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# EMO highlights

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Gear technology, gear cutting tools, measuring technology, and automation systems

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# LIEBHERR

Gear technology and automation systems

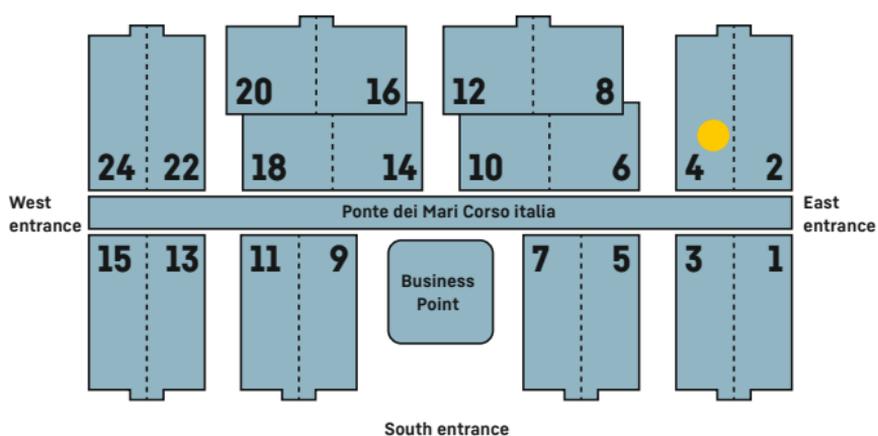


# Contents

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- 3** EMO – the world’s leading trade fair for metal machining
- 4** Generating gear grinding machine LGG 300 / 380 / 500 / 700 M
- 5** Grinding of internal gears
- 6** SECLA – segment clamping arbor
- 7** **LHStation** and **LHMobile**
- 8** **LHGearTec**
- 9** **LHWebPlatform**
- 10** WGT 600 gear inspection machine
- 11** Gear cutting tools
- 12** PHS Allround
- 13** Bin-picking solutions with **LHRobotics.Vision**

# EMO – the world’s leading trade fair for metal machining



Liebherr-Verzahntechnik GmbH  
Hall 4, booth D07



# Generating gear grinding machine LGG 300 / 380 / 500 / 700 M



## Generating grinding, profile grinding, and internal grinding in one machine

Flexibility is hugely important to job shops and individual part manufacturers. The new LGG series has been specially designed for universal use, as well as for large serial production. It combines the three technologies of generating grinding, profile grinding, and internal grinding in one machine. Thanks to this technological diversity, Liebherr offers the universal user maximum benefit and a secure investment for the future. The machine can be configured for the individual application so that it can be optimally used for the production of large batch sizes. This can be done, for example, by an external automation system using a plastic chain conveyor or robot system.

The LGG is the most powerful generating gear grinding machine of its class on the market. With the new GH 320 CB gear grinding head, it is now possible to machine workpieces up to module 14 mm to excellent quality in a highly economically way. The extended travel range allow the machining of long shafts and at the same time improve the internal grinding of deep workpieces. The LGG 700 M is a manual gear grinding machine that can generate workpieces up to 500 mm and profile grind workpieces up to 700 mm.

## Highlights

- Generating grinding, profile grinding, and internal grinding in one machine
- Generating grinding workpieces up to module 14 mm
- Topological generating grinding and profile grinding
- Extension of travel ranges for the machining of long shafts and internal grinding

## Grinding internal gears



### More flexibility and new possibilities

The innovative internal grinding technology sets new standards and can be used on all Liebherr LGG gear grinding machines. The internal grinding arms have high system rigidity, which enables them to achieve exceptional grinding performance.

This technology can also be quickly and simply retrofitted on existing installed machines. In addition, internal grinding can also be combined with fully automatic workpiece change, which considerably increases productivity.

This makes the Liebherr LGG one of the most flexible gear grinding machines on the market. Generating grinding, profile grinding, and internal grinding are carried out on the same machine.

