

**PICOMAX® 60**  
Universal in all respects.



**PICOMAX® 60**



# Productivity increased four-fold: Precise, fast, reliable and ergonomic.

**Precise**, as the machine is standard equipped with several high-accuracy “features”, as well as having a thermally stable design and construction.

**Fast**, as completely digital axis drives, HSC spindles (optionally high torque or high-power spindle) and a rigid design and construction guarantee maximum productivity.

**Reliable**, as the machines are produced in-house, assembled, commissioned and tested by FEHLMANN.

**Ergonomic**, not only as the operator is close to the part, but also due to the well-thought-out arrangement of operating elements and peripherals.



## PICOMAX 60-M PICOMAX 60-HSC

The machine is simple to operate and perfectly suited for the cost-effective and profitable production of small to medium-size parts, allowing optimum surfaces and tolerances.

Optionally available with pick-up changer for 24 tools (see pict. above) or with the larger tool changer for up to 48 tools (see pict. on the right).

The tool changers allow for very easy and ergonomic access and are integrated into the machine in an efficient and space-saving way.

# Even more productive thanks to automation - can be freely configured and retrofitted at any time.

## **Well-thought-out and tailored to customer's needs.**

The FEHLMANN automation solutions expand the machine's application spectrum and can be integrated at any time without diminishing machine accessibility. The PICOMAX 60 can be easily adapted to a variety of automation concepts - tuned and tested for full performance from the very first day. Whether as a single-machine solution, automation for two machines or as a linear system.

## **Simple and intuitive control.**

Depending on the number of pallets and parts, the system is controlled and monitored either by the flexible FEHLMANN Milling Centre Manager (MCM) or via an integrated pallet management file.





## PICOMAX® 60-M / -HSC:

**Machining centres not simply meeting, but beating the user's expectations and requirements.**

*With its compact and easy accessible design the PICOMAX 60 is perfectly suited for each workshop.*

*This machine concept combines the qualities of a precision milling machine with the dynamics of an HSC-milling machine. Available in different models and applicable for both, a universal milling machine (-M version) or high speed cutting milling machine (-HSC version).*

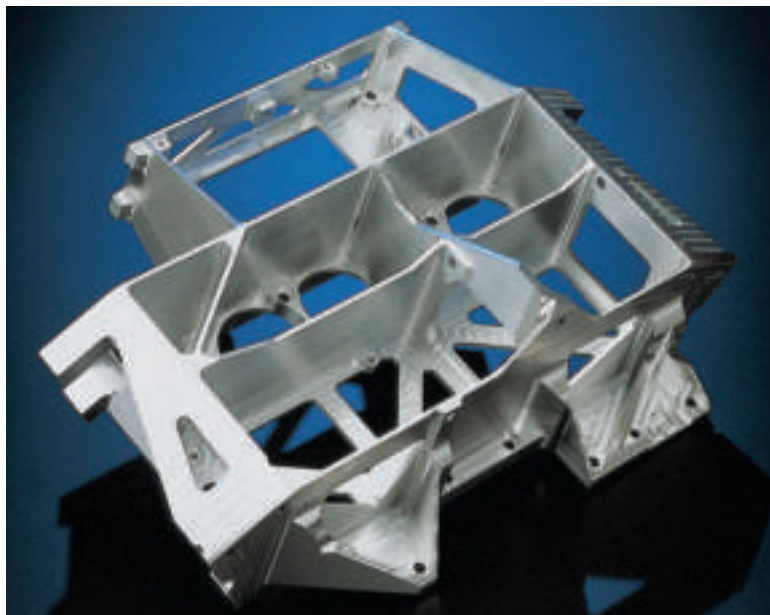
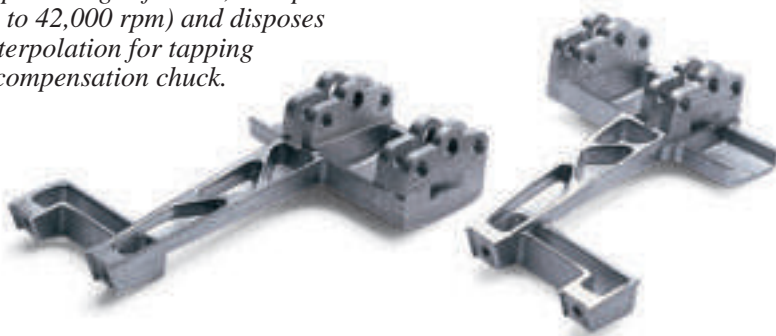
*The configurations of the machine depend entirely on the user's expectations and requirements. All axes drives are driven via ball screw and digital AC drivers with AC motor.*

