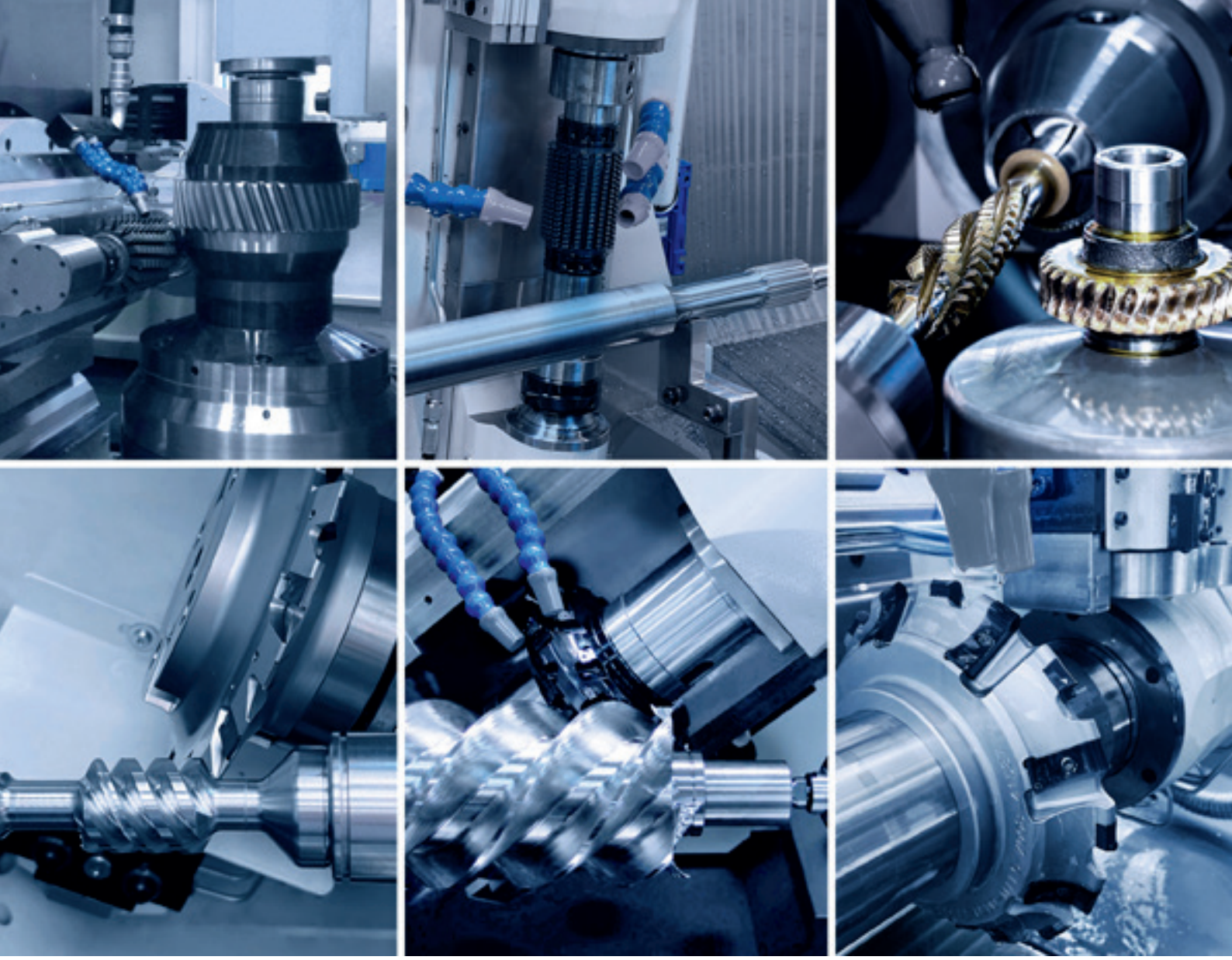


HORIZONTAL AND VERTICAL GEAR HOBBING AND PROFILE MILLING MACHINES

CLC 200, CLC 300, CLC 500, CLC 260H and CLC 500 H

EMAG

CLC-Gear Hobbing Machines
Highly Productive Gear Hobbing

EMAG CLC gear hobbing machines were developed for highly productive manufacturing of precision gears, gear shafts, and worm gears, and have been renowned for their efficiency, quality, and versatility for many years. The machines are the result of years of research and development aimed at achieving high-quality gear hobbing results while increasing productivity.

