

Gear technology, measuring technology and automation systems

# Highlights 2020 / 2021



# LIEBHERR

# Generating gear grinding machine

## LGG 300/380/500/700 M



**Generating grinding, profile grinding, and internal grinding in one machine** – flexibility is of enormous importance for job shops and individual part manufacturing. The new LGG series has been specially designed for a wide range of uses, 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 an excellent quality in a highly economically way. The extended travel ranges 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 machining long shafts and for internal grinding

# LK 180/280 DC gear skiving machine



## Skiving<sup>3</sup>: machine – tool – process

The new generation of gear skiving machines features an integrated tool changer with 12 storage locations. This enables additional SkivingPlus functions such as turning, drilling and gear cutting. This significantly increases the system's added value. Short set-up times are ensured by the integrated tool measuring device for skiving wheels. The unique LK 180/280 gear skiving machine combines maximum productivity with high flexibility. The skiving<sup>3</sup> concept includes the machine, the technology and the optimally designed tools. This ensures the best solution for each process.

## Highlights

- Newly designed gear skiving machine
  - Compact footprint
  - Short machining times
  - Integrated automation system
  - High-performance spindle with internal cooling lubricant return
- Integrated tool changer
  - Roughing and finishing tools
  - For additional functions such as turning, drilling, gear cutting and measuring
  - Cluster machining with several tools
- Integrated additional machining station
  - Skiving and chamfering in one machine
  - Chamfering during the machining process
  - Burr-free workpieces

# LHStation and LHMobile

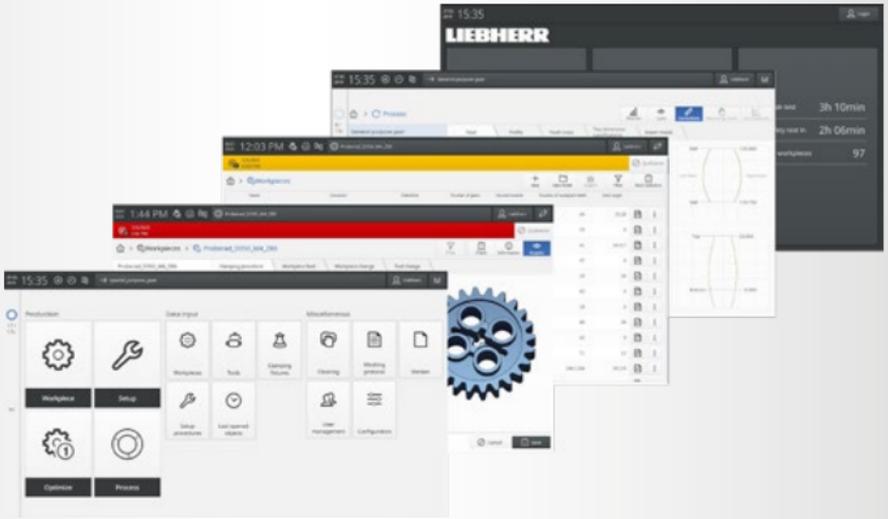


## **The new control panel from Liebherr: User-friendly, customizable and mobile**

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 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

# 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 suitable clamping device for the respective 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

- 10 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

# WGT 400 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 standard gear inspection machine options, customer-specific solutions are also available, such as extending the travel range on the Z-axis, longer tailstocks to accommodate long shafts, and rotary tables adapted to the payload. An automatic probe 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 bearings
- Low operating costs due to contactless guides and reliable probe heads 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

## Gear cutting tools



### **Internal grinding with multi-grooved CBN wheels**

Liebherr's extensive portfolio of high-quality gear cutting and stock tools includes single, double and triple-ribbed CBN profile grinding discs for gear cutting to the highest quality. Thanks to the different grit sizes in the individual ribs of the multi-grooved discs, roughing and finishing are carried out in one process. The grinding time can thus be significantly reduced while maintaining the same surface quality.

CBN tools can be manufactured in very small diameters, making them particularly suitable for internal grinding. In comparison, corundum tools reach their geometric process limits much faster.

Grinding with electro-plated CBN profile grinding discs also eliminates the need for time-consuming dressing. The discs also have a longer tool life. This is where high process stability meets a high rate of metal removal.

Liebherr offers the right grinding material for every application. The technology is particularly relevant for the aviation industry, where are the highest quality requirements. There is also great potential for the automotive sector and industrial gear applications.