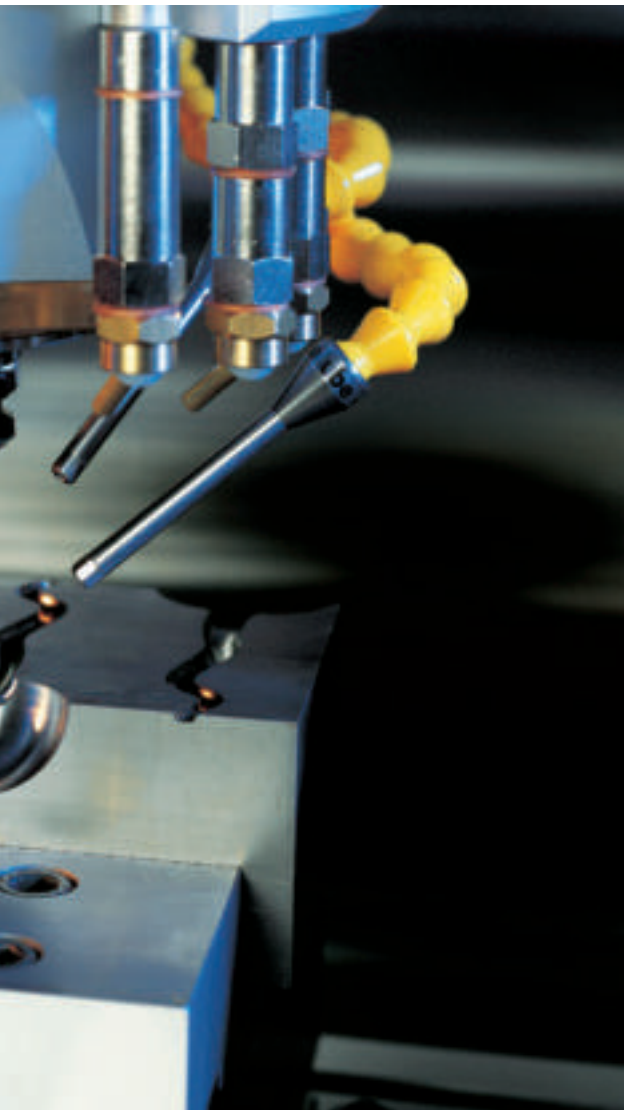
*The axes are equipped with high-precision glass scales for direct path measurement. The high-speed spindle integrated into the vertical column is equipped with hybrid bearings and offers a speed range of 50-20,000 rpm (HSC up to 42,000 rpm) and disposes of Z/S interpolation for tapping without compensation chuck.*

*The quiet low-vibration machine operation- even under high speeds- permits machining tasks with even the smallest tools. Milling operations of top precision and excellent surface finish are reached.*

### **Further features and characteristics:**

- Practical accessibility (operator to machine and spindle to dividing attachment).
- Liquid-cooled spindle (ideal thermal stability).
- Short acceleration/deceleration times of spindle and axes.
- Feedback of the effective spindle speed.
- Heidenhain CNC control unit. Practical options, adapted to the actual applications.
- Fully digital drive technology.



