuation

Aircraft landing and control on ground
- Landing gear structure
- Extension & retraction
- Landing gear sub-systems
- Thrust reverser actuation

Electronics for power and control
- Power electronics
- Signal electronics
- Power conversion
- Remote electronic units

Environmental control and cabin comfort
- Air conditioning
- Heating & ventilation
- Engine bleed air systems
- Cabin pressure control
- Anti-icing systems
- Cabin systems
- Fuel tank inserting

Thermal management
- Supplemental cooling
- Avionics- / hydraulic cooling
- Oil cooling
- POD cooling
- Satellite cooling

Utility actuation
- Wingtip folding
- Hydraulics
- Door actuation
- Air refueling
- Gears & gearboxes

The Liebherr Group

Global and independent: more than 70 years of success
Liebherr was founded in 1949 when, with the development of the world's first mobile tower crane, Hans Liebherr laid the foundations for a family-run company which now has more than 50,000 employees and comprises over 150 companies across every continent. The holding company of the Group is Liebherr-International AG in Bulle, Switzerland, whose shareholders are exclusively members of the Liebherr family.

Technology leadership and pioneering spirit
Liebherr is a pioneer and its forward-looking approach has seen it make important contributions to technology history over a wide variety of industries. Employees throughout the world continue to share the courage of the company founder, sharing a passion to produce innovative products and a determination to provide world-leading equipment and machinery.

Diversified product programme
Liebherr is one of the world's biggest construction machine manufacturers and provides high-quality, user-oriented products and services. Its product programme includes earthmoving machinery, material handling technology, deep foundation machines, mining, mobile and crawler cranes, tower cranes, concrete technology, maritime cranes, aerospace and transportation systems, gear technology and automation systems, refrigerators and freezers, components and hotels.

Customised solutions and maximum customer value
Liebherr solutions are characterised by precision, implementation and longevity. The company is committed to technological excellence and to providing customers with solutions that match their needs exactly. For Liebherr, customer focus does not end with delivery of a product but continues through a comprehensive range of back-up and support services.

www.liebherr.com

Liebherr-Aerospace & Transportation SAS
408 avenue des Etats-Unis, B.P. 52010, 31016 Toulouse Cedex 2, France
Phone +33 561 35 2828 · Fax +33 561 35 2676
info.aer@liebherr.com · www.liebherr.com · www.liebherr.aero

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