With its own tool production, Liebherr offers comprehensive expertise, so that the machine, tool, and process are perfectly coordinated with each other.

Of course, a test machining on your specific workpiece can be arranged. Various internal grinding arms are available for testing in the Liebherr test department at all times.

### Highlights

- Very high grinding performance
- Quick setup time
- Grinding disc change in the machine
- CBN / corundum tools can be used
- Integrated meshing sensor
- Retrofittable

## SECLA – segment clamping arbor



### **Everything from one source with the right clamping technology**

Clamping solutions for gear manufacturing machining are usually very individual and have special requirements regarding concentricity and interfering contours. For this reason, it is particularly important to find the right clamping device for the application. Liebherr therefore provides its customers with a specially developed clamping device within ten weeks.

Using segment clamping technology, reliable and precise clamping of the workpieces from the bore can be achieved. The segment clamping arbors can be used universally. They also offer further advantages compared to standard segment clamping arbors. Conventional systems often reach their limits, for example with small workpieces with interfering contours – for Liebherr's SECLA, this is no problem!

### **SECLA segment clamping arbor in figures**

- Ten sizes for the clamping range from 20 to 200 mm
- Concentricity < 8  $\mu\text{m}$
- At least 250,000 clamping cycles

### **Highlights**

- Fast availability and everything from one source
- Ideal interfering contour with maximum rigidity
- Highest concentricity and axial runout accuracy
- Simple and fast changeover
- Integrated rinsing solution for air and oil to remove chips

# LHStation and LHMobile

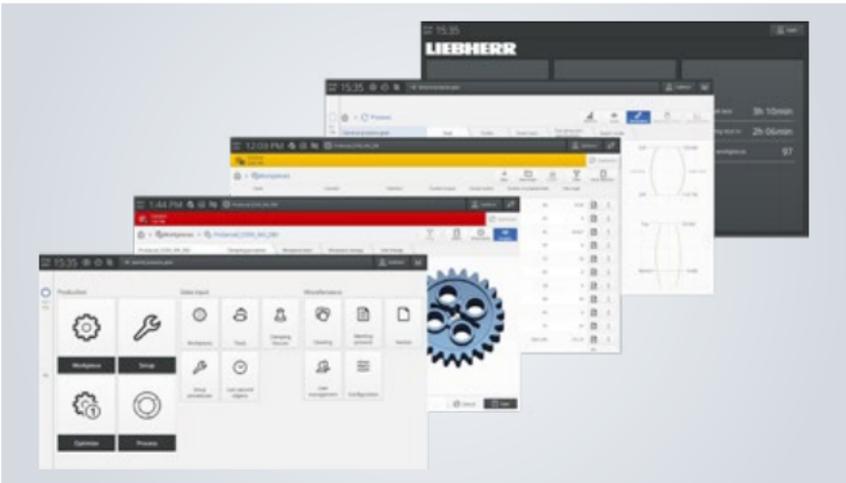


## **The new control panel from Liebherr: User-friendly, customizable and mobile**

The new control panel combines the functions of a classic control station with those of a mobile handheld unit. The virtualized NC/PLC operation contained in the handheld unit guides the user through all entry and monitoring processes in a technology-specific and situation-dependent manner. The result is consistent operation: from programming and setup to production monitoring.

### **Highlights**

- 24" main screen with Multi-Touch
- Eight buttons or key switches, freely configurable to customer requirements
- Two USB connection points for flexible data import/export
- Tactile numeric keypad for fast entry of tool and workpiece data
- Mobile handheld unit as standard
- Context-sensitive views such as PLC/NC keys and program statuses
- Reduced hardware key field (NC start/stop, handwheel, coolant control) for a clear overview
- Wired signal transmission for maximum safety
- Standardized operating mode selector with RFID-based user recognition
- Available as a variant on its own support arm or integrated in the machine enclosure/control cabinet enclosure



## The new programming system from Liebherr: 25% faster set-up time

With the new LHGearTec software, the system constantly guides users when entering workpiece and tool data, as well as during workpiece correction and process monitoring. The user guidance was redefined in intensive cooperation with designers and users. Attention was also paid to the consistent integration of the control system in factory processes with open interfaces for both measurement processes (closed loop) and MES/MDE/PDA interfaces.