KEY FEATURES OF EMAG CLC VERTICAL GEAR HOBBING MACHINES

The CLC series consists of three vertical gear hobbing machines:

CLC 200
- Workpieces up to 220 mm
- Modulee 5

CLC 300
- Workpieces up to 350 mm
- Modulee 7

CLC 500
- Workpieces up to 500 mm
- Modulee 10

All machines have several features that make them ideal for a wide range of gear hobbing tasks. These range from straight and helical gears to worm gears, crown gears, and short teeth (splines) of various sizes. This makes the machines suitable for many applications and industries. The machines are equipped with a Fanuc CNC control as standard, with a Siemens control available as an alternative.

SPECIAL FEATURES

All machines can be equipped with the following technologies: gear hobbing, finish hobbing as a pre-toothing process, and skin hobbing as hard fine machining.

+ The machines can be equipped for milling with oil and emulsion. In addition, the process can also be configured for dry operation, i.e., without coolant.

+ Longer hobs or multiple teeth with several tools can be clamped on the ground and hand-scraped tangential axis Y (shift axis). The milling head can be equipped with different speed ranges so that easily machinable material can be processed at high cutting speeds.

+ Tactile or inductive probes or sensors can be used for workpiece inspection or position orientation and to check the gearing. There are various options for chip removal for magnetic or non-ferromagnetic workpieces.

CLC-Gear Hobbing Machines

Stable Machine Construction and Direct Drives for Maxi

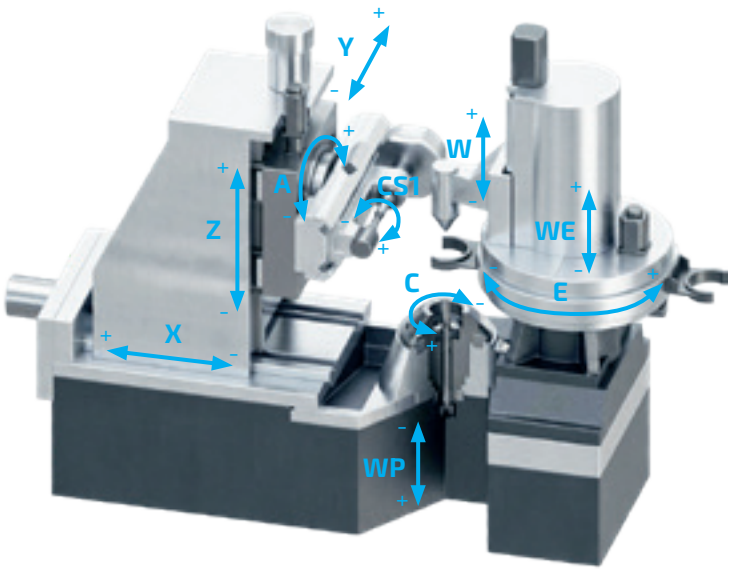
The stable basic design of EMAG CLC gear hobbing machines has a positive effect on vibration behavior during milling.

Like the milling head, the workpiece table is equipped with a direct drive. They also feature a hydraulic workpiece clamping device with the option of digital monitoring of the clamping path. This allows clamping operations to be performed on the workpiece table. In combination with the counterholder, gears and gear shafts can be clamped securely.

A rough deburring device is also available as an option. This makes the machine ideal for the production of splined shafts, worm gears, crown gears, and gear wheels, making it a flexible solution for both series production and single-part production.

