
Precise and productive.

Gear tools

LIEBHERR

Liebherr-Verzahntechnik GmbH



Gear tool product range

Liebherr offers a comprehensive range of gear tools, many years of experience in gear manufacturing and maximum product quality. We are a reliable partner offering innovative development and best tool performance.

Our product range is in demand by customers all over the world. Liebherr offers not only tool calculations, design and manufacture for all customers but also outstanding after-sales services, including sharpening and coating of gear tools and also reconditioning of CBN grinding tools in our in-house electroplating shop.

Tools

- Skiving Tools
- Shaping Cutters
- Wafer Cutters
- Solid Wafer Cutters
- Rolling Racks
- Shaving Cutters
- Rolling Deburring Discs
- Rolling Chamfering Discs
- Rolling Dies
- Master Gears
- CBN Grinding Tools
- Customised Grinding Tools

Services

- Sharpening and coating (also hobbing tools)
- Reconditioning of CBN grinding tools
- Profile modifications for shaper cutters
- Component and contract manufacture





Skiving tools

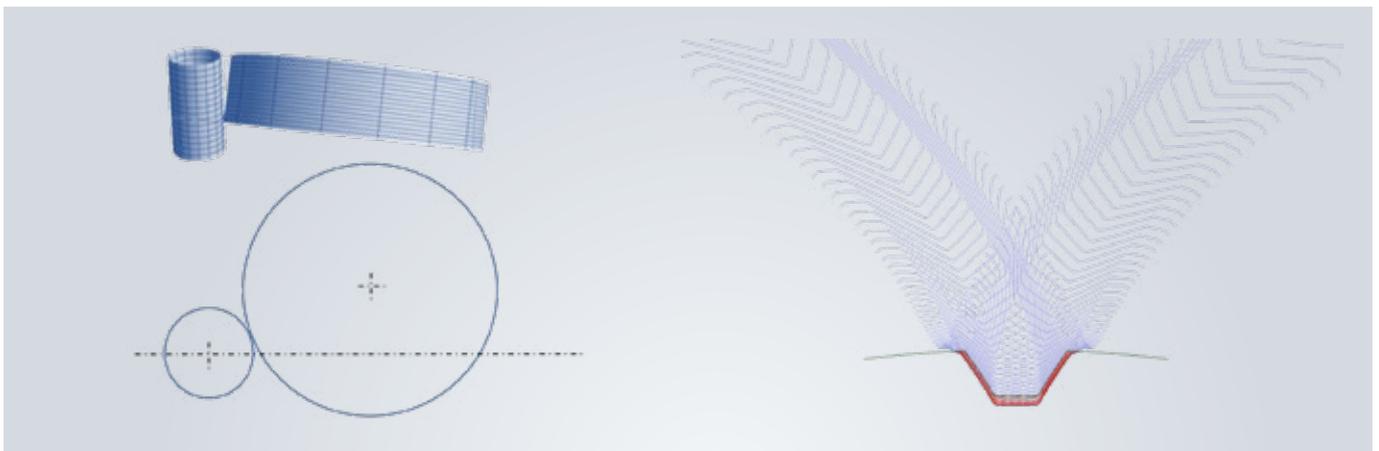


PM-HSS and carbide metal skiving tools

1. Tools made from powder-metallurgical steels (PM-HSS) have a lower invest, but are subject to increased wear.
2. Tools made from carbide metal have higher production and material cost due to more expensive raw materials and manufacturing. It is worth while to use them with high production output and higher-strength materials.

Conical and cylindrical tools

With conical and cylindrical tools, the axis arrangement is different: A conical skiving tool maintains a constructive re-lief angle and is usually centered, while a cylindrical skiving tool requires additional tilting or an off-centered position. The control system of the Liebherr machines controls both pro-cess variations.





Interaction of tool, technology and machine: Skiving³

Field tests have clearly shown that the mathematical mastery of the process and the coordination thereof to tool and machine is the key to success. With our experience in gear manufacturing, best results are possible. This was proven during customer trials.

