

Innovative Solutions for Your Production

Liebherr Automation Systems



LIEBHERR

Liebherr - Your Partner for Automation Systems





Kempten plant



Employees in the Kempten plant

Liebherr-Verzahntechnik GmbH offers an extensive range of machine tools, tools and automation systems. This independent business division of the Liebherr group employs around 1,700 people at production sites in Kempten, Ettlingen, Karlsruhe, Bangalore (India), Yongchuan (China), Saline (USA) and Turin (Italy).

Since the 1970's, the automation systems division has delivered turnkey production systems for mechanical manufacturing worldwide, automating high-efficiency manufacturing cells and manufacturing lines in cooperation with well-known machine manufacturers.

Thanks to its high level of in-house manufacturing depth, most of the mechanical manufacturing, metal plate machining, painting and component assembly is done directly at the Kempten site.

Liebherr Automation Systems delivers systems throughout the world worth €65 million per year, of which 90% of the deliveries have been to manufacturing firms outside the Liebherr group. The export share is 75%.

Sales per Business Unit of Liebherr-Verzahntechnik GmbH



- Gearing technology machines
- Automation systems
- Gearing technology tools

Sales according to Industry of Liebherr-Verzahntechnik GmbH



- Automotive
- Automotive suppliers
- Truck
- Agricultural and construction machines
- Aerospace
- General mechanical engineering
- Other

Economical Automation Systems

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Gantry Robots



Ford engine block line



Ford engine block line

Gantry Robots



LP 100



LP 200



LPR 200



LP 2000

Liebherr gantry robots can be deployed in a variety of ways: transporting, palletizing, goods handling, loading and unloading or storing. We offer four sizes of linear robots and three sizes of area gantry robots with load capacities up to 1,000 kg to solve a wide range of automation tasks. For all sizes, Liebherr offers a modular system that allows the automation system to be adapted to a specific application, such as the manufacturing of cylinder heads, engine blocks or gearboxes.

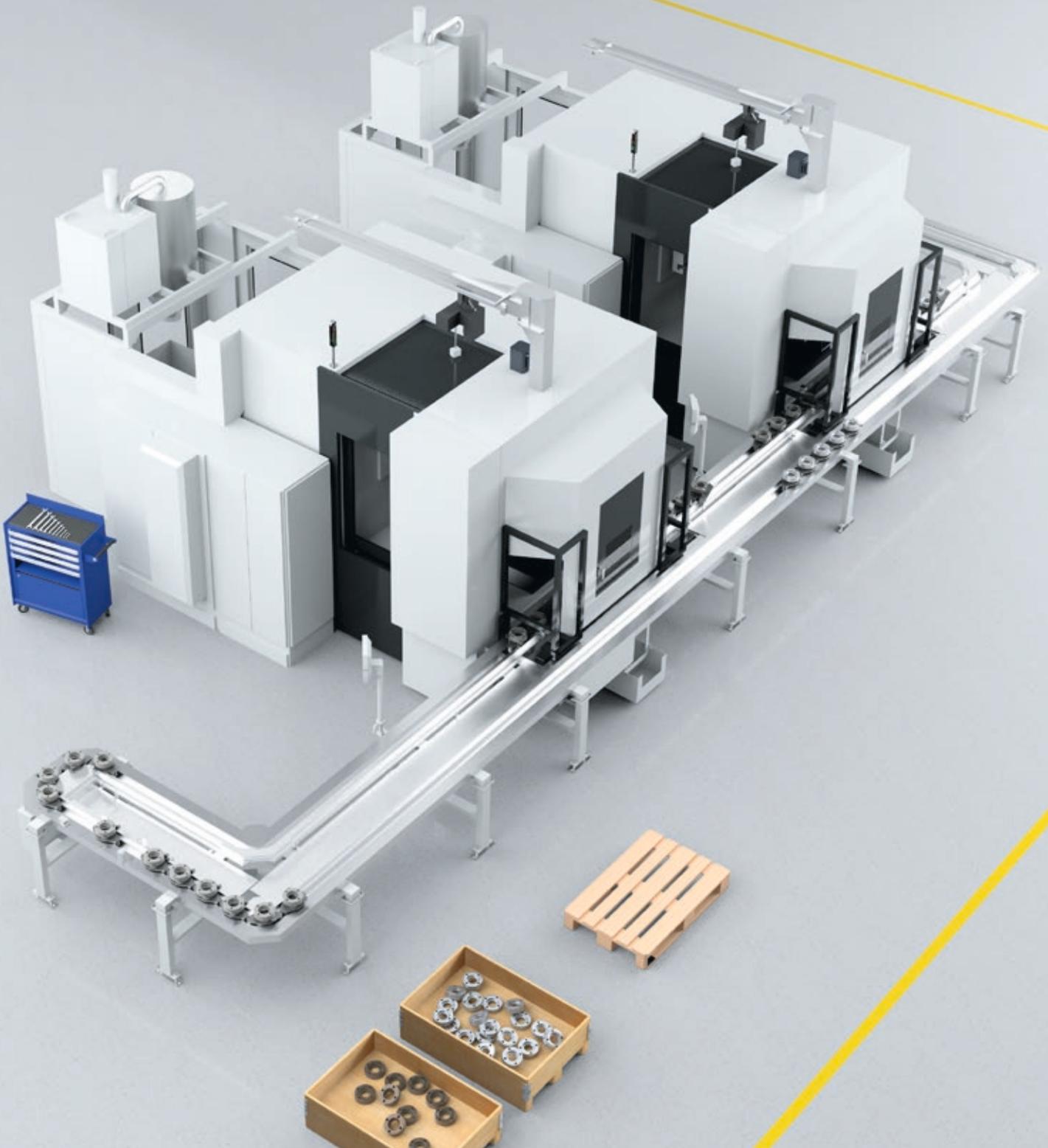
Linear gantry robots	Payload (kg)	Traverse Speed X (m/min) (High Speed)	Acceleration X (m/s²) (High Speed)
LP 20	160	180	4
LP 100	280	180 (300)	2.5 (4.5)
LP 200	600	180	3
LP 2000	1,000	120	2