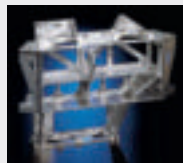


## Most versatile applications.

- In mould manufacturing for the production of copper and graphite electrodes, as well as for HSC milling operations in hardened tooling steel
- For the production of general maximum precision machine components
- For the machining of complicated and/or finest single parts
- For complete series production
- In 5-axis machining (in combination with the FEHLMANN dividing attachments)
- In tool, jigs & fixtures manufacturing
- Complex aluminium parts
- Prototype production
- In test workshops

The optimum rigidity and high precision guarantee jig boring quality.

## Precision parts



## Mould production



## Tool, jigs & fixtures manufacturing



## Precision «Made in Switzerland» since 1930..

Whether design, manufacturing, training, delivery, commissioning or service and maintenance: FEHLMANN customers receive everything from a single source. Each FEHLMANN product reflects the high quality standards applied to the entire production process. Energy consumption is taken into account early in the development process and the company's production is characterized by its sparing use of resources and lowest possible CO<sub>2</sub>-emissions.

FEHLMANN is renowned in the industry for its superior precision, ergonomics, handling ease and reliability. FEHLMANN's understanding of quality also means developing machines that satisfy today's workshop requirements.

With FEHLMANN you stay one step ahead of the competition!  
**Your Precision Advantage.®**



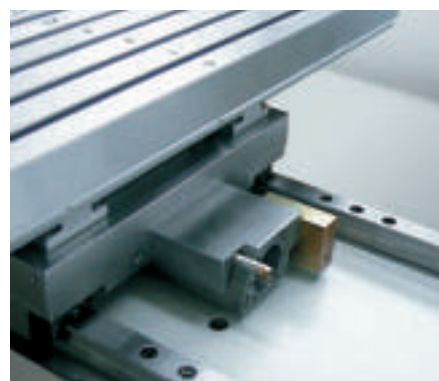
# The structure of the PICOMAX® 60: Solid, rigid, precise.

Optimum results in HSC milling may only be obtained if the electronic system is perfectly tuned to the precise and robust mechanics.

The in-house production of all essential machine parts forms the solid basis for reliable operation - day after day.



The customer is our trusted partner. A responsibility which Fehlmann takes on from A to Z. Our high level of production integration guarantees you quality on all levels.