Optimal tool design

- Technologically ideal design for each gear
- Profile calculation taking into account the crossed-axis angle and offset cutting face
- Observation of collision avoidance – especially for internal gears
- Optimal cutting and relief angles for the entire



Advantages

- Two to five times faster than gear shaping
- One to two quality grades better than gear shaping
- Excellent single indexing quality at the workpiece
- Tool life similar to gear shaping
- Available tool designs: conical and cylindrical
- Process-optimized tool design
- Tools available in PM-HSS and carbide (also with indexable inserts)
- Dry skiving possible
- Pressure angle and lead modification possible

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Video:
LK 300/500
<https://go.liebherr.com/j636wC>

Shaping cutters



We can look back on 50 years of experience in the design, development and manufacturing of gear tools at our plants in Ettlingen and Turin. Through this continuity and ongoing development, our customers have access to the extensive technical knowledge of our specialists. In particular, this also includes developing solutions and special designs for all types of gears that can be manufactured by shaping processes in involute or non-involute profiles.

Shaping cutters are available as disc, hub, shank and internal toothed hub types. PM materials and in special cases high-quality hard metals are used.

Shape, designs and coatings are adapted and customised in accordance with the gearing requirements. (look at page 13)

Various hub, disc and shank type cutters are available from our stock for different modules and pressure angles. They can be delivered at short notice for standardised reference profiles such as DIN 3972, DIN 5480, DIN 5482 and DIN 8197.

If required, semi-finished disc type shaping cutters are available, from which we can manufacture express shaping cutters for special gearing tasks at very short notice. The express shaping cutters can generally be delivered within 10 business days.

Wafer cutters



The wafer cutter is a coated one way tool, which represents the optimum tool status – comparable to a spur toothed shaping cutter. The thin, coated wafer disc is clamped in a special wafer holder and mounted on the shaping cutter holder of the shaping machine like a shaping cutter.

Advantages

- Maximum process reliability
- Economical in mass production
- No changes in the gear profile as a result of wear
- Very easy machine adjustment (reduced setup time)
- Fully coated tools always in use
- Machine adjustment after wafer change not required during one series of workpieces

Solid wafer cutters



Solid wafer cutters are used when a constant gear workpiece profile is required and thereby reducing the usable tool height. Solid wafer cutters are available for any kind of spur or helical toothed gears with an optimum coating for each application. The solid wafer cutter has the same advantages as the wafer even when used with smaller batch sizes.

In special cases solid wafer cutters can also be manufactured with different toothed sectors for up- and/or down-stroke shaping processes.



Rolling racks



Rolling racks are manufactured for special customer requirements and are generally used for the manufacture of splines.

Rolling racks are available up to the following maximum values

- Module 1,6
- Length 1.500 mm
- Width 350 mm
- Height 90 mm

Shaving cutters



Shaving cutters are available for all standard gear-shaving processes in hobbed, preground or fully ground quality.

The following types and limit ranges are available

- Module 0.5 to 12.7
- Helix angle up to 45°
- Max. tool diameter 305 mm
- Max. tool width 65 mm
- Slotting: straight or spiral, also available with positive front rake angle
- Root shape: milled or drilled

Grinding diagrams for optimum sharpening of the tools are optionally available.

Rolling deburring discs



Rolling deburring discs are used for creating chamfers on the teeth at both faces of the gear. Rolling deburring discs are available with an additional smoothing disc to minimise waste on the faces of the gear workpieces.

Different chamfering types such as

- Parallel
- Comma-shaped or
- Parallel with chamfers at the root of the teeth

are also available with face-bevelled workpieces. The tools are supplied already presetted and can be used for chamfering gears with the same gearing parameters and the same tooth width, if there is no risk of collision with the workpiece contour.

Economical use of tools is guaranteed with the option of reversing the rolling deburring discs.

When the wear limit of the rolling deburring discs is reached, the discs can be reversed and set up again in a very short time to re-use the tool.

Rolling chamfering discs



Flexible rolling chamfering discs are used with the same workpiece gearing parameters and different tooth widths. They can be supplied in sets or with holders for a specific tooth width.

As with the rolling deburring discs, the chamfers on the teeth at both faces of the gears can be parallel, comma-shaped or parallel with chamfers at the root of the teeth.

The rolling chamfering discs can be designed for wet or dry machining. An additional coating extends the already long tool life even further.

Rolling dies



Rolling dies are generally used for manufacturing conical spline, such as for synchro sleeves with broached internal spline. They can be used as single rolling die, single rolling die in a dual model and as set of two rolling dies. Rolling dies can have one or multiple flanks depending on the requirements. The rolling dies are available with hobbed or ground teeth depending on the required gear quality.