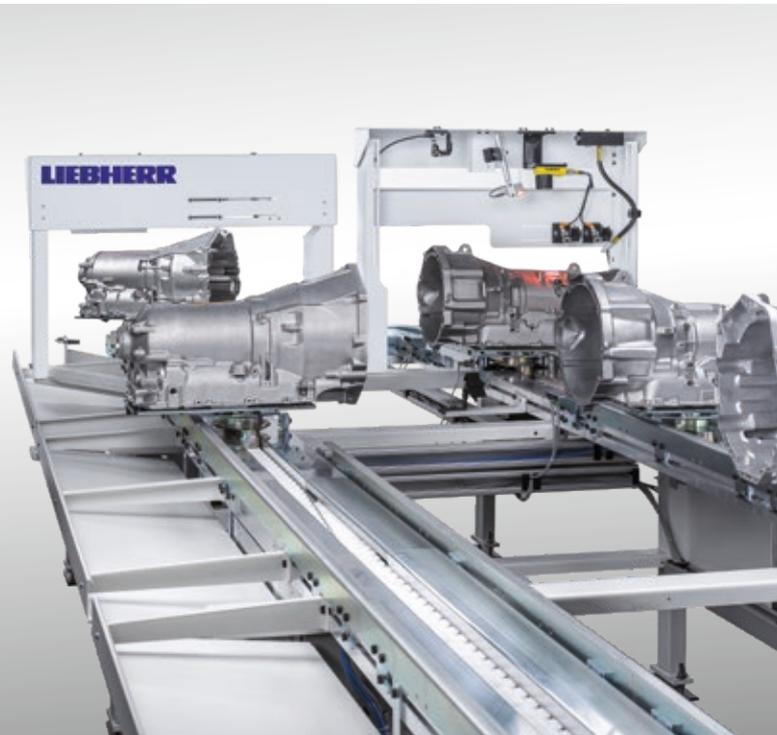
Further load capacities available on request

Area gantry robots	Payload (kg)	Traverse Speed X (m/min)	Acceleration X (m/s²)	Traverse Speed Y (m/min)	Acceleration Y (m/s²)
LPR 20	240	180	240	120	3
LPR 200	600	180	180	120	3
LPR 2000	1,500	180	120	120	2

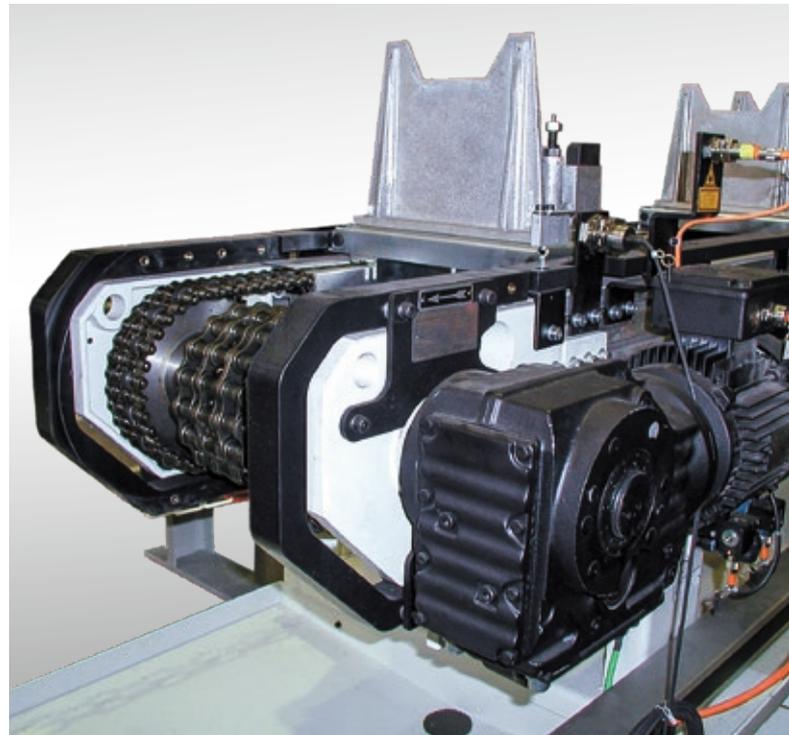
Further load capacities available on request

Conveying Systems





Plastic Chain Conveyor



Pallet Accumulating Conveyor

Liebherr conveyor systems are adapted to the form, position, weight, and size of the parts range, as well as the material. Standardized assembly groups provide an ideal enhancement to the program.

