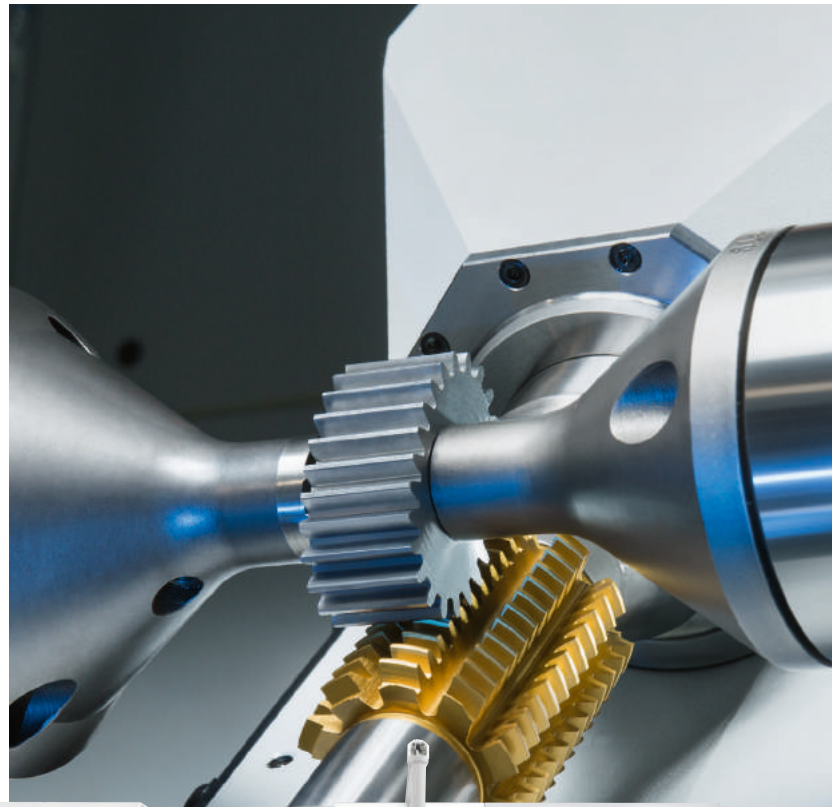
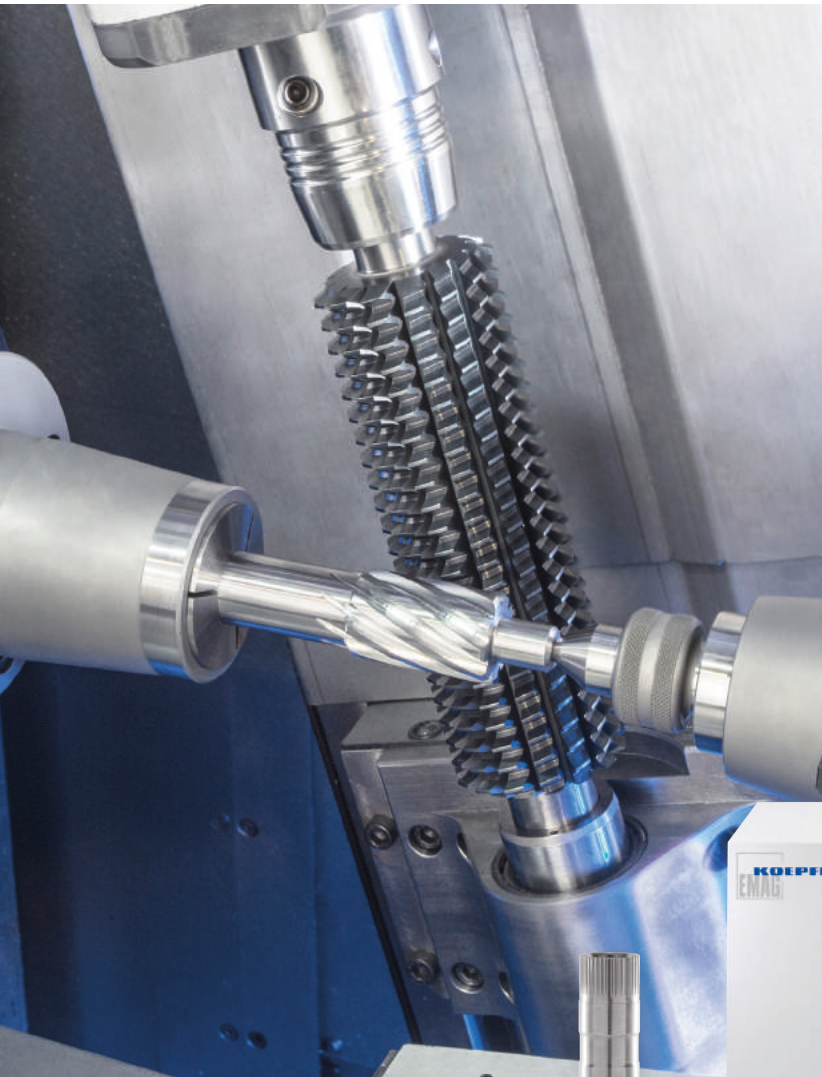