HIGHLIGHTS

- Direct drives in milling head and tool table for maximum dynamics
- Tangential axis with ground and hand-scraped guides for maximum precision and rigidity
- Automatically movable counter bearing
- High machine weight for vibration damping
- Wide range of workpieces: gears, worm gears, crown gears, and splines



AXLE ASSEMBLY

A	Swivel head
CS1	Tool spindle
C	Workpiece table
X	Radial travel
Z	Axial travel
Y	Tangential travel
W	T ailstock travel

Options:

WP	Hydraulic clamping
WE	Vertical travel
E	Axis of rotation
Rimfire	2 or 4 stations

mum Precision

ADVANTAGES AT A GLANCE:

- + Maximum flexibility thanks to large working space
- + Tool spindle and work table with direct drive
- + High-speed gear hobbing spindle and work table
- + The work table can be equipped with a hydraulic workpiece clamping device with the option of digital monitoring of the clamping path
- + Also designed for dry machining
- + Tactile or inductive measuring probe or sensor for workpiece inspection
- + Magnetic chip conveyor
- + Tailstock movement via servo motors and preloaded recirculating ball screw
- + Hobbing mandrel with ISO cones
- + Robotic loading onto the spindle with automatic door
- + Chamfer cut on the main spindle
- + L-shaped door for loading with a crane

Optional:

- » Long tangential axis Y (for longer gear hobs or multiple tools)
- » Scraper chip conveyor for non-ferromagnetic materials (steel, aluminum, or bronze)
- » 2-NC ring loader for minimal setup effort
- » Coarse deburring station under the workpiece

TECHNICAL DATA

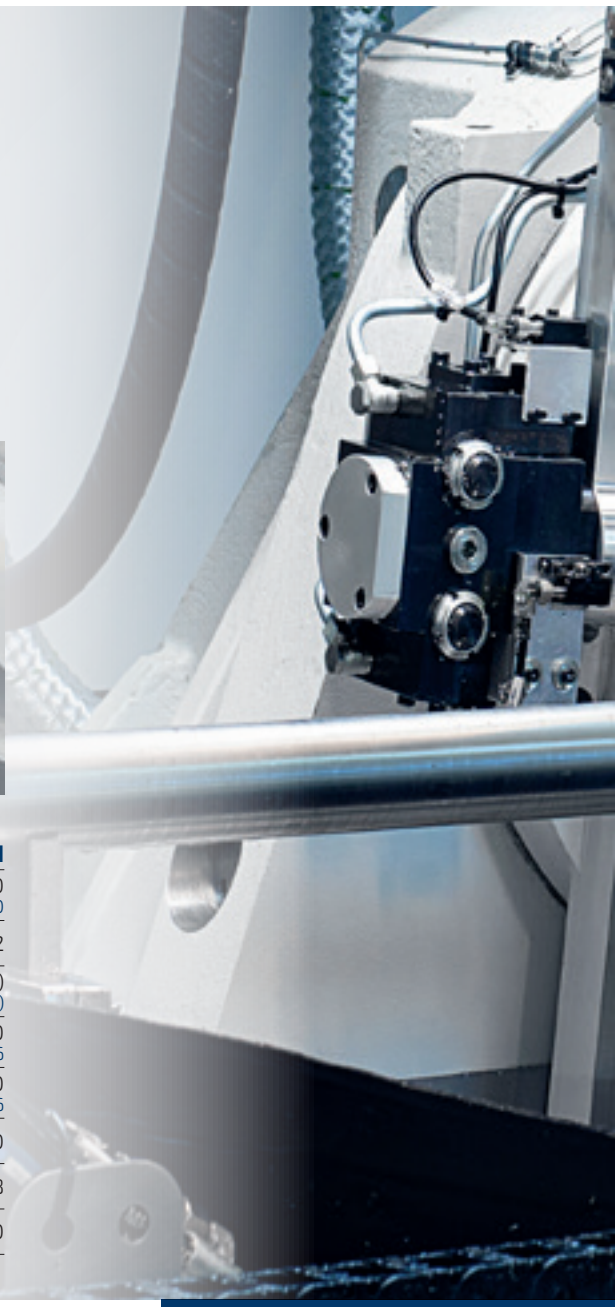
		CLC 200	CLC 300	CLC 500
Workpiece diameter max.	mm inch	220 9	350 14	500 20
Module		5	7 (5)	10 (6)
Workpiece length	mm inch	600 24	600 24	850 33
Axial travel (Z)	mm inch	370 14	400 16	600 24
Tangential travel distance (Y)	mm inch	200 8	250 10	300 12
Milling spindle speed	1/min	1.300 (2.500)	1.300 (2.500)	700/1200
Drill diameter X Length max.	mm inch	140 x 210 5 x 8	160 x 255 6 x 10	160 x 300 6 x12
Tool clamping		ISO 40	ISO 40	ISO 40 (HSK80)
Machine weight	kg	12.000	16.000	18.000

