Liebherr Automation Systems
Innovative solutions for your production
Liebherr offers a wide range of automation systems that support modern high-efficiency production. They not only contribute to reducing production costs but also enable a fast and flexible response to fluctuations in demand from the market. Economy, user friendliness, quality and reliability as well as a high level of flexibility are at the forefront.

The range of products comprises robotic palletisers, conveying systems, storage systems, pallet handling systems and robot integration. The use of modular systems with high quality components as well as a broad knowledge of the demands of manufacturing production systems mean that a high level of availability is assured.

As a general contractor or in conjunction with well-known machine manufacturers, Liebherr automates production lines, highly efficient production cells for processing centres, standalone systems and integrates production-relevant additional equipment.
Economical Automation Solutions

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Liebherr gantry robots can be deployed in a variety of ways: For transporting, palletising, goods handling, loading and unloading or storing. Linear gantry robots are available in five sizes and gantry robots with layer pickup available in three sizes for workpiece weights of 0.5 kg to 1,500 kg solve a wide range of automation tasks. For all sizes, Liebherr offers a modular system with which the automation system can be adapted to the respective application, e.g. cylinder head, engine block or gearbox manufacturer.

<table>
<thead>
<tr>
<th>Gantry robots</th>
<th>Workpiece weight (kg)</th>
<th>Transport load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP 10</td>
<td>0.5 - 10</td>
<td>40</td>
</tr>
<tr>
<td>LP 20</td>
<td>10 - 40</td>
<td>160</td>
</tr>
<tr>
<td>LP 200</td>
<td>40 - 250</td>
<td>600</td>
</tr>
<tr>
<td>LP 2000</td>
<td>250 - 600</td>
<td>1,500</td>
</tr>
</tbody>
</table>
Liebherr conveying systems are adapted not only to the shape, position, weight and size of parts but to the material as well. Standardised assembly groups provide an ideal enhancement to the programme.

**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. Transportation of the workpieces on pallets. Due to the linear effect they can be operated independently of cycles.

**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. Due to the linear effect they can be operated independently of cycles. Return of the pallets is on the underside of the conveyor to save space.
Conveying Systems

Timer chain conveyor (TKB)
Timer chain conveyors serve to transport parts on workpiece carriers. These are permanently joined to the drive chain and are conveyed depending on the cycle.

Hinged chain conveyor (SKB)
With the aid of hinged chain conveyors, it is possible to transport workpieces with a flat surface, e.g. gear wheels. Depending on the scenario, multi-track versions are also possible. By joining individual belt sections, hinged chain conveyors can be extended to any length. Due to the linear effect they can also be operated independently of cycles.

Tooth chain conveyor (ZKB)
Tooth chain conveyors transport workpieces that do not have a flat surface, e.g. those with journals or shoulders. By joining individual belt sections, tooth chain conveyors can be extended to any length independently of cycles.
Accumulating conveyor (SFB)
With accumulating conveyors, it is possible to transport workpieces either directly or on pallets. By joining individual belt sections, the transport length can be extended according to requirement and, furthermore, accumulating conveyors operate independently of cycles.

Drag frame conveyor (SRB)
Drag frame conveyors serve to transport parts with a flat surface, e.g. gear wheels, 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. Due to the linear effect they can be operated independently of cycles. The friction method means that the transport surface on the workpiece is not damaged.
Storage systems for workpieces can be deployed in a variety of ways: whether for decoupling on a production line, as a loading and unloading system or as a classic logistics module with storage functionality.

**Palletizing cell (LPC)**
The palletizing cell is the basic module for realising an ultramodern production system. Standardised transport containers with basket technology facilitate a uniform approach to logistics as well as flexible future-orientated production.

**Shelf magazine system**
The shelf magazine system combines fixed workpiece supports with a robotic palletiser system. Here, the shelf magazine can be loaded either from the top or from the side. Debonding to the modular design, the overall 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 palletisers or robot systems to allow loading and unloading. A manual loading and unloading drawer for gauging parts for Statistical Process Control (SPC) can be included if required. This draw also allows for easily extracting and reintroducing of parts in and out of the system. The integrated control system with standardized software reduces commissioning times.
Pallet Handling Systems

Liebherr pallet handling systems are deployed to automate processing centres in the area of individual part production and small series production. The basis is a workpiece clamped on a machine pallet. An intelligent overall concept, which includes retooling during main operation as well as resource and work order scheduling, increases productivity and thereby reduces the unit labour costs. Pallet handling systems from Liebherr are offered in two versions: rotation loading system (RLS) or a linear loading system (PHS). Both versions are modular in design and can therefore be adapted to the respective requirements of the production concept.

Pallet handling system (PHS)

On the linear-type pallet handling system, the number of connected machines can vary depending on requirement as, too, can the setting-up and storage areas. With the means to extend the system with unprocessed and finished part management on material pallets, all of the requirements of a modern production system can be covered. The linear system is made in three construction sizes for transport loads of 500 kg to 6,500 kg.
Rotary loading system (RLS)

Rotary loading systems from Liebherr are distinguished by their high storage depth in relationship to its footprint and are designed for one or two machining centers. In combination with the Liebherr rotation storage tower (RTS), the storage areas can be configured individually to meet specific needs. The rotary loading system is available in two construction sizes and is designed for transport loads from 800 kg to 1,500 kg.

