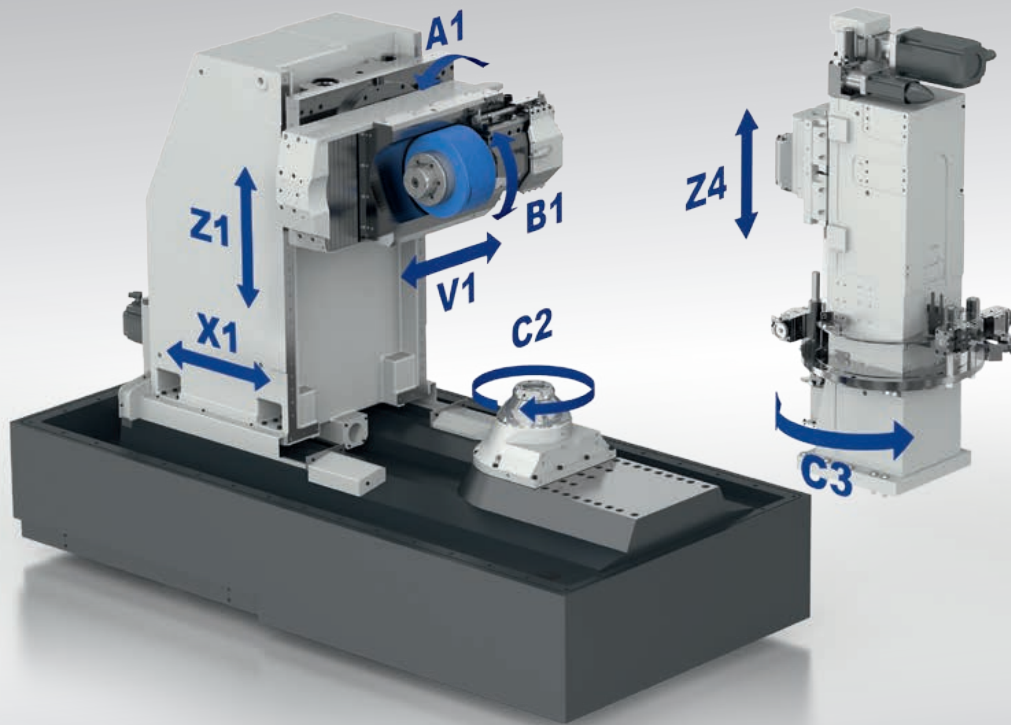


# Generating- and profile-grinding machines LGG 180 / 280



**LIEBHERR**

# The Machine Concept



## Machine Concept

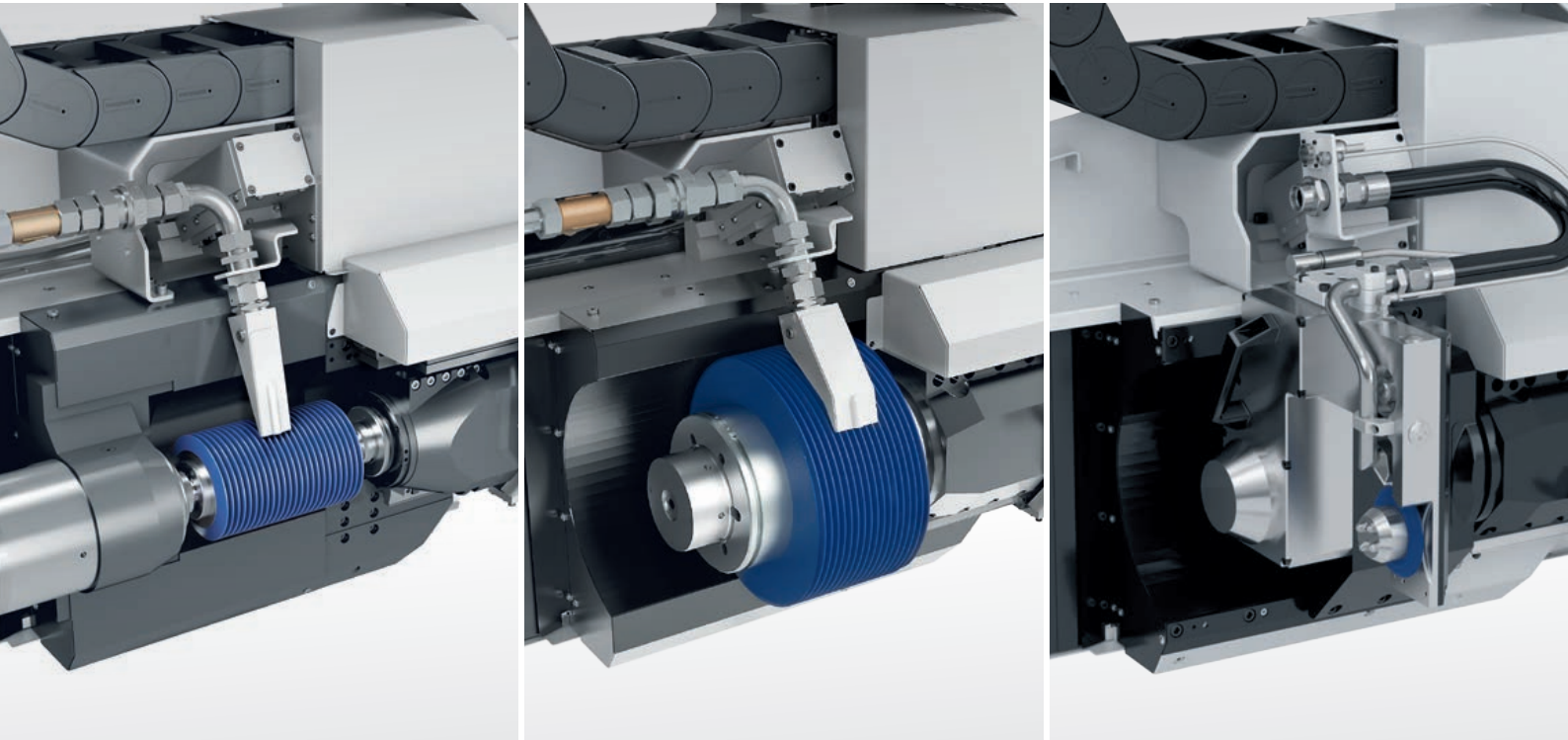
The new generating and profile grinding machine LGG 180/280 is suitable for the processing all gears up to 180/280 mm diameter. In addition, workpieces can be machined to 650 mm length. For special customer needs various machining variants are available. The generating and profile grinding machine combines short grinding times with consistently high quality in high-volume operations.

- Higher quality and reliability across the entire lot size
- Single-table solution
  - One clamping fixture, one geometry
  - For all gears up to 180/280 mm
  - Shaft length 500 mm (650 mm as L-version)
  - Planet and sun gears, ring gears and input and output shafts
- Machine bed made of thermally stable material
- Fast loading thanks to integrated ring loader
- Chip-to-chip times
  - Gears: 4 seconds
  - Shafts: 6,5 seconds
- Small amount of space needed

## Axes

- X1 - Radial movement of spindle slide
- V1 - Tangential movement of tool
- Z1 - Axial travel of grinding head
- B1 - Rotary movement of tool
- C2 - Rotary movement of workpiece
- A1 - Swivel motion of tool
- Z4 - Vertical movement of steady column
- C3 - Rotary movement of ring loader

# External and internal grinding heads



The LGG machines are suitable for hob grinding and profile grinding. As standard, the machines are equipped with an external grinding head and can be supplemented with an internal grinding head.