CLC 260 H (HW) & CLC 500 H
Horizontal Gear Hobbing Machines

The CLC 260 H (HW) and CLC 500 H horizontal gear hobbing machines can be used to machine gears, worm gears, and long toothed shafts with maximum precision.

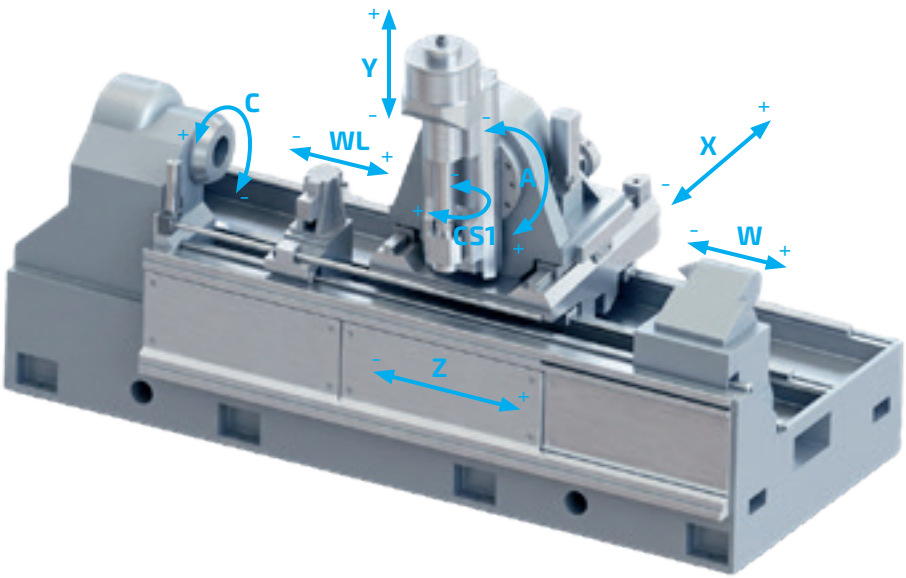
Their quick changeover to new workpieces makes them ideal for producing individual parts and series. In addition, the machines can be equipped with automation systems, increasing their versatility and efficiency.

CLC machines are available with different axial travel distances, which makes them particularly interesting for machining shafts with multiple teeth.



TECHNICAL DATA

		CLC 260 H	CLC 260 HW	CLC 500 H
Workpiece diameter max.	mm inch	260 10	260 10	500 20
Module max.		6	10	22
Axial travel max.	mm inch	1.500 (2.000) 59 (79)	1.500 59	2.000 (3.000) 79 (118)
Disc cutter diameter/width	mm inch	160/50 6/2	240/100 9/4	350/400 14/16
Hobbing cutter (diameter/length)	mm inch	160/255 6/10	180/255 7/10	350/400 14/16
Milling spindle speed	1/min	1.300 (2.500)	1.300	600
Table speed	1/min	250	250	68
Machine weight	kg	16.000	19.000	35.000



AXLE ASSEMBLY

- **A** Swivel head
- **CS1** Tool spindle
- **C** Workpiece table
- **X** Radial travel
- **Z** Axial travel
- **Y** Tangential travel
- **W** Tailstock travel
- **WL** Bezel (CLC 260 H only)*