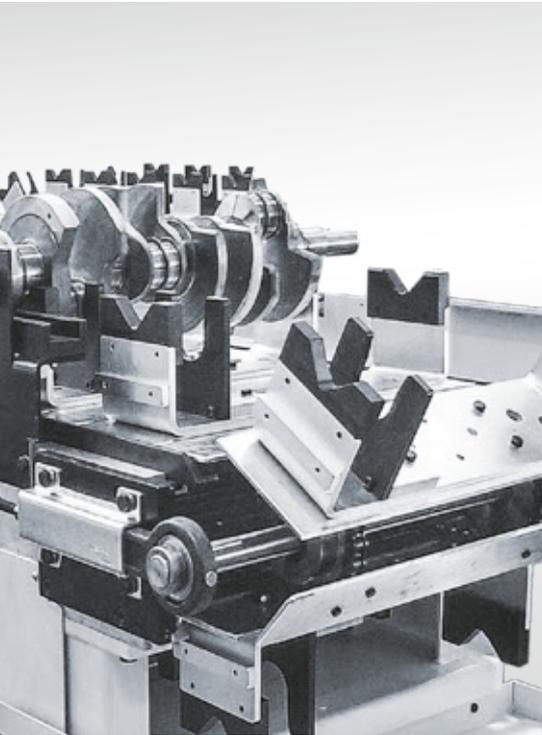
Plastic Chain Conveyor (KKB)

Plastic chain conveyors from Liebherr are designed to transport any number of irregularly shaped workpieces without them coming into contact with each other. The workpieces are transported on pallets. Provides optimal solution for multiple machine cells with buffering requirements. Allows for flexible layout configurations.

Pallet Accumulating Conveyor (PSB)

Pallet accumulating conveyors also serve to transport any number of irregularly shaped workpieces without them coming into contact with each other. Here, too, transportation of the workpieces is on pallets. Empty pallets are returned on the underside of the conveyor to save floor space. Provides optimal solution for moving large parts between operations, with excellent buffer capacity.

Conveying Systems



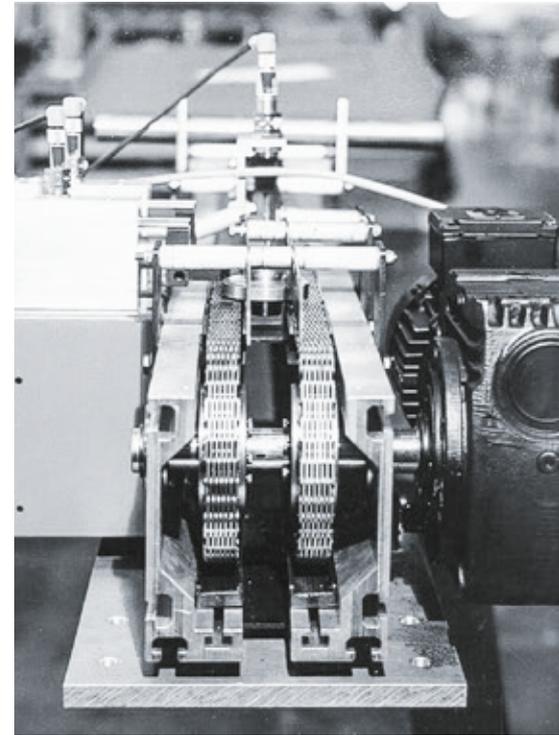
Indexing Chain Conveyor (TKB)

Indexing chain conveyors are used to transport parts on workpiece carriers. Carriers are fixed to the drive chain and conveyed based on the cell sequence.



Hinged Chain Conveyor (SKB)

The hinged chain conveyors are designed to transport workpieces with an even surface, e.g. pinion/gear wheel. Depending on the scenario, multi-track versions are also possible. By joining individual belt sections, hinged chain conveyors can be extended to any length.



Tooth Chain Conveyor (ZKB)

The toothed chain conveyors are designed to transport workpieces with an uneven surface, e.g. pins or collars. By joining individual belt sections, tooth chain conveyors can be extended to any length independently of cycles.



Accumulating Conveyor (SFB)

Accumulating conveyors are designed to transport workpieces either directly or on pallets. By joining individual belt sections, the transport length can be extended to any length. Ideal conveyor solution for assembly or adapter plate processes.



Drag Frame Conveyor (SRB)

Drag frame conveyors are designed to transport parts with an even surface, e.g. pinion/gear wheel, hubs, or rings. The workpieces are dragged by a frame that is connected to a chain. Transportation is either directly on the transport conveyor or indirectly via workpiece carriers. The prism-shaped mountings mean that, generally, no interchange parts are necessary.

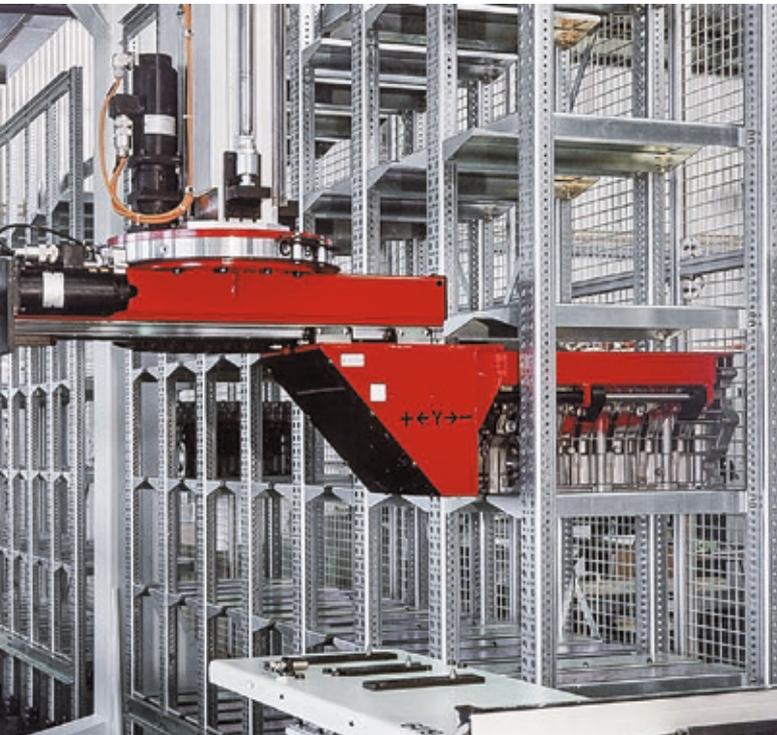


Friction Roller Conveyor (FRB)