HORIZONTAL GEAR CUTTING MACHINE HLC 150 H



KOEPFER
EMAG

HLC 150 H – COMPLETE GEAR CUTTING SOLUTION PRO

Horizontal gear hobbing machine with integrated chamfering unit for maximum productivity

Covering a unique spectrum of production applications, the HLC 150 H stands out because of the number of innovations included.

The machine's ability to hob either straight, angled, or worm gear profiles on a wide range of geometries (short gears or long shafts with gear profiles), puts all of EMAG KOEPFER's expertise at the user's disposal. To compliment this machine's abilities, a device for chamfering and deburring of components during loading and unloading, without interrupting operation is also included. Together, these features allow for the perfect gear-cutting solution with short cycle times and minimized costs.

For workpieces with the appropriate geometry, the HLC 150 H can be equipped with the ChamferCut process. This process is ideal for an accurate, cost-efficient chamfering process that produces zero secondary burrs.

Gearbox shaft machining using gear hobbing and chamfering with zero secondary burrs

The first step is the gear hobbing of the running gears (roughing), then the gears are roller-deburred and the second gear hobbing represents the final dressing process. The result is a burr-free, chamfered running gear.



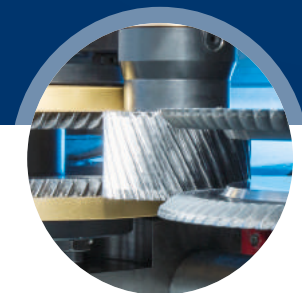
TECHNOLOGIES IN THE HLC 150 H



Gear Hobbing



**Single Index
Milling/Skiving**



Roll Chamfering



Skiving



Conikron Hobbing



Chamfer Cutting

PROVIDES MORE FLEXIBILITY AND COST REDUCTIONS



BENEFITS OF HLC 150 H

- + Unparalleled range of applications including pinions, shafts, gears, worm gears and screws
- + Integrated chamfering technologies
- + Drive technology with outstanding performance data for high-performance machining
- + Excellent value for money



There is a high-speed loading portal with double rotary gripper or a linear gripper in a V layout available for automation.

RANGE OF WORKPIECES FOR THE HLC 150 H

This high-performance technology has the capability to produce a massive variety of workpieces, from gear shafts and armature shafts, to pinions and planetary gears, with a maximum length of up to 20 inches.



HORIZONTAL GEAR HOBBING AND WORM MILLING MACHINE

- » FANUC control unit
- » Extensive range of workpieces due to innovative compound slide design and “virtual Y-axis”
- » Worm milling operations are possible due to the large milling head swivel angle
- » Integrated deburring technology
- » Different linking options including TrackMotion
- » Gear hobbing machine with impressive performance data

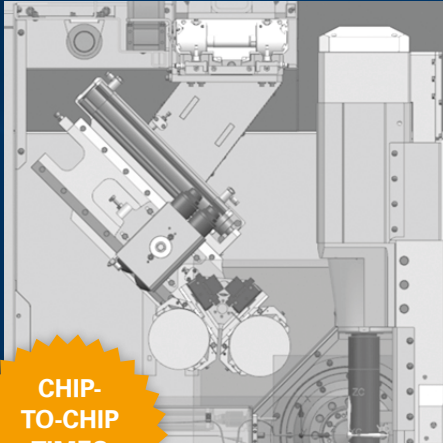
TECHNICAL DATA

Max. module	mm	3
	inch	0.1
Max. workpiece diameter	mm	150
	inch	6
Workpiece length, max.	mm	500
	inch	20
Angle of inclination		-45/+135°
Tool diameter, max.	mm	120
	inch	4.5
Shift travel	mm	220
	inch	8.5
Max. speed of gear hobbing head	rpm	4,000 (optional 12,000)
Power rating, 100% duty cycle	kW	28
	hp	38
Torque (100% duty cycle)	Nm	140
	ft-lb	103