Process-optimised external and internal grinding heads are available for the LGG. In both external grinding heads, internal spindle balancing systems are employed. High drive power and speeds are great benefits, e.g. when used with new grinding material. Simple and fast replacement of the grinding pin is made possible by means of modern tool clamping. For collision-critical workpieces and for special tooth corrections, small grinding tool diameters are available.

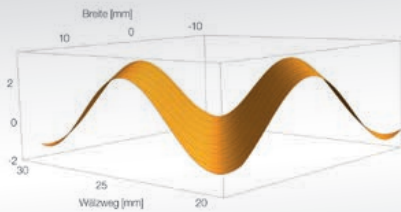
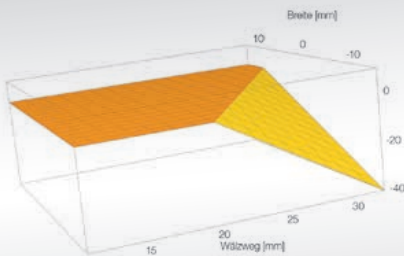
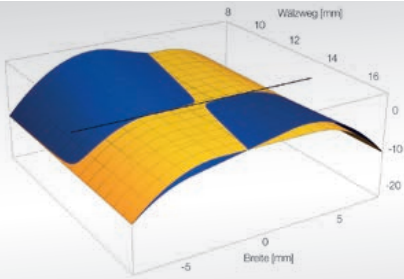
The adaptable internal grinding heads can be mounted quickly and easily on the external grinding head and are driven via the main drive. Other external and internal grinding heads can be realised on request.

Grinding heads		GH 4.0	GH 5.0
Speed	rpm	10,000	12,000
Grinding spindle drive power	kW	35	28.5
Max. grindable module hob grinding	mm	6	5
Max. grindable module profile grinding	mm	12	10
Galvanically coated CBN tools		yes	yes
Dimensions of worm grinding wheel (DxLxW)	mm	275(320)x160x160	220(240)x200x76.2
Workpiece diameter	mm	max. 280(400*)	max. 280(400*)

Internal grinding heads		IG Opal 4.0	IG Opal 4.1 / 4.11
Speed	rpm	12,000	max 7,500
Max. module	mm	3	5
Galvanically coated CBN tools		yes	yes
Dimensions of disc grinding wheel (DxLxW)	mm	100x12x36	125x16x50.8
Plunge depth	mm	142	132/195

\* LGG 400 M: Manual loading

# Prepared for the future



## Deviation-free topological grinding<sup>1</sup>

- Deviation free and twist-free grinding<sup>2</sup>

## New technological possibilities<sup>1</sup>

- Superimposition of rolled end relief (GER: Generated End Relief)<sup>2</sup> with conventional topological corrections
- Constant profile crowning across whole effective tool area
- Excitation-optimised edge corrections, NEO (Noise Excitation Optimized)<sup>2</sup>
  - Free specification of amplitude, wavelength, phase and orientation
  - Superimposition of corrugation with conventional topological corrections
- Asymmetric gearing
- Beveloids