With friction roller conveyors, workpieces can be transported directly or on pallets. In this case, the transport length can be extended as required by joining individual conveyor sections. The friction rollers are designed to not damage the part surface during transport.

Storage Systems





Shelf Magazine System



Decoupling Module

Storage systems for workpieces can be deployed in a variety of ways: Whether it is for loading/unloading function, decoupling module, in-process buffers or automated storage retrieval system.

Palletizing Cell (LPC)

The palletizing cell provides an ideal means to implement decoupled automation systems for gears or other small parts. The LPC employs basket technology to standardize the manufacturing logistics for loading/unloading and material transport.

Shelf Magazine System

The shelf magazine system combines fixed workpiece supports with a gantry loading system. Here, the shelf magazine can be loaded either from the top or from the side. Thanks to the modular design, the complete system can be extended and, depending on the layout, enables storage based on the principle of "first in – first out".

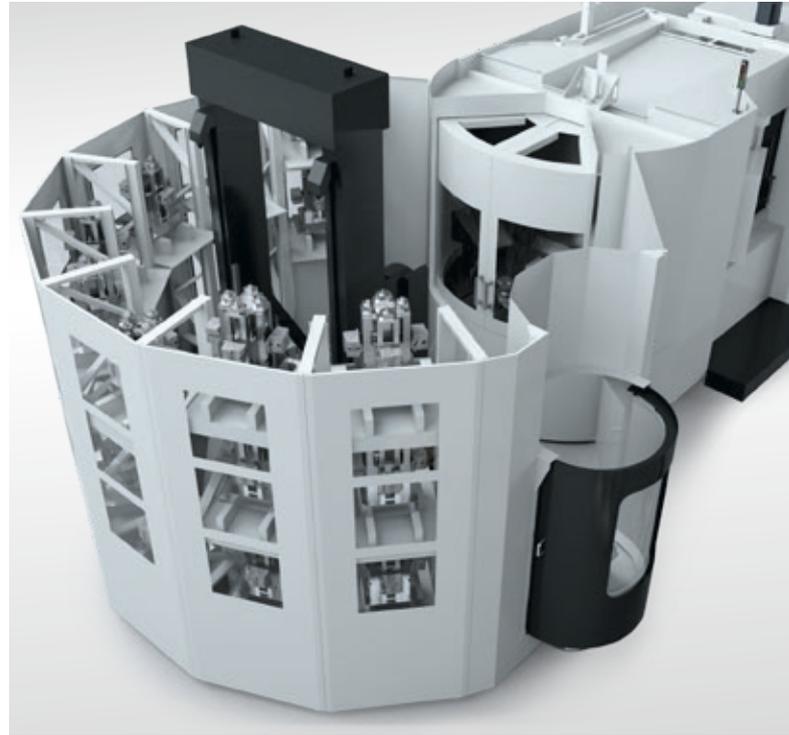
Decoupling Module (EKM)

The decoupling module serves as a means of storing and decoupling on flexible production lines. It features a high storage capacity with small surface area requirement and is suitable for a very wide range of workpieces and production concepts. The workpieces are placed on pallets in the decoupling module and made available via pull-out mechanisms for the robotic palletizers or robot systems to allow loading and unloading. A manual loading and unloading drawer for measured parts can be incorporated if required. With the integrated control system and standardized Liebherr software, the EKM can easily be implemented into any production system.



Video:
LPC 3400

Pallet Handling Systems



Liebherr pallet handling systems are deployed to automate machining centers in the area of individual part manufacturing and small batch manufacturing. Machine pallets with workpieces clamped to them are temporarily stored by the automatic PHS and then distributed to the machining centers. This intelligent overall concept, which includes retooling during the machining process as well as resource and order scheduling, increases productivity, reducing the unit labor costs. Pallet handling systems from Liebherr are available in two versions: a rotary loading system (RLS) or a linear loading system (PHS). Both versions are modular in design and can be adapted to the requirements of the production concept.