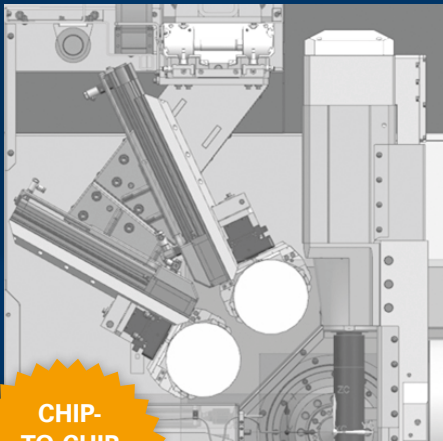
THE AUTOMATION OF THE HLC 150 H

High-speed loading system with double rotary gripper (up to 2 kg/4 lbs)



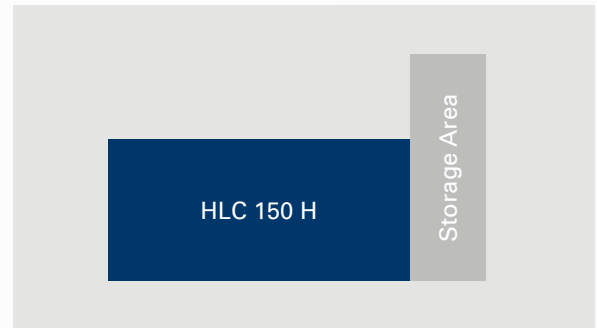
CHIP-TO-CHIP TIMES < 4 SEC

Linear gripper in V layout (max. 10 kg/22 lbs)

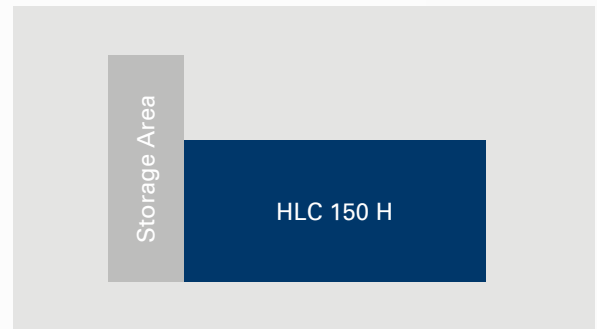


CHIP-TO-CHIP TIMES < 7 SEC

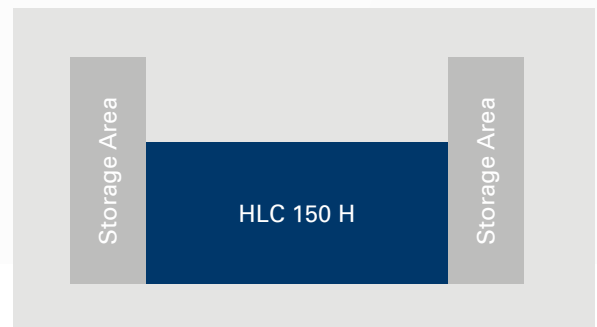
MODULAR AUTOMATION SYSTEM



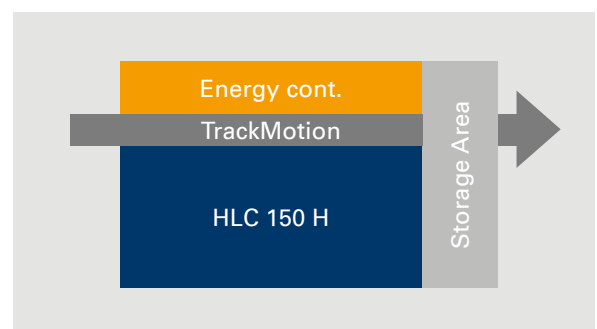
Raw and finished part storage area on the right



Raw and finished part storage area on the left

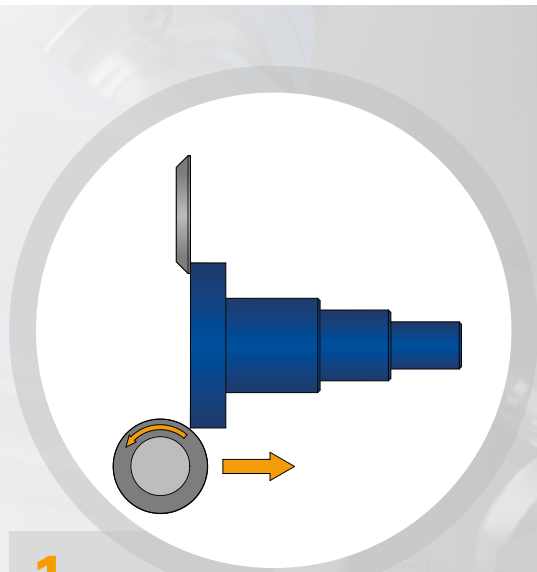


Raw part storage area on the left and finished part storage area on the right (or vice versa)