*manual or automated available as an option

ADVANTAGES

+ Highly flexible gear hobbing machine for gears, worm gears, and long toothed shafts
+ Minimal setup effort when clamping between face driver and tip
+ Automatic or manual steady rests
+ Separate NC slide for moving the steady rest along the workpiece
+ Additional NC-controlled air nozzles for oil blowing
+ Table through-hole for long, thin shafts
+ Multiple gear teeth on one shaft

Highlights:

» Machines available with different axial travel
» Direct drive in table and milling head
» Milling head with ground and hand-scraped tangential axis
» Automatic counter bearing in milling head
» Automation with robot or gantry loader
» Table through-hole
» NC axis for mounting a steady rest

HORIZONTAL GEAR HOBBING MACHINES

The CLC 260 H (HW) and CLC 500 H (FR) are suitable for machining medium and large rotors and rotary pistons. Rotors can be manufactured using the gear hobbing process or the single-part process.

CLC 260 H

» Workpieces up to260 mm
» Module 6

CLC 260 HW

» Workpieces up to260 mm
» Module 10

CLC 500 H

» Workpieces up to500 mm
» Module 22

CLC 260 H FR – CLC 300 FR
Profile Milling Machines for Processing Worms

When it comes to machining worms for worm gears, the CLC 260 HR (horizontal profile milling machine) and CLC 300 FR (vertical profile milling machine) are used. On these machines, the workpiece is machined with a profile cutter.

The Machine Types – Machining of Worms:

HORIZONTAL PROFILE MILLING MACHINE

The horizontal profile milling machine is particularly suitable for milling worms or hydraulic spindle pumps. The machine is automated using a robot or a gantry loader.

CLC 260 H FR

- Workpieces up to 260 mm
- Module 12 (28 mm cutting depth)

VERTICAL PROFILE MILLING MACHINE

The vertical CLC 300 FR is equipped with a profile milling head and can load workpieces with a ring loader. In addition, additional operations, such as keyway milling, can be integrated in the 90° position of the ring loader.

CLC 300 FR

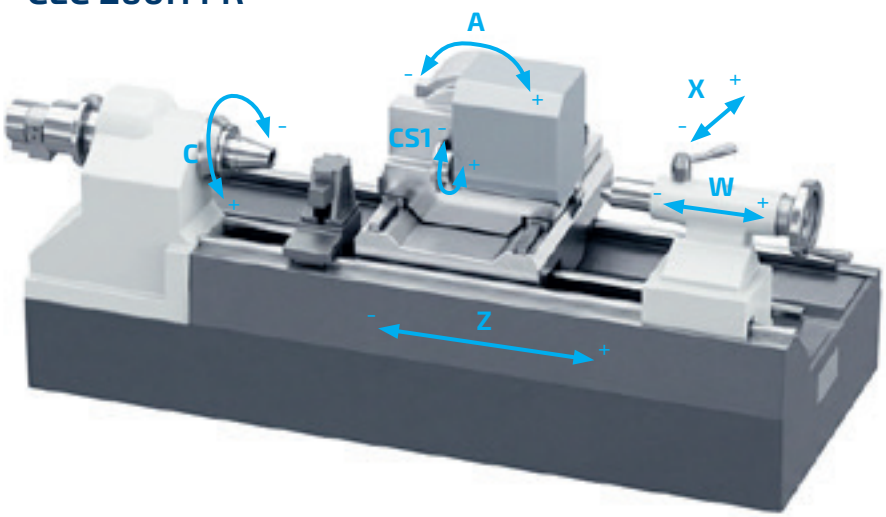
- Workpieces up to 200 mm
- Module 10 (22 mm cutting depth)

The Machine Structure

These machines are designed for efficiency and precision. They feature powerful milling heads and tool tables and are designed for heavy-duty machining with high torques on the milling spindle.

Another special feature of these machines is that steady rests can also be added to support the workpieces.