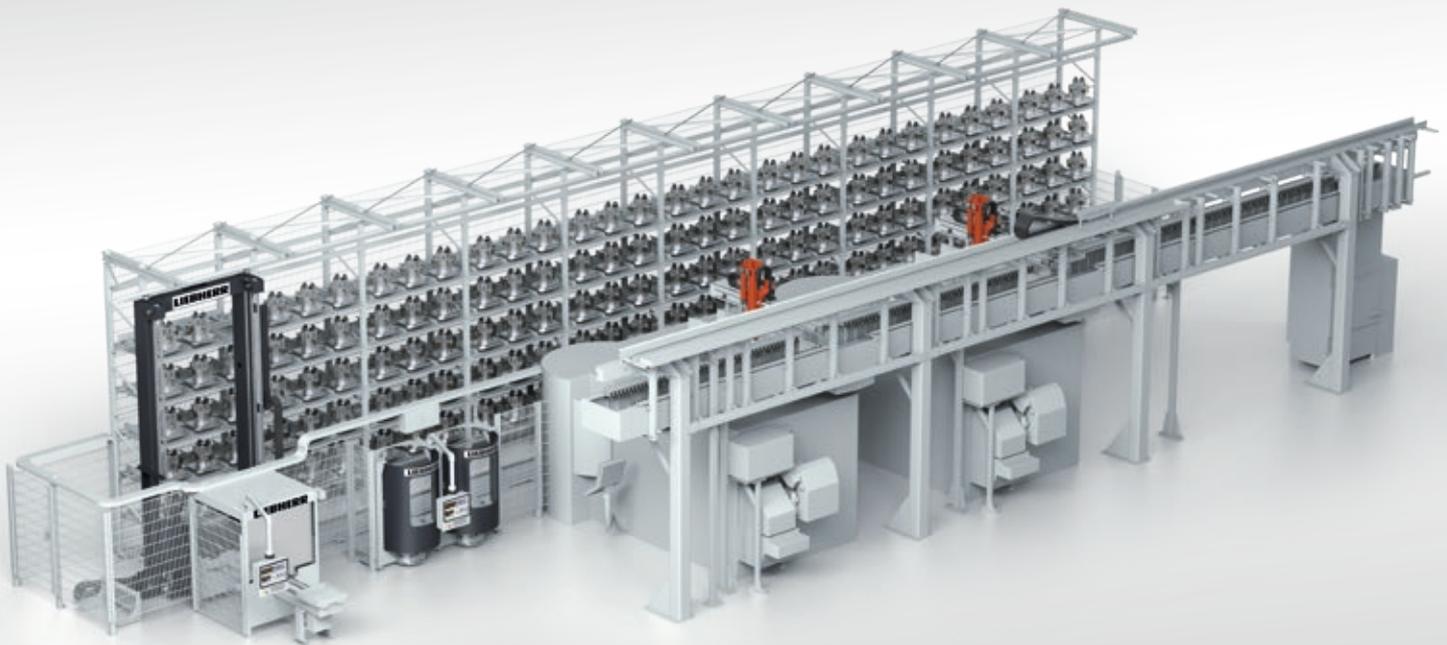
Rotary Loading System RLS

Rotary loading systems from Liebherr are distinguished by their high storage density in relation to the footprint and are designed for one to two processing centers. In combination with the Liebherr rotary storage tower (RST), the storage areas can be configured individually to meet specific needs. The rotary loading system is available in two sizes and designed for transport loads between 800 and 1,500 kg.

Rotation Loading System	Collision circle diameter (mm)	Transport Load (kg)
RLS 800	600/800	800
RLS 1500	900/1,300	1,500



Video: Rotary Loading System RLS
<https://go.liebherr.com/2N1z63>



Pallet Handling System PHS PRO

In the linear-type pallet handling system, the number of connected machines can be adapted to the requirements as can the setup and storage locations. The flexibility to extend the system to optimize the proper mix of finished part storage and unprocessed part management can meet the requirements of the modern manufacturing process. The linear system is manufactured in four sizes for transport loads up to 13,000 kg.

Pallet Handling System PHS Allround

The modular PHS Allround system can be individually configured and expanded at any time. The possibility of frontal arrangement of the machines, additional devices and shelves offers maximum flexibility in the system design. The double loader option enables the end-user to further optimize the productivity of the machine tool and replaces the machine's own pallet changer, making a PHS with a double loader the more cost-effective alternative.

The detachable front access allows individual machines to be decoupled from the system, without interrupting the Automatic Mode of the remaining machines.

Pallet Handling System	Collision circle diameter (mm)	Transport Load (kg)
PHS 750 PRO	1,000 / 1,400	500 / 700 / 1,000
PHS 1500 PRO	1,000 / 1,400 / 1,700	1,500 / 2,000 / 2,500
PHS 3500 PRO	1,900 / 2,700	3,500 / 5,000 / 6,500
PHS 10000 PRO	3,200 / 4,000 / < on request	10,000 / 13,000 / < on request