Subject to special manufacturing guidelines, our rolling dies have the longest possible tool life.

Master gears



Gauges are manufactured up to quality 3 as per DIN 3962 and are supplied with an inspection certificate.

The following gauge types are available

- Master gears
- Plug gauge
- Ring gauge

Plug and ring gauges can be supplied as Go and No Go gauges.

CBN grinding tools

Customised grinding tools



CBN grinding tools are available as grinding worms and as profile discs with a galvanic CBN coating. The coating is customised for the specific machining requirements. The tools are primarily used for grinding involute gears with the highest possible quality requirements in mass production.

The following grinding worms are available

- Set of rough and finishing grinding worm
- Monofinishing worm
- Combination worm with profile grinding disc

The following profile grinding discs are available

- Roughing profile grinding discs
- Finishing profile grinding discs

Maximum processing reliability in gear grinding is guaranteed by highest precision during the tool manufacturing processed by our tool specialists.

Profile grinding discs for

- Spline shaft profiles

Slot and surface grinding discs for

- Fixing and indexing slots
- External cylindrical grinding

Cup-discs for sharpening of

- The stepped cutting face on helical shaping cutters
- The conical cutting face on straight shaping cutters
- Hobs

Grit size

- Grinding worms B76 - B251
- Profile grinding B35 - B301

Sharpening and coating of gear tools



Liebherr after-sales service offers sharpening and coating of gear tools. Our satisfied customers are pleased to take advantage of this well-established service.

Trust the experience of the gear tools manufacturer also for sharpening and coating of your tools.

ISO 9001:2015

Our high quality requirements induced us to implement the international standards for quality management systems into our tool department as long ago as the 1990s. The benefits of this can be seen in the high degree of customer satisfaction and are highlighted by the success of our products in the market. Therefore, it is our goal to improve our quality management system continuously.

