

HMX-400

the new generation of gear-honing machines



Fässler

Today, the Fässler gear-honing process with the HMX-400 is the most economical way for hard finishing gears in mass production for the car, truck, motorcycle and aerospace industries. Recently, the gear-honing process has become popular in the whole gear industry owing to its technical and economic advantages.

The HMX-400 Gear-Honing Machines are exclusively intended for the green or hard finishing of spur and helical gears, shaft type pinions, cluster gears and internal gears.

The 9-axis machine with the Siemens SINUMERIK 840D control system is particularly distinguished by its compact design, outstanding productivity, and efficiency and versatility, which allows for conventional double-flank honing, synchronous single- or double-flank honing, as well as internal and combi honing. Longitudinal crowning and tapering (conical honing) of the tooth flanks are also possible.

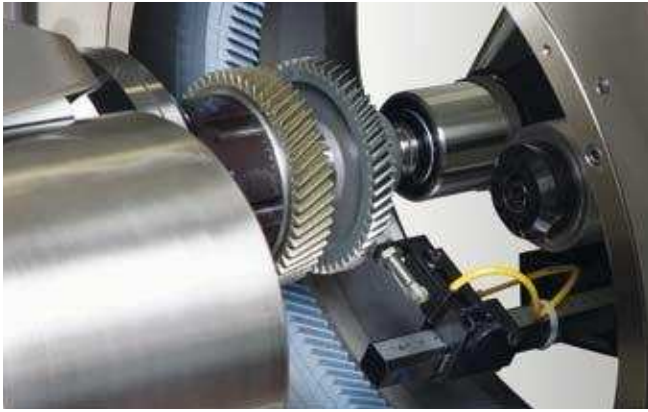
Dimensions

Length x width (including honing-oil unit)	3150 x 2350 mm
Height: top of machine enclosure	2180 mm
Height: top of oil-mist filter (on top of machine, option)	3100 mm
6 damper pads (for 6-point setting): height adjustment	±5 mm
Required floor space: length x width (approx.)	4500 x 5000 mm
Height of centres from the shop floor (approx.)	1165 mm
Length of parts between centres (max.)	450 mm

Process data

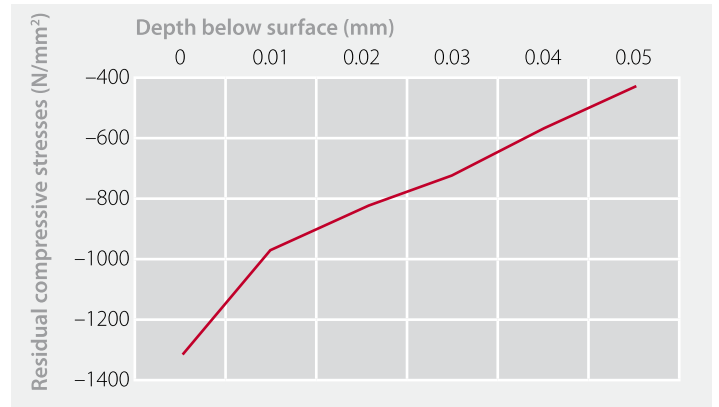
Swivel drive (A-axis) speed	0-112°/s
Swivel drive (B1-axis) speed	0-12°/s
Cross slide (X-axis) infeed travel	-180/+5 mm
Cross slide (X-axis) speed	0-7500 mm/min
Longitudinal slide (Z1-axis) travel	-400/+100 mm
Longitudinal slide (Z1-axis) speed	0-8000 mm/min
Longitudinal slide (Z2-axis) travel	-627/-87 mm
Longitudinal slide (Z2-axis) speed	0-50 m/min
Honing stone (C1-axis) RPM, stepless	0-1500 1/min
Workpiece (C2- and C3-axes) RPM, stepless	0-6000/9000 1/min
Max. honing force (max. process load)	1000 N





Comparison of Fässler's noise power spectrum vs grinding.

Decibel measurements have demonstrated that with a frequency of 3000 Hz, for instance, a noise reduction from 90 dBA to 55 dBA can be achieved.