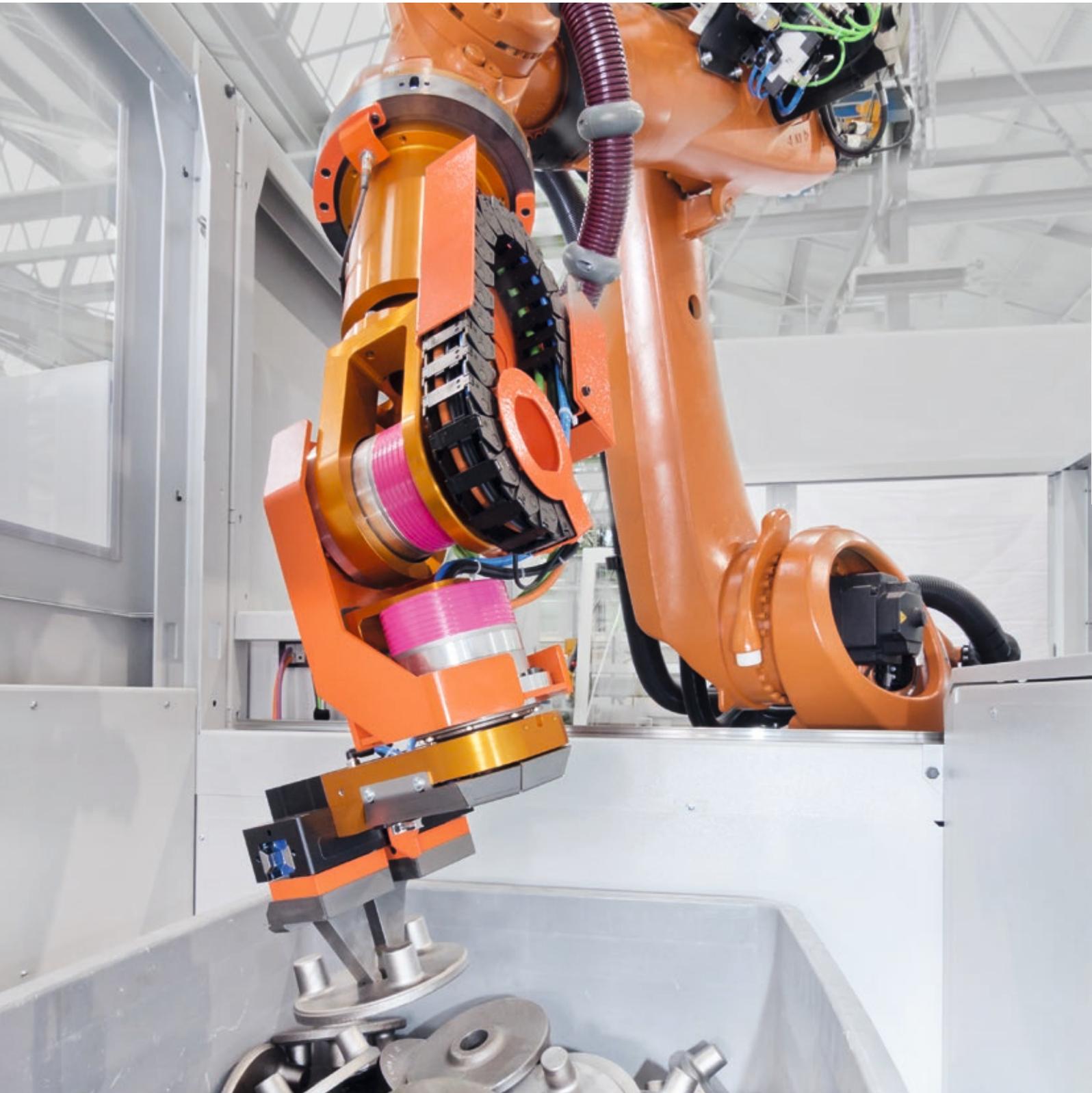
Video: PHS PRO
<https://go.liebherr.com/yBF8Bn>

Pallet Handling System	Collision circle diameter (mm)	Transport Load (kg)
PHS 800 Allround	600 / 900	800 (2 x 600)
PHS 1500 Allround	900 / 1,400	1,500 (2 x 1,200)



Video: PHS Allround
<https://go.liebherr.com/87KD2N>

Robot Integration

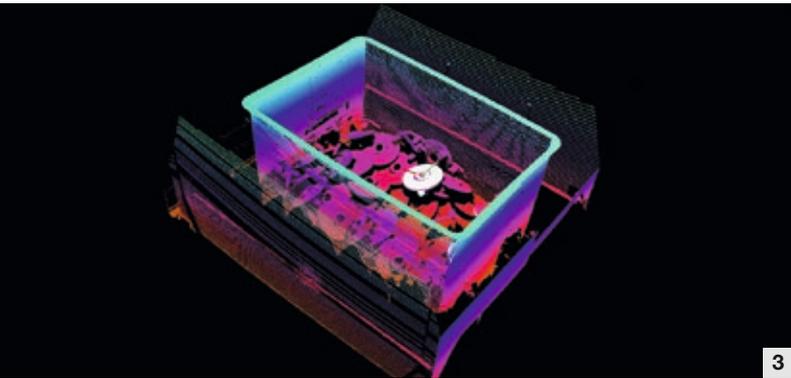




1



2



3



4



5

1 Requirement · 2 Visual data acquisition and evaluation
3 Object identification and selection · 4 Collision-free parts removal · 5 Object positioning

As a turnkey supplier of complete production lines, Liebherr covers all process steps from blank to finished part from a single source. In the area of robot applications, Liebherr performs parts handling, palletizing/depalletizing, and bin-picking tasks.

Parts Handling

In parts handling Liebherr performs loading tasks for a wide range of machine tools. In recent years solutions from machining centers, turning machines, gear cutting machines, rotary transfer machines through to grinding machines have been implemented here. The robot cells are always designed specifically for the requirements in close cooperation with the customers.

Palletizing

Liebherr uses 2D and 3D vision systems to perform palletizing and depalletizing tasks. Whether it be to detect and grip

unsorted parts from Euro pallets or transport presorted parts in blisters.

Random Bin Picking

"Random bin picking" replaces complicated sorting systems, heightens productivity, and relieves the strain on personnel. In order to be able to remove unsorted workpieces from a transport container, a complex interaction between image recognition system, software, and robot is required. Based on the range of parts, all steps required for the process complement each other so that an optimal removal and positioning result is achieved.

Reliable 3D object detection systems record the data visually and evaluate it. Depending on the requirement, Liebherr works with different 3D vision systems.



Video:
Bin Picking

Additional Equipment

To set up production lines to solve complex tasks, Liebherr supplies not only basic components, but also all of the necessary additional equipment, e.g. for the labeling, detection by camera systems, orientation, or spinning of oil-covered parts and discharge of measured parts (SPC station).