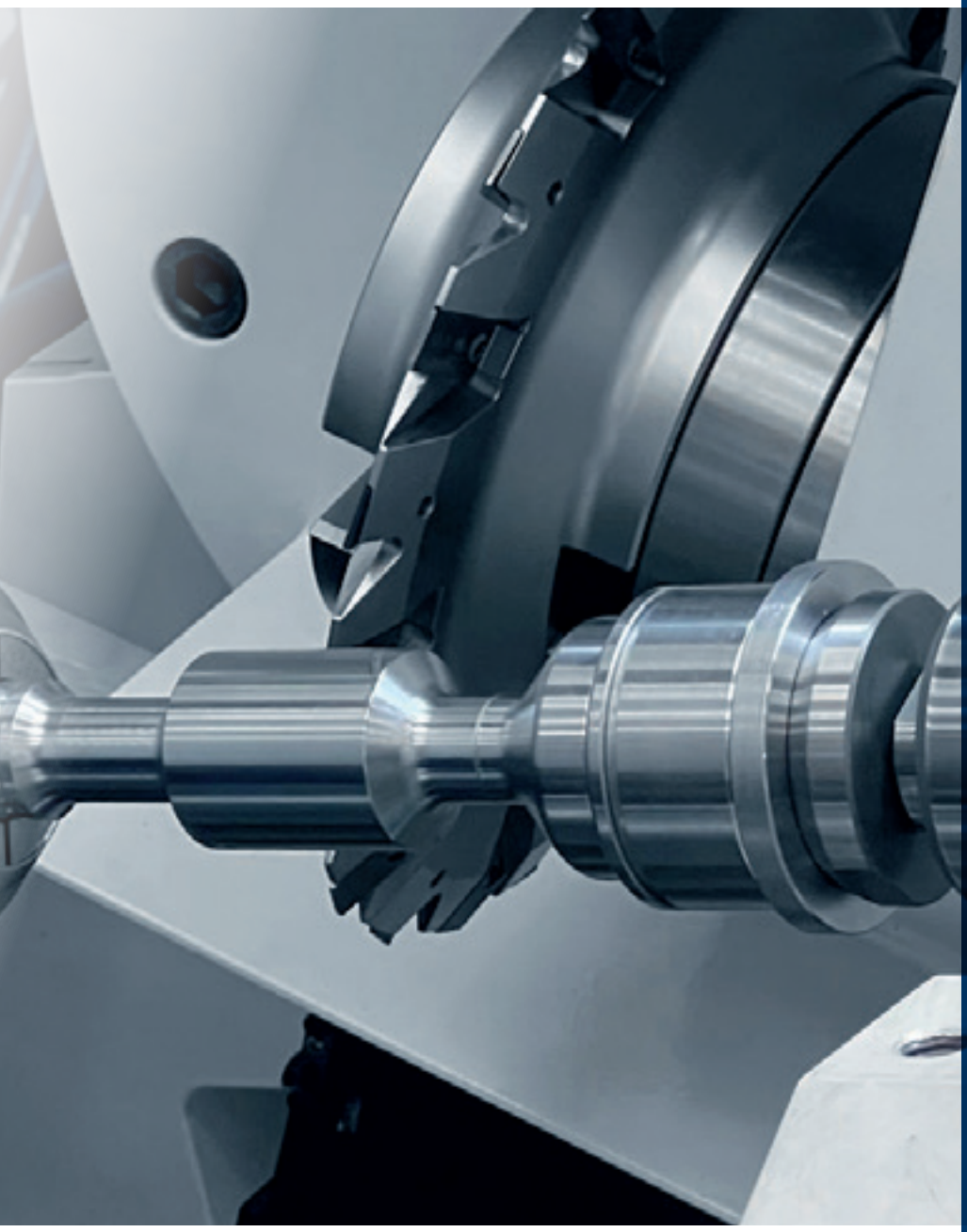
CLC 260H FR



AXLE ASSEMBLY

A	Swivel head
CS1	Tool spindle
C	Workpiece table
X	Radial travel
Z	Axial travel
W	Tailstock travel
WL	Bezel*

*manual or automated available as an option



HIGH-PRECISION PROFILE MILLING

The milling head of the CLC 260 H FR and CLC 300 FR is made of cast iron for better vibration damping and can accommodate solid carbide disc cutters or carbide indexable insert cutters.