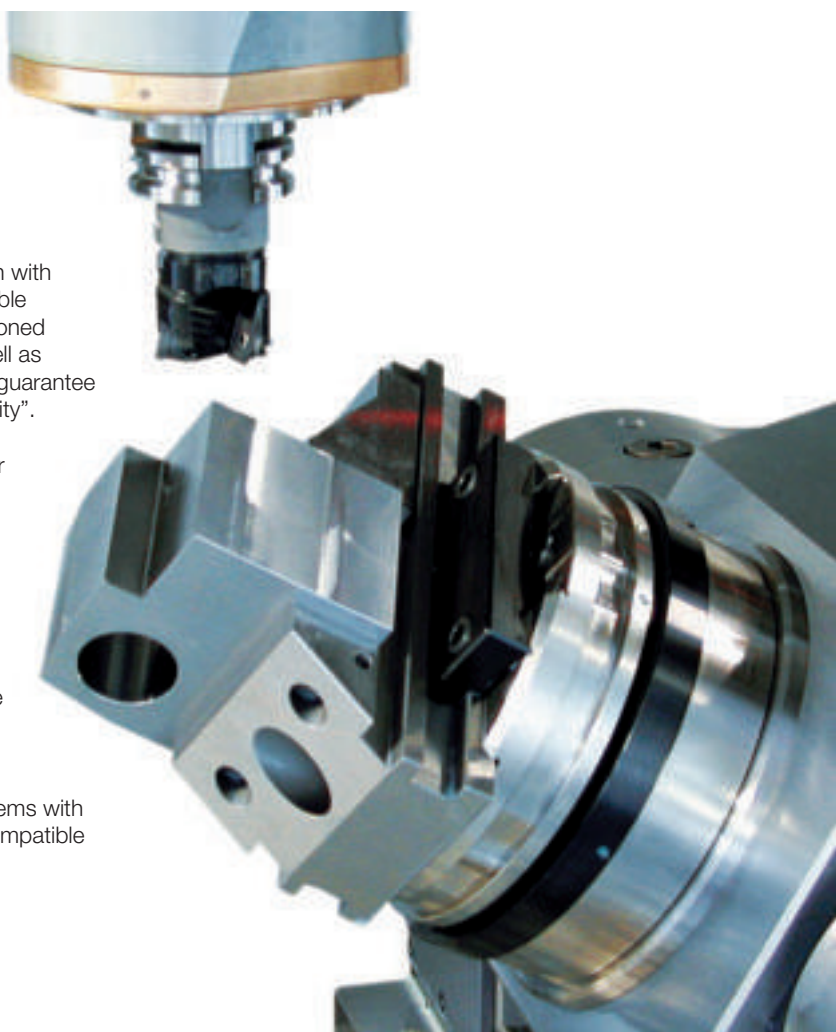


Ultimate final quality check in every machine using laser interferometer and cross-grid measuring device.

Machine construction in vertical column design with integrated coordinate table and generously dimensioned profile guideways, as well as glass scales in all axes, guarantee "jig boring machine quality". Completely digital drive technology in all axes for maximum dynamics.

Everything from a single source: Naturally, the complete dividing attachments are also developed and produced in-house.

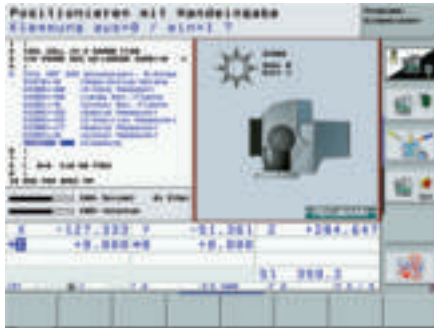
Which means: No problems with accessibility and non-compatible machine elements.



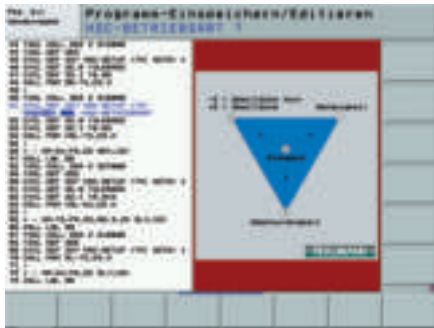


# The Heidenhain CNC control reflects the machine: Universal, versatile, flexible.

The fully digital HEIDENHAIN control unit meets all workshop requirements. It is suitable for processing simple mechanical parts that are programmed directly on the machine up to the complex 5-axis CAD/CAM program applications. Thanks to various built-in machining cycles developed by FEHLMANN, the control unit is perfectly attuned to the machine.



**Automatic detection of rotation centres.**  
In combination with the separately available tailstock, the FEHLMANN alignment cycle (optional) easily detects the rotation centres of the ATS dividing unit, with an accuracy of one thousandth of a millimetre. The cycle requires an alignment pallet or inspection cylinder.



**Perfect adjustment of the axis in each processing step.**  
The FEHLMANN-developed HSC-SETUP cycle for dynamically optimizing digital axis drive settings. For each tool, the focus can be placed either on processing speed, surface quality or accuracy.

- Free contour programming for insufficiently dimensioned contours.
- Heidenhain interactive programming and also DIN/ISO programming possible.
- Swivelling cycles support the programming of the dividing / swivelling attachment.
- Handbox
- Integrated hard disk for transferring of 3D programs of almost unlimited length.
- Fast-Ethernet network interface for high-speed data transmission from external programming stations.
- New FEHLMANN specific diagnosis system for fast troubleshooting.
- DXF converter for reading DXF contours (option).

Please ask for the detailed control unit brochure!

## Practical accessibility on two levels: operator-to-machine and spindle-to-dividing attachment.

The automatic dividing/swivelling attachment FEHLMANN ATS 160 set on top of the machine table. It can be mounted/dismounted quickly.