Residual compressive stresses

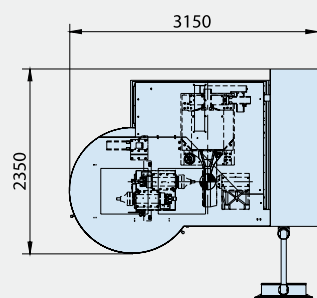
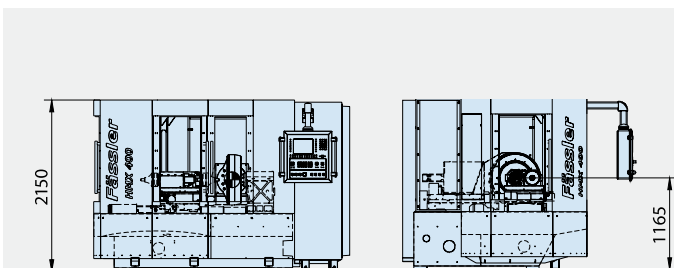
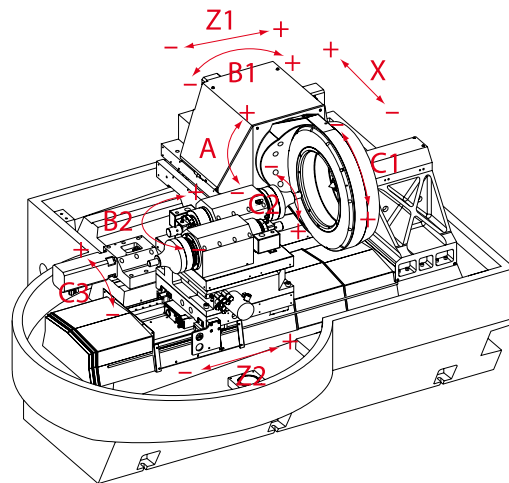
Workpiece: $\alpha_n=18^\circ$, $\beta_2=30^\circ$, $z_2=37$, $m_n=1.625$ mm, $b_2=14.7$ mm
Material: 16MnCr5E

Axis concept – compact and rigid

A	Swivels the honing stone to the axis-crossing angle.
B1	Swivels the honing-stone head (the pedestal on the cross slide) for longitudinal crowning and tapering (conical honing).
B2	Swivels the turntable of the headstock, i.e. the work spindles, to honing or loading/unloading position.
C1	Honing-stone drive: positions and rotates the honing stone. Positions and rotates internal gears
C2/C3	Two work spindles sitting on the turntable of the headstock. They position and synchronise the workpiece or dressing tool with the honing stone (C1 axis).
X	Cross slide for the radial movement (infeed) of the honing stone towards the workpiece or dressing tool.
Z1	Longitudinal slide for the axial movement of the honing stone (oscillation movement).
Z2	Moves the headstock that carries the 2 work spindles to honing or loading/unloading position.
Tailstock	Supports the clamping mandrel or shaft-type part with rotating centre. Normally, no axial movement of the spring-loaded live centre takes place.

Technical data HMX-400

Honing-stone diameter	400 mm
Machinable workpiece diameter: external honing	20-320 mm
Machinable workpiece diameter: internal honing	50-350 mm
Max. workpiece-shaft length	400 mm
Weight	10500 kg
Number of axes	9
Max. speed, honing stone drive	1500 1/min
Max. speed, workpiece drive	6000/9000 1/min
Slewing range A-axis	$\pm 45^\circ$
Slewing range B-axis	$\pm 10^\circ$
Control system	Sinumerik 840 D



HMX-400 layout

The HMS-400 has a very compact design – it lifts up with one single hook! All the auxiliaries such as the hydraulic and pneumatic systems are included in the casing. This high-precision machine has an optimised stiffness for the gear-honing process. Loading/unloading times are very low owing to the two workpiece spindles.

The gear-honing process

Owing to its economic feasibility, gear honing has become an essential part in the production of high-speed transmissions. This is particularly true in the automotive and truck industries as honed gears, in comparison to ground gears, are extremely quiet and have excellent wear characteristics thanks to their typical surface finish. Recently, Fässler has taken the gear-honing process a step further to enhance its economic feasibility and increase its process capacity. Of special interest are the tool developments, machine developments and new process strategies which were specifically adapted to customers' needs as a result of computed simulations in conjunction with the company's know-how over many years.

The new Fässler HMX-400 Gear-Honing Machine has been launched on the market incorporating all these developments and all this know-how. With this machine, our customers are able to finish high-quality gears very quickly and economically directly after hobbing and heat-treating. Costs per part are close to those of green shaving – but with the quality advantages of a hard finishing process!

FOR DECADES

Fässler AG has been considered to be the world's market leader in honing technology. Innovative, high-precision and sustainably designed honing systems are developed in real time regardless of the complexity of requirements. Constant movement is the creed that is adhered to in all the corporate divisions of Fässler AG.

Renowned corporations on the world market rely on honing to Swiss perfection. Cog by cog. Perfect to the very last detail.

Fässler

Honing to Swiss perfection

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