The milling head is designed for high torque on the milling spindle and is equipped with an HSK interface for quick tool change. The tool table is directly driven.

Optionally, the milling head can be equipped with a counter bearing.

For more demanding tasks, such as profile milling of rotors, rotary pistons, or large screws, there is a reinforced version, the CLC 260 HW or CLC 5000 H FR, with a stiffer machine bed and greater milling capacity. (See Rotor Milling).

TECHNICAL DATA

		CLC 260 H FR	CLC 300 FR
Workpiece diameter max.	mm inch	260 10	200 8
Milling depth	mm inch	28 1	22 1
Ttravel distance Z	mm inch	1.500/2.000 59/79	400 16
Milling diameter	mm inch	200–250 8–10	200–250 8–10
Tool clamping		HSK 80A	HSK 80A
Swiveling tool head	°	± 60	± 45
Machine weight	kg	16.000	16.000

CLC 260 HW & CLC 500 H FR
Rotors, Rotary Cobs and Large Screws Machining

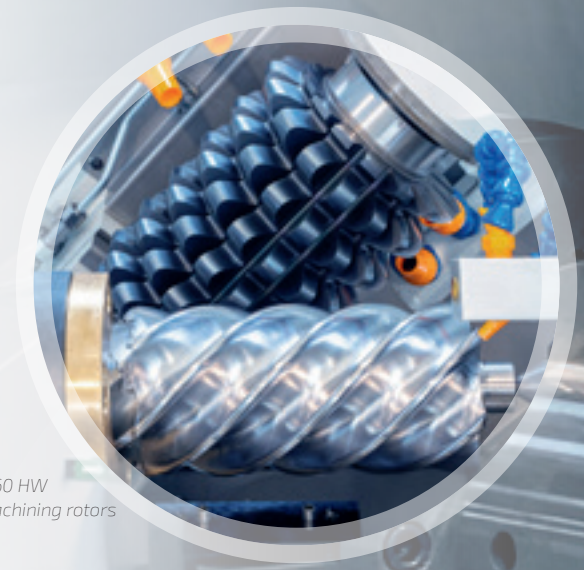
The Machine Types – Profile Milling of Rotors and Rotary Pistons:

HORIZONTAL PROFILE GRINDING MACHINES

The machine is the heavy-duty version of the CLC 260 H FR with ground and hand-scraped guides in the tangential, radial, and axial directions. Gear hobbing with gear hobbing cutters and profile milling with single-piece milling cutters can be used here as a process for rotors.

CLC 260 HW

- For rotors up to max. 160 mm
- Rolling and profile milling
- Max. profile height 42 mm

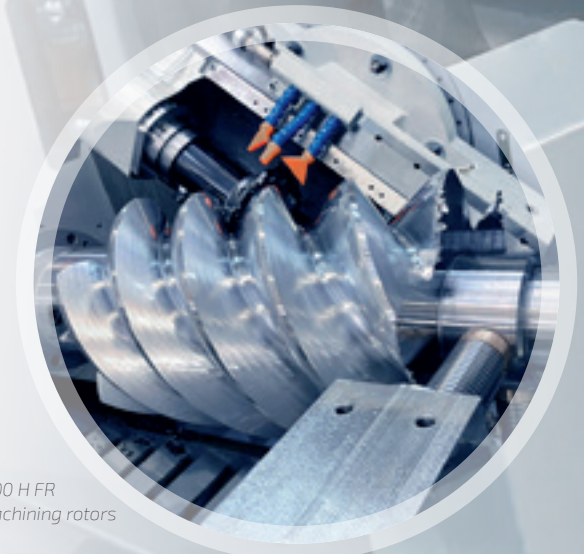


CLC 260 HW
for machining rotors

This machine has a profile milling head and can machine large profile depths with a single-piece milling cutter. This machine has ground and hand-scraped guides in the radial and axial directions.