- Optimum accessibility of the work piece by the spindle, even in case of small parts with extremely short clamping area.
- 5-axis machining (picture: 5-face complete machining)
- With direct measuring system of the swivelling axis - maximum precision guaranteed.



- Reduction of set-up times and fast set-up/order change.
- Unhindered accessibility to the work piece.
  - Comfortable operation of the tool magazine.
  - Ergonomic arrangement of all operating elements.

## Handiness and easy accessibility are further valuable benefits in daily use.



The platform for efficient and precise working offers a perfectly ergonomic workplace.



Work comfortably - all machine elements are within easy reach and effortlessly accessible.



The angular arm with twin-gripper guarantees a precise, fast and simple loading of the tools. The disk magazine offers ample room and stations for the machining of demanding or sophisticated work pieces.



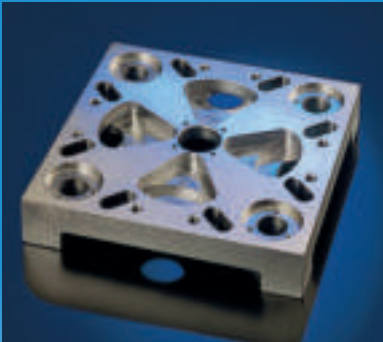
The compact pick-up changer comfortably fits 24 tools.



Virtually unlimited versatility and flexibility for all types of applications ...



**The all-rounder, up to 20,000 rpm**  
With its 20,000 revolutions per minute, this spindle may be used for most applications. Thanks to the perfect combination of torque, speed and quiet low-vibration operation you efficiently get all tasks done .. from roughing to fine finishing.



Steel 200 x 200



Copper 50 x 50



Hardened steel 240x164



Turnover plate drill Ø 40

... hand in hand with the appropriate spindles.

### Technical data

Repeat accuracy	mm	0.002
Speed range	rpm	50-20000
Output at S1 (100% ED)	kW	5.6
Output at S6 (40% ED)	kW	8.3
Max. torque at S6 and rated speed	Nm	63.9
Rated speed	rpm	1240



ISO 30

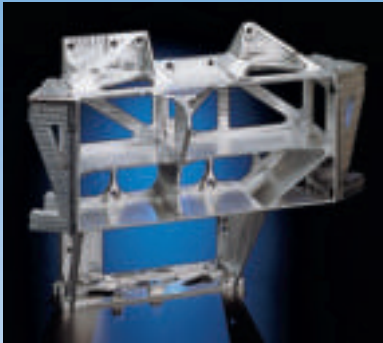
**The high speeder up to 30,000 or 36,000 rpm**  
These speeds allow for the use of the smallest of tools or for high feedrates. These spindles are the perfect solution for those who frequently work at speeds of over 20,000 rpm, but still have high demands on stability and rigidity.



Copper 130 x 80



Hardened steel 290 x 220



Aluminium for space technology 400x350



Copper 15x15

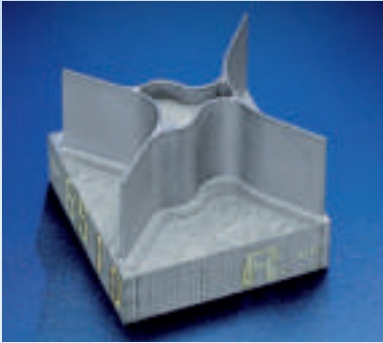
Repeat accuracy	mm	0.002
Speed range	rpm	50-30 000
Output at S1 (100% ED)	kW	11.5
Output at S6 (40% ED)	kW	15
Max. torque at S6 and rated speed	Nm	32.9
Rated speed	rpm	4360

Repeat accuracy	mm	0.002
Speed range	rpm	50-36 000
Output at S1 (100% ED)	kW	15.6
Output at S6 (40% ED)	kW	17.8
Max. torque at S6 and rated speed	Nm	14.6
Rated speed	rpm	11650



HSK-E50

**The fine solution, 42,000 rpm**  
This high-speed spindle with its 42,000 revolutions per minute was developed for small and medium-size machining applications.