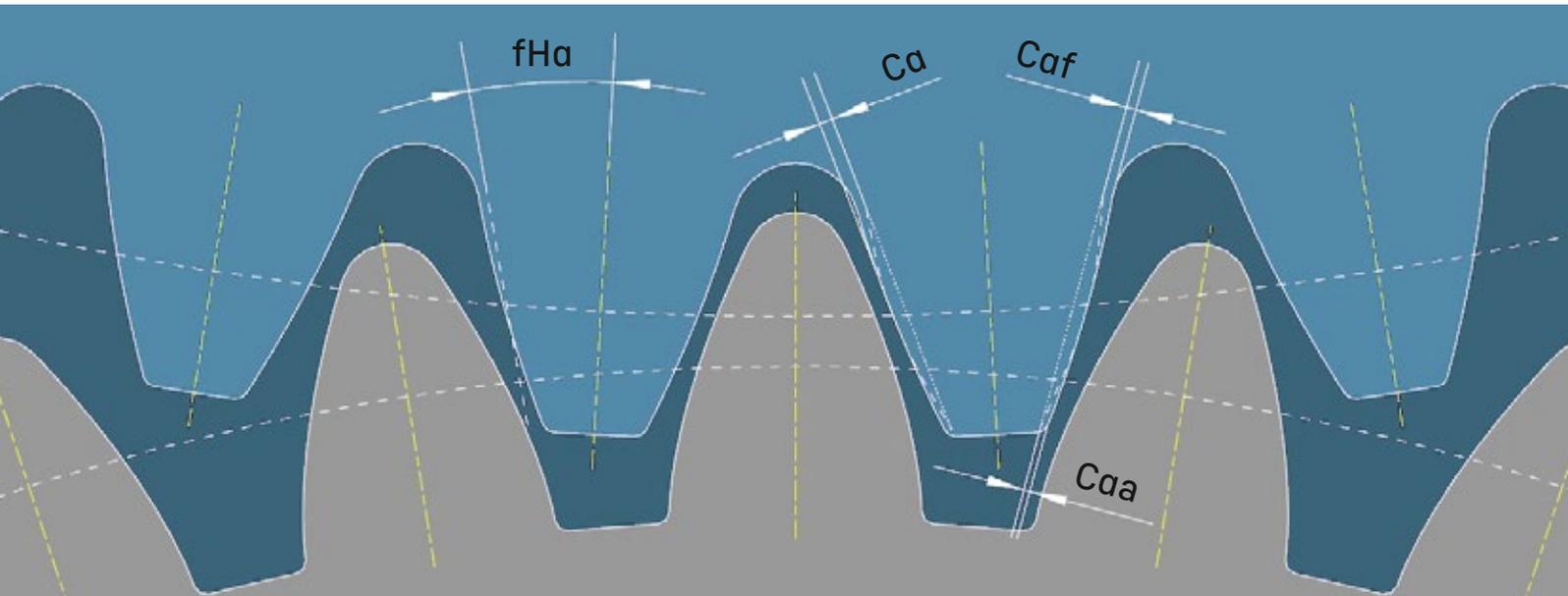
Reconditioning CBN grinding tools



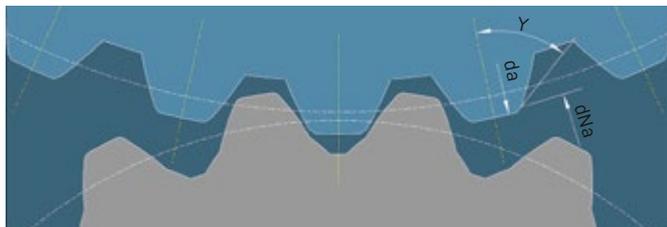
Highly qualified specialists will recondition your grinding tools in our in-house electroplating shop.

After incoming goods inspection, in case of new gear geometry requirements the tool body is ground. This takes a very short time at very economical prices. Total quality control at all process steps ensures a consistently high quality of the tools.

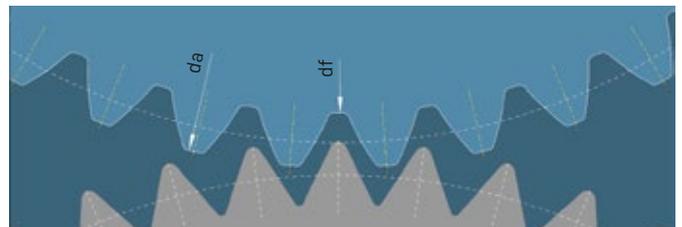
Profile modifications for shaper cutters



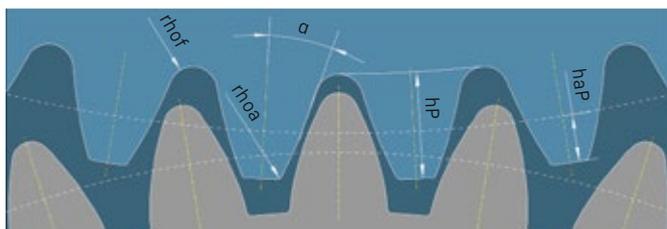
Pressure angle modification, Profile crowning, Addendum modification and Dedendum modification



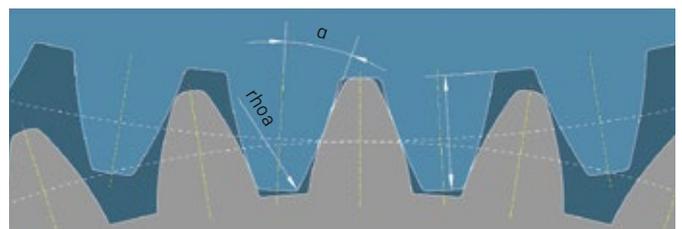
Topping cutter



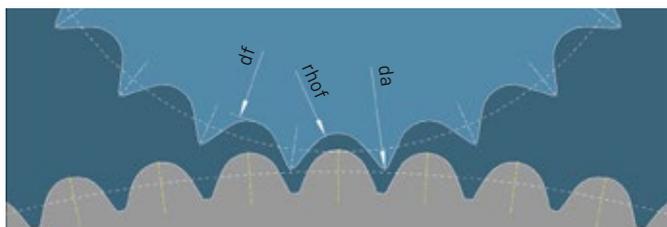
Block form and involute profiles for splines



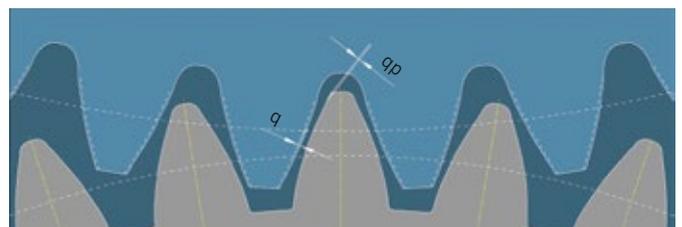
Basic rack tooth profile with topping



Topping



Involute for sprockets



Protuberance

Component and contract manufacture

As a service-based company in the field of drive technology, Liebherr-Verzahntechnik GmbH supplies complete components as well as a wide range of gears by contract manufacture.