<sup>1</sup> Standard planer can be used, no linear planing necessary

<sup>2</sup> Planing and grinding time in-line with torsion-free hob grinding

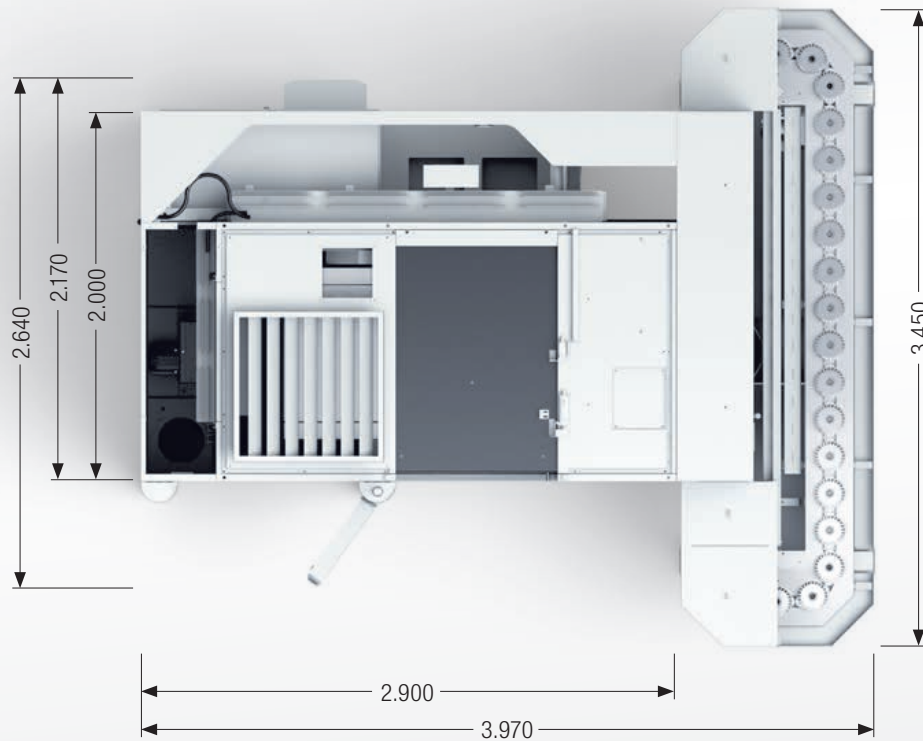
## Polishing

- Multi-part tool concept for fast grinding times and highest level of surface quality
- Simple planing concept for individual worm wheel areas
- High process reliability for  $R_z < 1.0 \mu\text{m}$  and  $R_a < 0.2 \mu\text{m}$

## Gear on-Bord Inspection

- Profile and edge line
- Concentricity, single and accumulative
- Interlink measurement
- Grinding measurement system
- Rolling measurement
- Dimension measurement

# Technical Data



LGG 180/280 with Plastic Chain Conveyor (KKB)

		<b>LGG 180/280</b>	<b>LGG 180 L/LGG 280 L</b>	<b>LGG 400 M</b>
Max. workpiece diameter hob grinding/profile grinding	mm	180/280	180/280	280/400
Max. workpiece speed	min <sup>-1</sup>	3,000	3,000	3,000
Max. axial travel	mm	660	1.000	660
Min. pos. over table	mm	90	90	90
Grinding head tilt angle	Grad	± 45°	± 45°	± 45°
Weight of machine with counterstand	ca. t	13	14	13
Total connected load	ca. kVA	32	32	32
Machine dimensions without automation	LxBxH	2.9x2.0x2.9	2.9x2.6x3.4	2.9x2.0x2.9
Shaft length	mm	500	650	500

LGG 400 M: Manuelle Beladung

# Additional features

## Software/control technology

The new, user-friendly LHGe@rTec® interface makes it much easier to operate the gear cutting machine and has many advantages for the operator:

- Individual configuration
- Intuitive operation
- User guidance for process and change-over procedures
- Mathematical analysis
- Touch screen
- Graphical input support
- Incorporation of additional documentation (e.g. fixture layout, hob tool/arbor assembly, etc.)
- Integrated webcam
- Siemens 840 D Solutionline

The Collision Control software package is available to minimise damage in the event of unexpected impact between tool and clamping fixture or spindle and machine table.



## Energy and resource efficiency

Liebherr has analysed the energy usage of its gear cutting machines in extensive tests. An important conclusion is that every 100 watts saved reduces the environmental impact, and justifies evaluation!