Graphite 50 x 50



Brass Ø 50



Twist drill Ø 0,2



Copper 50x50

Repeat accuracy	mm	0.002
Speed range	rpm	50-42000
Output at S1 (100% ED)	kW	13
Output at S6 (40% ED)	kW	17
Max. torque at S6 and rated speed	Nm	5.4
Rated speed	rpm	30000



HSK-E40

**Tapping**  
Naturally the 4 spindles are suitable for tapping without compensation chuck. The machine synchronizes the feed movement with the spindle rotation (Z-S Interpolation).



**The selection of the correct spindle is essential.**  
New technologies and tools continue to open up new paths. We would be happy to advise you.





## Economic and profitable 4/5 axis machining with automatic dividing attachments.

### Dividing attachment AT 100

Precise automatic dividing, circular and helical milling, etc., centre height 100 mm.

*Please ask for our separate brochure for dividing attachments!*



Perfect accessibility - even small, fine parts may be machined using short standard tools.

The work pieces do not have to be "extended" to be clamped.

The use of a tail center grants the perfect stabilisation of long parts or swivelling bridges.



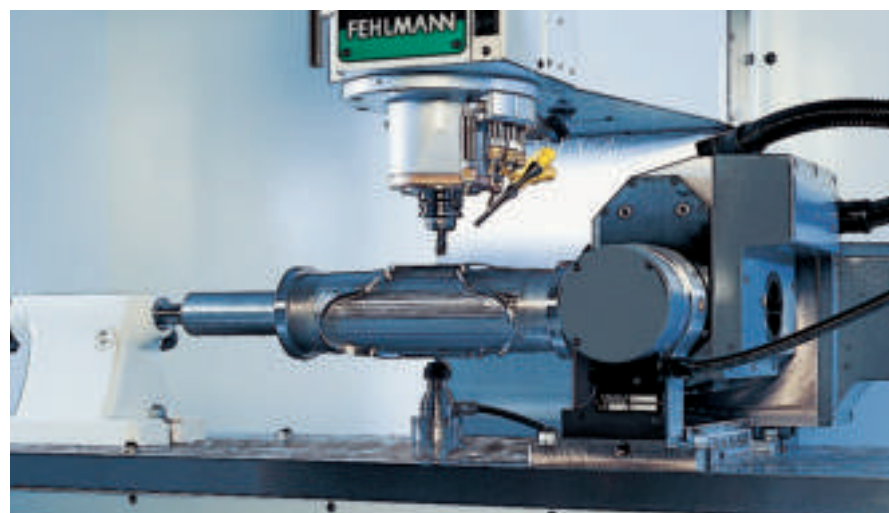
### Dividing attachment AT 125

To be used horizontally with pneumo-hydraulic spindle clamping. Ultracompact, high-precision dividing attachment for automatic dividing, circular and helical milling, etc., centre height 125 mm.

### 5-axis machining

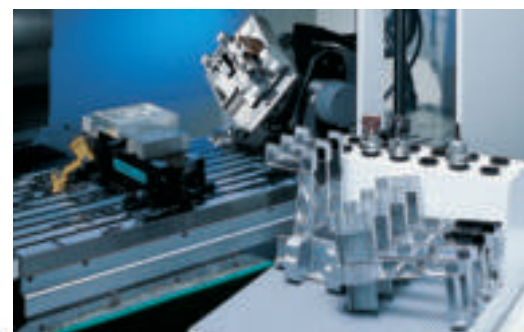
Automatic CNC dividing and swivelling attachments with pneumo-hydraulic clamping of both axes, which can be controlled simultaneously or simply be used as positioning axes. Very compact, solid and highly precise. Swivelling axis is fitted with double clamping.

For fully automatic dividing, circular and helical milling processes, etc. Fully digital drive technology.



### Dividing/swivelling attachment ATS 160

Centre height 160 mm  
Positioning measure via direct measuring system at swivelling axis.



Flexibility - you can easily use an additional vice next to dividing attachment on the spacious table.