### Highlights

- Ergonomically optimized operating areas for tool and workpiece input
- Quick access to the data records last modified
- Import and export of workpiece and tool geometries in Gear Data Exchange (GDE)
- Measured value transfer via GDE communication between gear inspection machine and gear cutting machine
- Improved 3D visualization and process display
- Available for hobbing, grinding, shaping, and skiving machines
- Possibility of integrating Siemens cycles for drilling, hobbing, and turning operations
- "Digital Twin": one-to-one offline version for programming during job preparation
- Support of tool changers
- Available with Siemens 840Dsl and SINUMERIK ONE

# LHWebPlatform



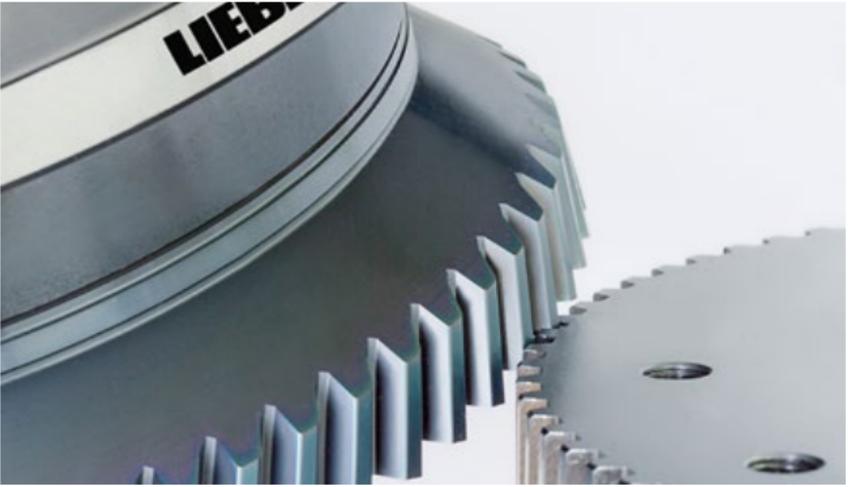
## Tailor-made digitalization solutions with our LHWebPlatform

With the LHWebPlatform, Liebherr offers a platform of web applications and networking possibilities that can be used to easily configure a tailor-made digitalization solution. The spectrum ranges from simple monitoring applications to far-reaching Industry 4.0 scenarios – such as process logging, manufacturing analysis, and production optimization. A wide variety of interfaces and protocols – from fieldbus (Profibus, Profinet) to OPC-UA or umati – enable Liebherr to connect machines to higher-level systems, for example. This gives the customer full control over their manufacturing.

## Highlights

- Live status of machines in the field at a glance
- Real-time recording of changes in production
- Detailed information on each machine on their respective machine dashboards
- Individual selection of relevant data from defined data profiles (Basic, Production, Process)
- Data-based optimization of production
- Possibility to adapt signals with the integrated logic editor
- Wide selection of interfaces and protocols available: OPC UA, MT Connect, MQTT or umati

## Gear cutting tools



### **Holistic technological competence with Skiving<sup>3</sup>**

The success of gear skiving lies in the significantly higher efficiency and productivity of this process compared with shaping and the considerably higher flexibility and lower investment compared with broaching. Liebherr knows the entire process of gear skiving profoundly. We have combined all of our expertise concerning tool design, machines, and technology of gear skiving in the Skiving<sup>3</sup> technology package. Very high accuracy in tool production, coupled with optimal tool design, guarantees an excellent gear quality and long tool life. Liebherr guarantees the reliability of its manufacturing process at the highest quality level. The gear skiving tools are available in tapered and cylindrical form and can be optionally manufactured from powder-metallurgical high-speed steel (PM-HSS) or full carbide. The combination of axial crossing angle, cutting speed, feeding, and other kinematic parameters make the method very flexible: Particularly for internal gears in medium batch sizes and external gears with an interfering contour, gear skiving is an additional “ace up your sleeve” in the gear cutting range.