- Regenerative drive technology
- Use of efficient control cabinet chillers
- LED lighting
- Coolant supply and treatment with speed-controlled pumps

Also available:

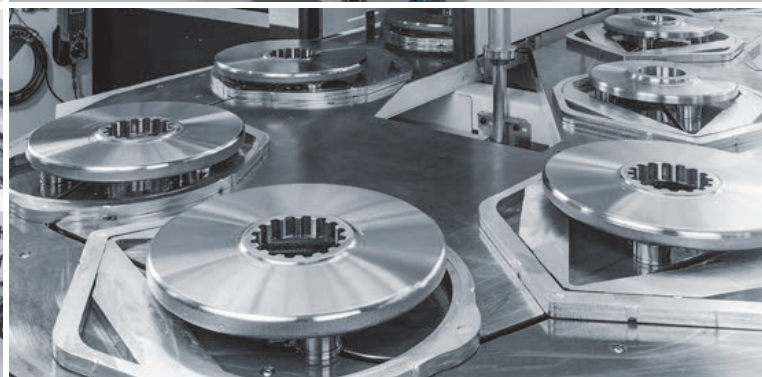
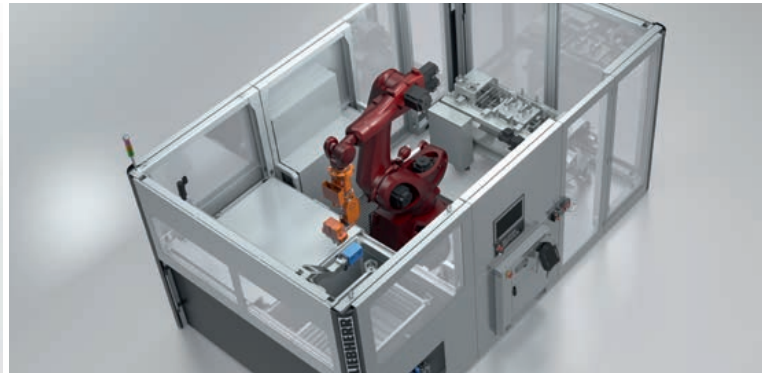
- Pneumatic-free automation (conveyor with metering unit)
- Monitoring of air consumption with leakage monitoring
- Reduced oil loss
- Workpiece spinning station and chip centrifuge
- Water/air heat exchanger with regulated fan (energy and noise)
- Incremental shutdown of auxiliary drives when inactive

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Partner of the Engineering Industry Sustainability Initiative

# External Automation Possibilities



## **Palletizing Cell (LPC)**

Standardized transport containers with basket technology facilitate a uniform approach to logistics, as well as flexible future-oriented production.

## **Plastic Chain Conveyor (KKB)**

The plastic chain conveyor is available in the standard version for workpieces up to 20 kg in weight and in the heavy duty version for workpieces up to 180 kg in weight, and is designed to transport any number of irregularly shaped workpieces without them coming into contact with each other.

## **Robot Cell (LRC)**

Hook-ready robot solution in modular design replaces complex sorting systems, increases productivity, and alleviates burden on personnel.

## **Drag Frame Conveyor (SRB)**

Drag frame conveyors serve to transport parts with a flat surface, e.g. bore-type gears, hubs or rings. The workpieces are dragged by a frame that is connected to a chain.

## **Hinged Chain Conveyor (SKB)**

With the aid of hinged chain conveyors, it is possible to transport workpieces with a flat surface, e.g. bore-type gears. Depending on the scenario, multi-track versions are also possible.

# Machine Tools and Automation Systems from Liebherr

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.

With over sixty years of industrial experience, Liebherr is one of the world's leading manufacturers of CNC gear cutting machines, gear cutting tools and automation systems. The company's innovative products are the result of pioneering ideas, highly qualified staff and state-of-the-art manufacturing systems at each of their locations. They are characterised by economy, ease of use, quality and reliability in combination with a high degree of flexibility.



## System Solutions in the Area of Machine Tools

Included in the production programme are gear hobbing machines, gear shaping machines and generating- and profile grinding-machines, all noted for their high degree of stability and availability. 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 and 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 shaping 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 robots, pallet-handling systems, conveying systems and robot integration for projects in all areas of production and can provide above-average availability of systems.

[www.liebherr.com](http://www.liebherr.com)

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