CLC 500 H FR

- For rotors up to max. 500 mm
- Profile milling
- Max. profile height 80 mm



CLC 500 H FR
for machining rotors

TECHNICAL DATA

		CLC 260 HW	CLC 500 H FR
Workpiece diameter max.	mm inch	260 10	500 20
Milling depth	mm inch	42 1	80 3
Workpiece length	mm inch	1.500 59	2.000 (3.000) 79 (118)
Milling diameter Milling cutter/disc width	mm inch	240/100 9/4	350/450 14/18
Milling diameter Cutter/disc width	mm inch	180/255 7/10	-
Maximum workpiece weight	Kg	500	1.500
Axis	Piece	5	4

THE CLC 500 H FR: A HEAVYWEIGHT IN ROTOR PROCESSING

The CLC 500 H FR is the perfect machine for heavy-duty clamping. Its design with flat guides, which provide additional rigidity, makes it ideal for meeting demanding machining requirements.

Powerful Processing Parameters
The CLC 500 H FR can perform machining of a profile height of 80 mm in a single cut. The direct-drive table is designed for high chip capacity and has very high torque.

Automation Solutions
Automatic Loading

A ring loader with two stations is available for the vertical gear hobbing machines. The ring loader offers many advantages: for example, two NC axes (E and WE axes) allow the workpiece to be loaded and unloaded directly into the clamping device.

But it also makes setting up the machine much easier: the two NC axes can be used to move to different positions, meaning that only a minimum of replacement parts are required when retooling for a new workpiece. This simplifies handling and enables flexible automated production.

Another advantage is that the coarse deburring disc can be hydraulically adjusted axially and radially to the underside of the workpiece (optional). This greatly reduces the manual changeover effort, increasing the versatility of the machine, making it well-suited for small series production.

In summary, the ring loader offers an efficient, versatile, and cost-effective solution for a wide range of applications. With its short setup times, minimal number of replacement parts, and the adaptability of the deburring disc, it offers significant advantages for any production process.

Conveyor belt with workpiece pick-up via a ring loader.

Robot loading from the rear with loading door.

Stacker cell with surrounding conveyor belt.

ROBOT AUTOMATION

+ Flexible automation for flat and shaft-type workpieces
+ For shaft machines Flexible automation for shafts of different lengths and diameters
+ Low setup effort
+ Blowing off components in the machine
+ Additional operations possible

PORTAL AUTOMATION

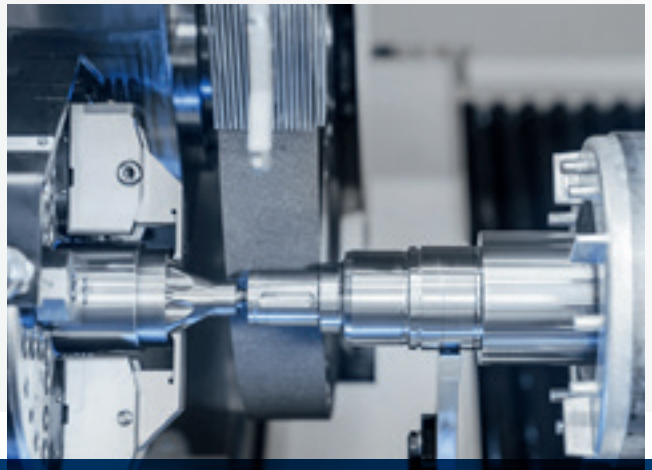
+ High-capacity stack magazine
+ Additional operations possible
+ Blowing off components in the machine

TECHNOLOGY. CONNECTED.

Turning Chucked Components

Turning Shafts

Gear Grinding

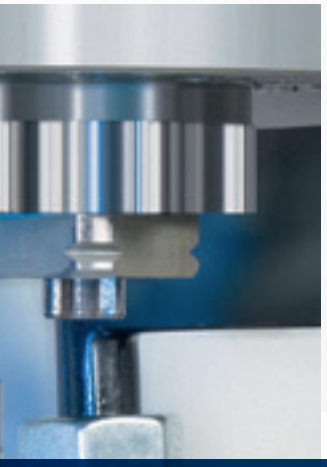


Cylindrical Grinding

Out-of-round Gr

Milling

Gear Hobbing



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