Statistical Process Control (SPC)

The statistical process control is a fixed element of any production line in modern production systems. Liebherr supplies these modular-based stations for discharge and inclusion.



Orientation Station

Modern production machines require that workpieces are loaded with the correct orientation. If the loading system is incapable of doing this, Liebherr offers ancillary orientation stations.



Camera Systems

With the aid of camera systems, labels and codes on the workpieces can be read and their information transferred to higher level production management systems.



Centrifugal Station

To prevent the displacement or mixing of cooling lubricants, it is necessary for the workpieces to be cleaned automatically. Depending on the needs of the customer and the workpiece, different processes are employed. The Liebherr modules include centrifuging, vacuum, and blow-off stations.

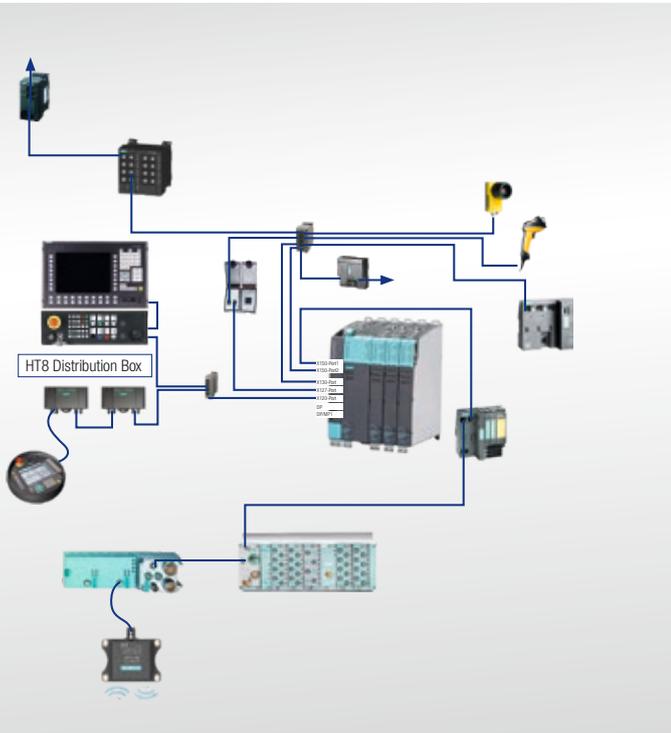


Labeling Systems

With the high-quality labeling systems offered by Liebherr, digital combinations or codes can be lasered, etched, or engraved with needles on the workpiece.

Data Matrix Code (DMC)

Hardware and Software



Control Structure

Customer-Specific complete Solution based on Modular System

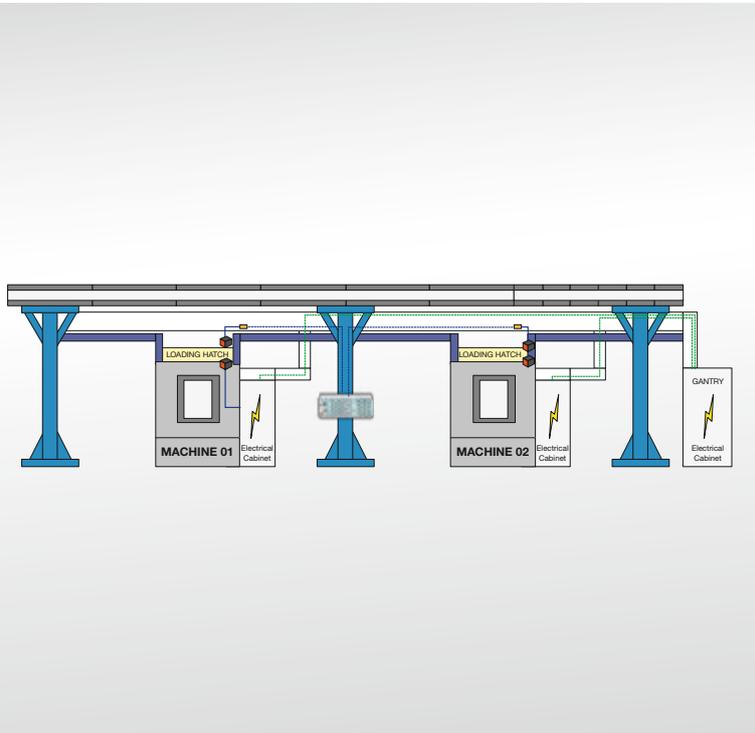
The comprehensive modular hardware and software modules ensure consistency between a mechanical function and the requisite hardware and software functions. Tested software modules with a functional description are configured as a complete solution according to the functions necessary for the process. Even before the award of contract, a detailed customer-specific process description (Sequence of Operation – SoO) is compiled.

Source	Condition	Aim
Infeed conveyor	Unmachined part	Machine OP10.1
	Rework	
	Unknown part	SPC station
Machine OP10	Finished part OK	Outfeed conveyor
	Test part	SPC station
	Reject	

Source-Target View

Source-Target View

By means of a source-target view within the automation control system, associated processes are divided into small individual steps, this means that complex tasks are well structured.



Interface Definition

Standardized Interface

Various processing machines, control, or production planning systems can be integrated using a standardized software interface. This interface is the basis for short commissioning times as well as trouble-free operation and straightforward maintenance of the system during the entire product life cycle.