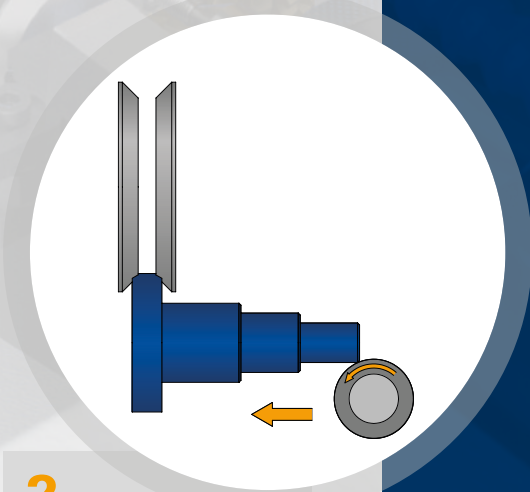


Connection to TrackMotion automation system

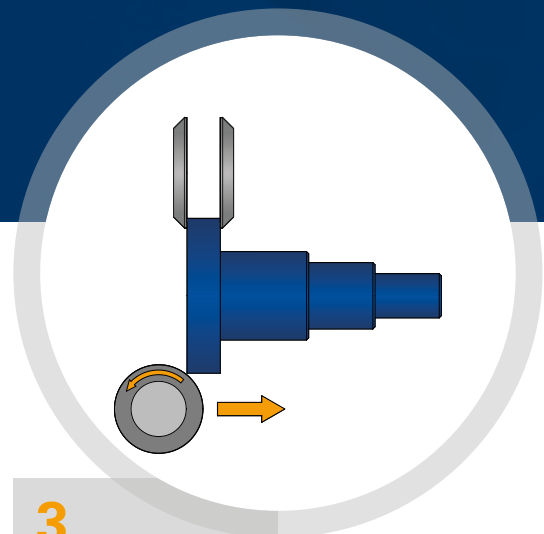
MACHINING EXAMPLE FOR A DRIVE SHAFT



1
Pre-milling of the running gears /
First cut



2
Roller deburring of the running gears & gear hobbing of the plug-in gears



3
Finish milling of the running gears with deburring of the flat surfaces

- + Process
 - » Gear hobbing 1st cut (roughing cut)
 - » Roll chamfering
 - » Gear hobbing 2nd cut (dressing)
- + Zero secondary burr machining of gear wheels
- + No risk for subsequent finishing processes (e.g., honing)

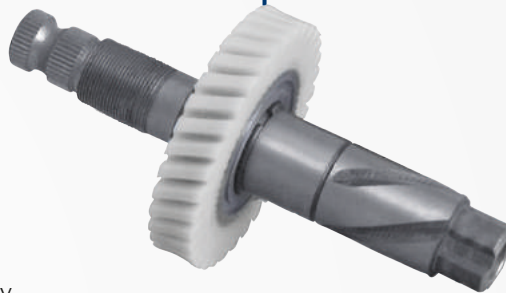


MACHINING EXAMPLE FOR EPS SYSTEM COMPONENTS (ELECTRIC POWER STEERING)

1

EPS WORM GEAR

- + External diameter of up to 150 mm / 6 in
- + Nylon requires a deep bed filter to dispose of the chips or extractors for dry machining



2

STEERING WORM

- + Gear hobbing head can be swiveled from -45° to $+135^{\circ}$
- + Cutting tools with inserts
- + Use of form cutters with inserts up to 120 mm / 5 in in diameter possible
- + **High torque for milling**



3

STEERING PINION

- + High rigidity for skiving (hard machining)
- + **High speed for pre-milling (soft)**

EXAMPLE: COMPLETE HARD AND SOFT MACHINING OF A STEERING PINION

13 linked EMAG machines are used for this production. The soft machining at the beginning is performed by three EMAG VT 2 machines. This is followed by the gear hobbing on two parallel EMAG KOEPFER HLC 150 H machines. The components are then hardened in an EMAG eldec MIND machine featuring induction technology. Hard turning is performed on the VL 2 DUO line from EMAG. This is followed by grinding processes on two EMAG VTC 100 GT turning and grinding machines and finally the gear hobbing once again on three EMAG KOEPFER HLC 150 H machines.

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Subject to technical changes.

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