Our practical solutions to problems are the basis for a long-term partnership. You can rely on the knowledge and experience of our competent team.

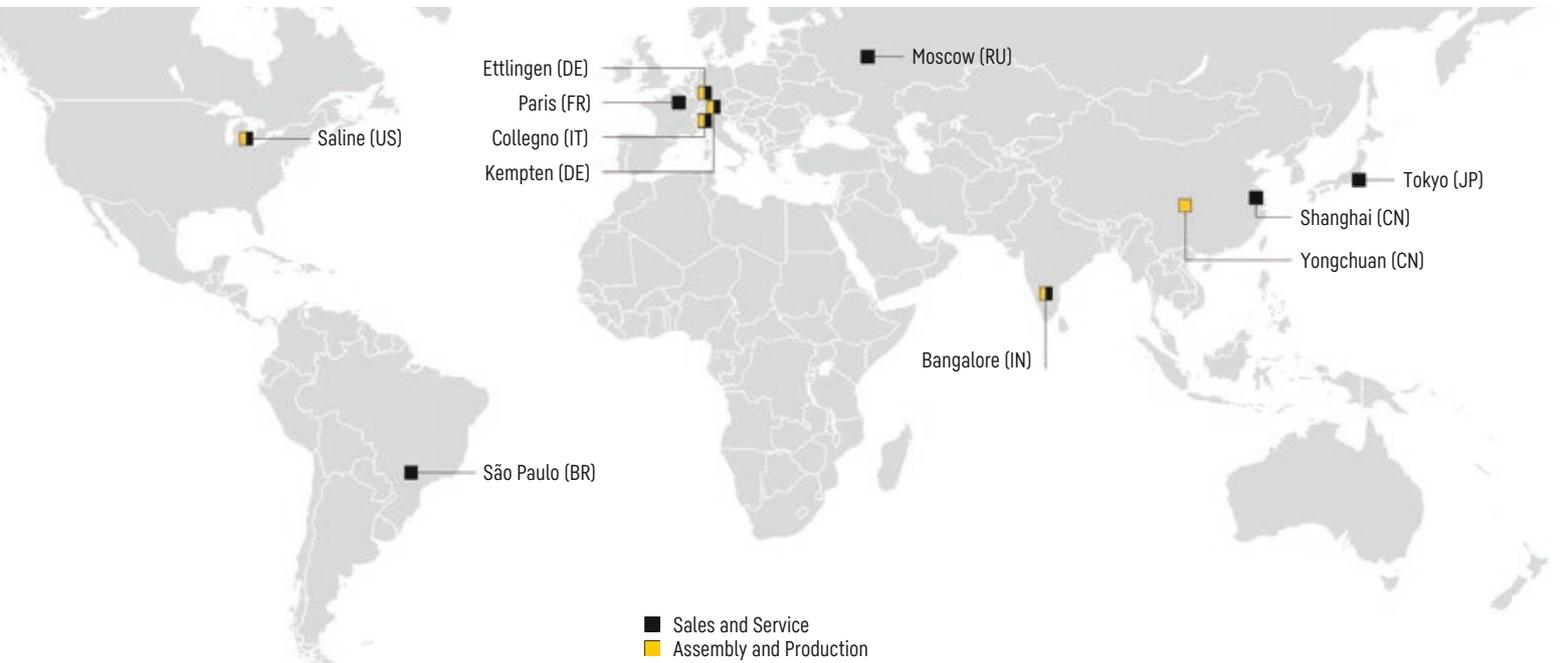
We manufacture using state-of-the-art CNC machines. Our delivery times are very short as a result of our in-house production depth and flexibility. Quality, on-time delivery and customer satisfaction are essential to our philosophy.

Liebherr-Verzahntechnik GmbH is ISO 9001:2015-certified.





Your solution provider



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