Gear technology, measuring technology and automation systems

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

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Automationssysteme
Hall 13, Booth B65

Verzahntechnik
Hall 26, Booth A90

Verzahnwerkzeuge
Hall 4, Booth E81
Economical series production of worms

The LC 80 WD worm milling machine is specially designed for the efficient and economical series production of worms. Due to the high machine rigidity and fast automation, the newly developed machine is perfectly suited for the series production of automotive steering worms and for a variety of industrial worm applications. Excellent workpiece quality combined with above-average tool life have been demonstrated in the extensive testing phase. This unique concept is equipped with an additional station where chamfering or brushing can be carried out during the machining process.

The machine concept is based on gear hobbing machine components, which are characterised by high precision and exceptional longevity. The internal ringloader allows workpieces to be loaded and unloaded very quickly, ensuring high productivity.

Highlights

- Machine design with optimised static and dynamic rigidity
- High process capability (SPC)
- Ringloader concept for fast loading and unloading
  - Optimised worm milling head
  - Robust tool holding
- Long tool life
- Integrated additional machining station
  - Chamfering or brushing during the machining process
  - Burr-free workpieces
Skiving⁳: machine – tool – process

The new generation of gear skiving machines features a machine-integrated tool changer with up to 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 skiving³ 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 installation area
- Short machining times
- Integrated automation system
- High-performance spindle with internal cooling lubricant return
- Tool changer integrated in the machine
- Roughing and finishing tools
- Additional functions such as turning, drilling, hobbing and measuring
- Cluster machining with several tools, for example
- Integrated additional machining station
- Skiving and chamfering in one machine
- Chamfering during the machining process
- Burr-free workpieces

LK 180/280 DC gear skiving machine
The fully electronic shaping head

The new LS 180 E gear shaping machine with an electronic shaping head stands out due to its enormous flexibility, as it can machine straight and angled gears in one clamping fixture and can therefore shape several gears on one workpiece.

The simple control system of the flank line modification makes it possible to produce different crowning amounts, making the machine valuable for both the supply industry and for prototype development.

With its small installation area and a maximum stroke speed of 1,500 double strokes, the machine is not only very productive, but can also be easily integrated into existing production systems.

Highlights

- The time-consuming changing of helical guides is no longer necessary
- Protracted procurement of new helical guides is no longer necessary
- The set-up procedure during a workpiece change is reduced to a minimum
- Gear shaping of several gears with different helix angles in one clamping fixture is possible
Topological CBN generating grinding as an economical alternative

Topological generating grinding of complex component geometries generally leads to a reduction in the dressing interval when corundum tools are used. This increases the proportionate dressing time per workpiece with effects on machine productivity.

Liebherr therefore offers topological generating grinding with electroplated CBN tools as an alternative for the LGG series. The dressing-free grinding tools combine high tool quality, simple handling and very long tool life. The low measuring complexity reduces indirect production costs and opens up the possibility of multiple machine operation. The integrated centrifugal station removes chips and coolant from the ground component so that there is no unwanted oil loss in the machine environment.

Highlights

- High component quality and very high statistical process control (1-table concept)
- Fast set-up and short non-productive times
- Technological flexibility for internal and external gears
- Dressing-free tool
- Significantly reduced measuring and testing effort
- Clean, drip-free workpieces; no oil loss
- Minimum set-up concept
- Statistical process control/NOK withdrawal of parts at the centrifugal station
- Closed loop solution between the WGT 280 gear inspection machine and LGG 280 generating gear grinding machine
The WGT series
The 4-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 wheel manufacturing and comply with VDI guideline VDI/VDE 2613, group 1. In addition to the gear measuring 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 probe changing system ensures uninterrupted measurement of the workpieces and also offers the highest levels of convenience for the operator. 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

WGT 280 gear measuring machine
The new control panel from Liebherr: 
User-friendly, customisable and mobile

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

Highlights

- 24” main screen with Multi-Touch
- Eight buttons or key switches, freely configurable to customer requirements
- Two USB ports for flexible data import/export
- Tactile numeric keypad for fast input 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
- Standardised mode selector with RFID-based user recognition
- Available as a variant on its own support arm or integrated in the machine/control cabinet housing
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.

There are numerous other highlights in conjunction with the new control system generation from Siemens and the new control panel:

- Quick access to the data records last modified
- Ergonomically optimised operating areas for tool and workpiece input
- Import and export of workpiece and tool geometries in Gear-Da-
ta-Exchange (GDE)
- Measured value transfer via GDE communication between gear inspection machine and gear cutting machine
- Improved 3D visualisation 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
- Support of the new SINUMERIK ONE control platform
Digitise your production
The Liebherr LHWebPlatform offers a platform of data profiles and web apps which 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 optimisation. 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 transmission of changes in production
- Detailed information on each machine on the respective machine dashboard
- Individual selection of relevant data from the defined data profile (Basic, Production, Process)
- Visualisation of the data from the respective data profile
- Data-based optimisation of production
- Individual definition of signals via an intuitive logic editor and storage in the reserved area
- Flexible determination of colour significance for signal lamps
- Wide selection of interfaces and protocols available: OPC-UA, MT Connect, MQTT or umati
New material and coating for gear cutting tools

Gear cutting machines are getting faster and faster. Cutting speeds are getting higher and higher. The machined materials are getting tougher and tougher. And the tool has to keep up.

In order to exploit the full potential of new and highly-efficient machines, the tool must also perform to ever higher levels. This is why Liebherr has set the material ASP 2052 with Alcrona Pro coating as the new standard for its stock tools. This guarantees that the tools can machine any material.