### **Highlights**

- Highest efficiency: roughing and finishing in one step
- Geometric possibilities: smallest diameters achievable
- Best quality: process reliability and individually available

# PHS Allround pallet handling system



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

The PHS Allround pallet handling system enables all users to start working in the field of automated manufacturing with machining centers.

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.

The detachable front access allows individual machines to be decoupled from the system, while the remaining machines continue to produce without restriction in Automatic Mode.

The optionally available double loader eliminates unnecessary downtime: The finished pallet is removed and a new one inserted in a single machining step. The pallet changer is therefore much faster than a single loader. Additional cost savings can be realized as the CNC machine pallet changer is no longer required. The double loader is also suitable for handling two different pallet sizes, which means that different machine sizes can be connected in one system.

## **Highlights**

- Double loaders as a more cost-effective and flexible 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



## Virtual simulation of random bin picking

With the LHRobotics.Vision technology package, Liebherr offers a proven solution for the process-reliable removal of unsorted components from deep bins. The holistic approach bundles all tasks in a single software package – from blank recognition, gripping the workpieces, collision-free withdrawal of parts and transportation to the transfer point on the machine tool.

With the new LHRobotics.Vision Sim simulation app, Liebherr offers a way to virtually simulate bin filling and point cloud generation. A wide variety of gripper designs can be tested and their performance proven without hardware investments and tests on real production. This feature closes a gap in the offline programming of the robot, because the entire process, including bin picking, can now be mapped virtually.

What is also new is that the software can be integrated in systems from other manufacturers. This makes it particularly interesting for system integrators. They have a fully developed product and can also draw on Liebherr's system expertise.

## Highlights

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

# E-mobility / battery production



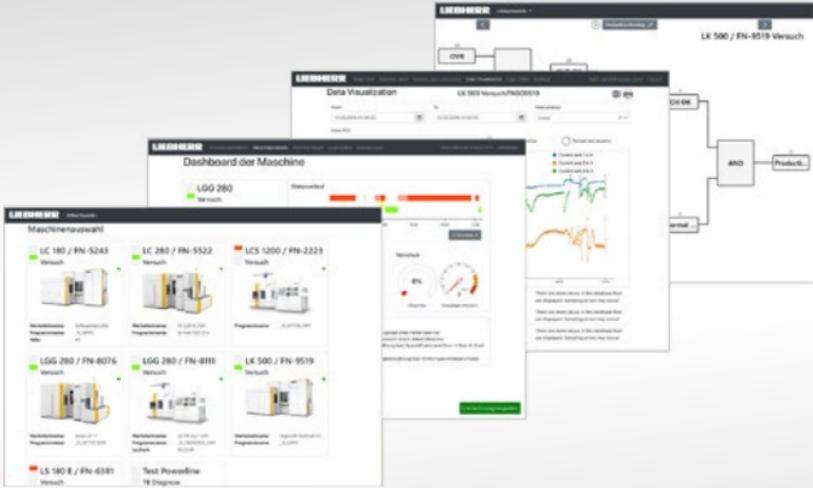
## **Modular solutions for the automated battery pack assembly**

Liebherr designs and builds tailor-made, turnkey battery pack assembly lines from small batch production to mass production. Liebherr draws on decades of experience in automating large batch production in the automotive industry. As a specialist in heavy-duty automation, the Liebherr modular product system is ideally suited for battery pack assembly. Conveyor belt systems and handling systems, linear gantries, industrial robotics, storage solutions, intralogistics concepts and process stations can be individually combined to form a complete system. The holistic approach also considers interface standardization and interface integration of process partners, parallel processes, reproducibility, emergency strategies, parts availability and parts traceability.

As a solution provider, Liebherr delivers comprehensive project management to go along with our highly reliable, efficient and robust automation solutions.

## **Highlights**

- Turnkey solutions from small batch production to mass production for battery pack assembly
- Decades of experience in the system design of large serial production systems
- Worldwide locations for a fast service response time
- High availability of battery production equipment



## Tailor-made digitalization solutions with our LHWebPlatform

Digitalize your manufacturing with the Liebherr LHWebPlatform, which offers a platform of web applications and networking methods that can be used to easily configure a tailor-made solution. The spectrum ranges from simple monitoring applications to far-reaching industrial 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

# Notes

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# Notes

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# Your solution provider



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