<table>
<thead>
<tr>
<th>Pallet handling system</th>
<th>Workpiece diameter (mm)</th>
<th>Transport load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHS 750</td>
<td>1,000</td>
<td>500/700/1,000</td>
</tr>
<tr>
<td>PHS 1500</td>
<td>1,150/1,700</td>
<td>1,500/2,000/2,500</td>
</tr>
<tr>
<td>PHS 3500</td>
<td>1,900/2,400</td>
<td>3,500/5,000/6,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rotation loading system</th>
<th>Workpiece diameter (mm)</th>
<th>Transport load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLS 800</td>
<td>600/800</td>
<td>800</td>
</tr>
<tr>
<td>RLS 1500</td>
<td>900/1,300</td>
<td>1,500</td>
</tr>
</tbody>
</table>
Flexible robot systems and deployed to load and unload workpieces in production environments. Here, all well-known robots manufacturers can be utilized. In addition to numerous standard applications, the special "random bin picking" area is included in Liebherr's range. Thanks to Liebherr developed software along with a vision system, it is possible to reliably remove random parts from a container.

"Random bin picking"
"Random bin picking" substitutes complicated sorting systems, heightens productivity and relieves the strain on personnel. Unloading workpieces from a parts container is a complex interaction between image detection system, software and robot. Based on the range of parts, all process-relevant steps have to be adapted to each other in such a way that optimum withdrawal and positioning is achieved.
To set-up production lines in order that complicated tasks can be solved, Liebherr supplies not only the basic products but also all requisite ancillary equipment, e.g. for labelling, detection by camera systems, orientation or the centrifugation of oil-coated parts and discharge of measured parts (SPC station).

**Static 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 lever 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 most common processes are: centrifugation, vacuum or draining stations.

**Labelling systems**
With the high quality labelling systems offered by Liebherr, digital combinations or codes can be lasered, etched or engraved with needles on the workpiece.
**Customer-specific complete solution based on modular system**

The comprehensive modular hardware and software building block system ensures continuity between a mechanical function and the hardware and software functions necessary to achieve this. Tested software modules with a functional description are configured as a complete solution according to the functions necessary for the process. Even before the purchase order is awarded, a detailed customer-specific process description is created (sequence of operation – SoO).

**Flow diagram**

Complex processes are also visualized in flow charts and then implemented accordingly.
**Standardized interface**

With a standardized software interface, a wide variety of processing machines can easily be integrated, allowing them for shorter commissioning times and full production at launch. Production scheduling, trouble free operation and minimized maintenance are realized throughout the entire product life cycle.

**Additional software enhances process safety**

Complex production systems require a universal intelligently conceived system. With the Liebherr Manufacturing System (LMS), Liebherr offers user-friendly ancillary software that safeguards the process safety on a production and assembly line. The LMS is capable of logging a temporary retraction of parts as well as securing specific data and making this available to all users participating in the system. The system offers a range of assessments and can be deployed, for example, so that correct adherence of the production process can be monitored.
The Liebherr Automation Service has its headquarters in Kempten (Germany), and has a network of Liebherr service centres around the world. The experts who man the customer hotline provide professional first-aid should help be needed. Included in the services offered are the provision of spare parts, inspections, maintenance or modifications to systems. Since the products have a universal modular design, rapid provision of spare parts is assured, which means that periods of downtime are kept to a minimum. Thanks to the use of commercially-available components, such as drive and control systems, a high level of availability for the whole system is assured.

Liebherr automation systems are designed to be particularly maintenance-friendly. All necessary lubrication points are supplied from a central lubrication system that, as with all pneumatic components and bus modules, can be found on an easily accessible maintenance unit.

Liebherr-Verzahntechnik GmbH
Werkzeugmaschinen,
Automationssysteme
Kempten
(Germany and Europe)

Liebherr Automation Systems Co.
Saline, Michigan
(USA)

Liebherr Brasil Ltda.
Guaratinguetá / SP
(Brazil and Mexico)

Liebherr Machinery Service Co. Ltd.
Shanghai
(China)

Liebherr-Russland OOO
1 Borodinskaja Str. 5
Moscow
(Russia)
Liebherr employs roughly 1200 staff in the area of machine tools and automation technology and has production facilities in Kempten and Ettlingen (Germany), Collegno (Italy), Saline (Michigan, USA) and Bangalore (India). They are supported by expert and reliable marketing and service specialists at a large number of locations worldwide.

**System solutions in the area of machine tools**

Included in the production programme are gear hobbing machines, gear shaping machines and hobbing and profile grinding machines, all noted for their high degree of stability and availability. Liebherr can supply all technologies required for the manufacture of high quality gears and continues to develop these technologies. Particular importance is attached to the energy efficiency of the machines. Gear cutting machines from Liebherr are supplied to renowned manufacturers of gears and gearboxes as well as large-scale slewing rings worldwide. They are in demand primarily from the automotive and construction machinery industries and also increasingly from the wind power industry for the manufacture of gears for wind turbines.

**High quality gear cutting tools**

Liebherr manufactures high quality, precision tools for the soft and hard machining of gears and all Liebherr gear cutting machines are fitted with Liebherr tools. The range also includes Lorenz bearing tools and products customised for specific customer applications.

**Automation systems for a broad range of applications**

Liebherr has a wide range of products for linear portals, pallet-handling systems, conveyor systems and robot integration for projects in all areas of production and can provide above-average availability of systems.

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