### **Highlights**

- Optimal tool design
- Best quality: High level of accuracy and long tool life
- Short delivery times and process support

## WGT 600 gear inspection machine



### **Are you looking for a solution to ensure quality and increase productivity in gear manufacturing?**

The four-axis measuring instruments of the WGT series have high-precision mechanics and electronics, which are controlled by smart and user-friendly software. They meet all accuracy requirements regarding gear measurement and comply with VDI guideline VDI/VDE 2613, group 1. In addition to the gear inspection machine options available as standard, customer-specific solutions are also available, such as adjusting the travel range on the Z-axis, longer tailstocks to accommodate long shafts, and rotary tables adapted to the payload. An automatic sensor changing system ensures uninterrupted measurement of the workpieces and also offers the highest levels of convenience for the user. The extensive software features make the machines suitable for measuring all types of gears, such as spur gears, bevel gears, worms, worm gears, shafts, gear cutting tools, and other rotationally symmetrical parts.

### **Highlights**

- Highest precision provided by granite guides and air cushioning
- Low operating costs due to contactless guides and reliable probes as well as inexpensive spare parts
- Flexible for all types of gears
- User-friendly interface and ergonomic design
- Manufacturer-neutral GDE interface for data transmission to production machines

## PHS Allround pallet handling system



### **Automation system for machine tools from batch size 1**

The Liebherr PHS Allround pallet handling system typically interlinks up to four machines and increases productivity – just like all Liebherr pallet handling systems.

The modular system can be individually configured and expanded at any time if required. The possibility of the frontal arrangement of machines, additional units, and shelves offers maximum flexibility in the system design.

Innovative options such as the double loader and front access set new standards in this product segment. The front access allows individual machines to be decoupled from the system, while the remaining machines continue to produce without restriction in Automatic Mode.

The double loader reduces the time needed for a workpiece change and thus maximizes its productivity – or it increases its flexibility by using different pick-up forks for different pallet sizes.

### **Highlights**

- Double loaders as a more cost-effective alternative to machine trains with pallet changers
- Integration of different machine sizes in one system
- New size for pallets up to max. 800 kg: very narrow telescopic unit enables loading of small machines
- Can be combined with additional technologies such as automated setup and tool handling systems for even more productivity

## Bin picking solutions with LHRobotics.Vision



### From the technology package to the turnkey robot cell

Liebherr supplies automation systems for automated raw parts input and finished parts removal in production facilities and possesses extensive system and software competence for position and object recognition with 2D and 3D camera systems.

With the LHRobotics.Vision technology package, Liebherr is making this industrial application expertise available to a broad range of users of robot integrations, to withdraw unsorted components from deep bins with process reliability. As a manufacturer of bin picking robot cells, Liebherr knows the challenges of the application and, with the aid of artificial intelligence has simplified the software so much that it can be intuitively used by anyone.

The technology packages consist of a projector-based stereo-vision camera system and the LHRobotics.Vision software for object identification and selection, collision-free withdrawal of parts, and robot path planning up to the depositing point.

A special feature is the optional simulation tool LHRobotics.Vision Sim. This enables the user to test and optimize the processes in a completely virtual manner, without expensive hardware investment.

### Highlights

- LHRobotics.Vision - software for object identification and collision-free withdrawal of parts
- LHRobotics.Vision Sim - virtual simulation of bin picking
- Available as a software package or turnkey robot cell





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