Highlights
Increased tool life
Higher workpiece gear quality
Higher performance

Liebherr also keeps its high-quality shaper cutters in stock. Whether as bore, shank or bell-type shaper cutters, tools in stock can be delivered within a very short time. New shaper cutters can easily be ordered as pre-cutting or finishing shaper cutters via the stock tool catalogue.
50% shorter changeover times due to double loader

The PHS Allround pallet handling system enables all users to start working in the field of automated production with machining centres. The modular system can be individually configured and expanded at any time. The possibility of placing machines, additional devices and shelves at the front extends the flexibility of 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 twin loader reduces the number of movements of the lift module and thus the spindle downtimes of the machine tools connected in the system. There are significant advantages, especially for directly loaded machines. The system also offers an alternative to machines with pallet changers. Another twin loader application is the combination of two different pallet and machine sizes in one system. This increases the flexibility of the system design.

Highlights

- Modular concept, individually configurable and expandable
- Decoupling of individual machines from automatic mode
- Optional twin loader for quick pallet change or connection of machines with two different pallet sizes
- Also suitable for existing halls with low ceiling heights thanks to the low overall height
- Intelligent cell control with freely configurable supplementary apps
Continuous machine loading using basket logistics

With the new robot-based LPC palletising cell, Liebherr offers a universally applicable automation solution for machine tools in the areas of turning, hobbing and grinding of gear components with basket stack logistics.

A 6-axis articulated-arm robot is used for loading and unloading the machines. Furthermore, the robot performs additional customer-specific tasks such as measuring, deburring or cleaning.

The workpieces are provided, stored and transported in stacked wire mesh bins or plastic blister packaging on mobile transport dollies. This makes it easy to network several machines flexibly to form a single manufacturing system.

The advantages of the high autonomy in the parts supply combined with the protection of the workpieces in the bin are decisive for achieving the highest quality and productivity at the lowest unit costs in the manufacturing system.

Highlights

• Integration of additional customer-specific operations possible, e.g. measuring, deburring, cleaning
• Unloading of NOK and statistical process control workpieces
• Perfect accessibility for maintenance or set-up work
• Double gripper system for fast workpiece change at the transfer position
From chaos to order with a system
With the new LBP3 bin picking software, Liebherr is setting new standards for the reliable removal of bulk material from deep mesh boxes. The holistic approach bundles all tasks in a single software package – from blank recognition, gripping the workpieces, collision-free withdrawal of parts and collision-free transport to the transfer point at the machine tool. Modern, graphically supported user interfaces enable intuitive parameterisation of the application; robot programming knowledge is not required. Almost all manufacturer-independent 3D vision systems available on the market can be integrated. Since component recognition is not based on reflections or edges, but on real 3D models of the workpieces, maximum component flexibility and precision during the withdrawal of parts are guaranteed. As a system supplier, Liebherr supplies the manufacturing cell with robot, including additional 7/8 axis, gripper, vision system and software as a turnkey solution.

Highlights
• 3D vision systems for any application: quick, precise and durable
• LBP3 – bin picking software developed in-house for object identification and collision-free withdrawal of parts
• Highest degree of emptying due to patented 7/8 auxiliary axles
Connecting production flexibly
With the AGV intra logistics concept, Liebherr offers innovative manufacturing systems that can be flexibly adapted to changing requirements with regard to production capacity and sequence. The focus here is on the continuous supply of parts to the individual manufacturing facilities. The traditionally directed material flow is replaced by automated guided vehicle systems with freely configurable route planning. This opens up completely new possibilities for networking machines and systems. The Liebherr AGV manufacturing systems range of services includes project planning, simulation of processes, integration of own or provided AGV vehicles, interface coordination with existing production facilities, as well as connection to master computers and production planning systems – turnkey, in quality and time. At EMO 2019, visitors can experience automated line input and output with automated guided vehicle systems using the example of turned parts for gear manufacturing with LRC 20 bin picking and the LPC 3600 palletising cell.

Highlights
- Integration and connection of automated guided vehicle systems to production facilities and control systems for continuous parts supply and intra logistics tasks
- Easy adaptation to changed requirements in production capacity and sequence
- High availability and reliability through organised and system-controlled material flow
- Avoidance of transport damage
Added value for customers over the entire life cycle
Customer orientation and service are the top priorities of the Liebherr Group. This area will therefore be expanded and developed in a targeted manner. At EMO 2019 in Hanover, global customer service will be in the spotlight for the first time. The focus here is always on the customer and their requirements. With a broad standard portfolio of services and customer service products, Liebherr creates added value for its customers over the entire life cycle. We offer consulting and services from the planning stage, commissioning and production at the customer’s site, right through to the end of the life cycle or a second life cycle. Our goal is to support our customers in all challenges, to find the best possible solution and to implement it together.

Highlights
- Project management and commissioning
- Preventive maintenance and inspection
- Spare parts service
- Remote service, hotline and technical advice
- Process optimisation
- REMAN
- Digital Services

“Customer service means customer satisfaction.”
Overhaul according to Liebherr quality
As part of the REMAN programme, customers can have their machines overhauled, have individual components repaired or can opt for a second-hand machine that is as good as new and meets the latest technical standards.

During the general overhaul, which is offered for grinding, hobbing and shaping technologies, the machines are returned to their original technical condition and are given a new guarantee.

The qualified and experienced employees of the REMAN division are indispensable. They have worked on the construction of the machines for many years and are also familiar with older control systems, for example.