Liebherr Manufacturing System (LMS 4.0)

Additional Software Increases Process Reliability

Complex production systems require increased functionality in their software systems. With the Liebherr Manufacturing System (LMS 4.0), Liebherr offers user-friendly additional software which guarantees process reliability in a production or assembly line. The LMS 4.0 is able to record temporary parts tracking, as well as save specific data and make this available to all system-based users. The system offers a range of assessments and can be deployed, for example, so that correct adherence of the production process can be monitored.

Thanks to the extension with new functions such as "Production Monitoring App" and "Info Board App", the processes can be easily tracked on mobile end devices and interfaces.



Video:
LMS 4.0

Service



Training

We offer a comprehensive range of training courses both at the customer's premises and in our subsidiaries. The practical technical training courses are delivered by our experienced system technicians who are very familiar with the systems and applications owing to their many years of experience. These training courses enable you to help yourself and use systems safely in emergency situations, e.g. a power failure.

Customer Hotline and Remote Maintenance

Our experts on the customer hotline provide professional initial assistance when needed. Many faults can be eliminated with the support of our experts via remote access.

Global Presence and Spare Parts Availability

With our headquarters in Kempten and global subsidiaries, as well as service outlets, we guarantee a fast response time in order to be able to deploy a service technician to the customer's premises if necessary. A rapid replacement parts service is guaranteed thanks to the consistent modular system of the products and the use of basic components from well-known, global manufacturers. Original spare parts are stocked in the subsidiaries and can be delivered to your production sites within a short period of time. Included in the services offered are the provision of spare parts, inspections, maintenance, or modifications to systems.

Service and Maintenance

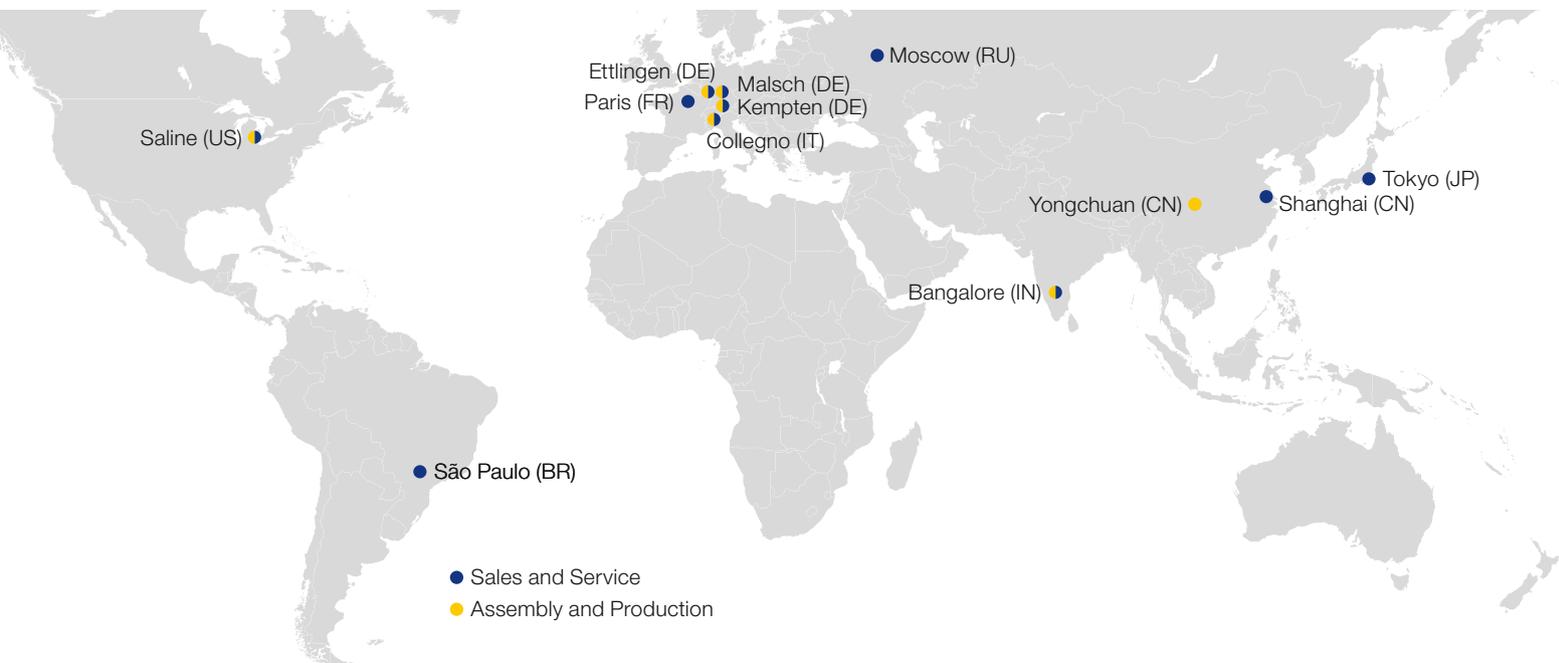
Liebherr developed a system for optimizing repair and maintenance based on experiences with aerospace components within the Liebherr Group. As a result of this, maximum availability values and minimal total costs of ownership are achieved.

Most of the unexpected system failures can be avoided through preventive maintenance.

We also offer our customers optional "Wellness Checks" to minimize the risk of machine downtimes and secure the machine availability over the long term. Axles, gearboxes, cable drag, guides, carriages, as well as cables and hoses, are checked and replaced if necessary.

The system data is saved as a backup during each service and maintenance call in order to restore the status of the last maintenance if needed and thus quickly guarantee the restart of production.

Your solution provider



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