*So why not let us advise you.*



**Individual options.  
Used precisely where they  
are required for diverse  
machining tasks.**

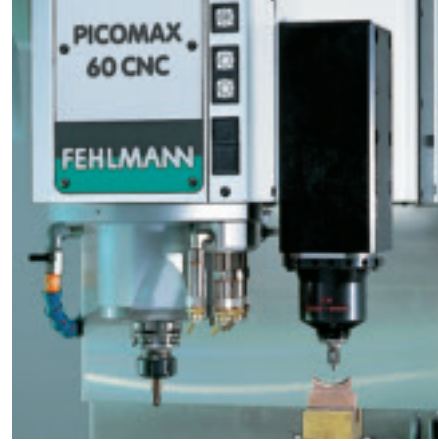


#### **Laser System**

Non-contact tool measurement and breakage detection directly on the machine. Precise length or diameter measurements in the  $\mu\text{m}$ -range of even the smallest part diameters, starting from 0.3, are possible - either stationary or rotating. The measured values are stored directly in the central tool file of the machine control unit. The tool is cleaned prior to each measurement.



For the machining of graphite parts, an efficient exhaust/disposal system can be integrated. Quick re-equipping for the machining of graphite is possible.



#### **Additional HF spindle**

for speeds up to 40 000 or 100 000 rpm. Simple installation - laterally mounted to the machine head (prepared mounting face, including mounting holes).



#### **Measuring probe**

for measuring the tool length and tool radius (single-edge measurement). The measuring values are automatically stored in the central tool memory via the TNC control unit. The measuring probe also allows for efficient tool breakage control.



#### **3D probe system**

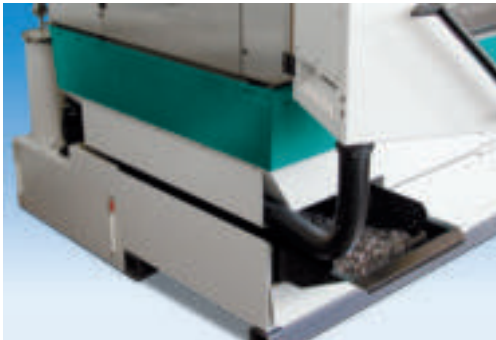
with infrared signal transmission to register the part zero point and for part measurement functions. Automatic eccentricity compensation thanks to 360° radiation.





#### Enhanced power-save function

Automatic standby mode of machine drives after processing the NC-programs. Re-start of the system automatically via electronic timer. This allows for unattended spindle and axes warm up.



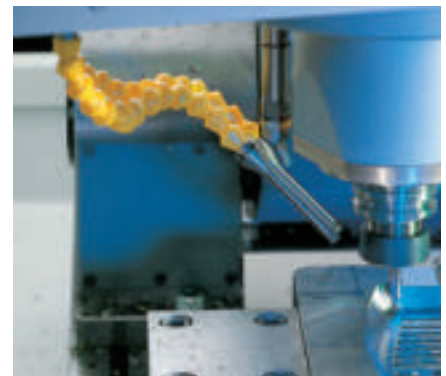
#### Standard coolant system

Coolant tank, chips container and workpiece shower.



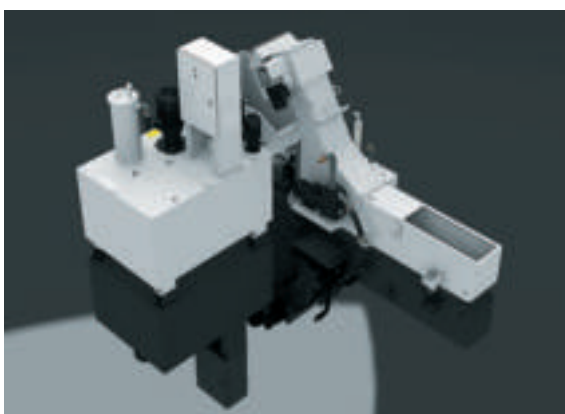
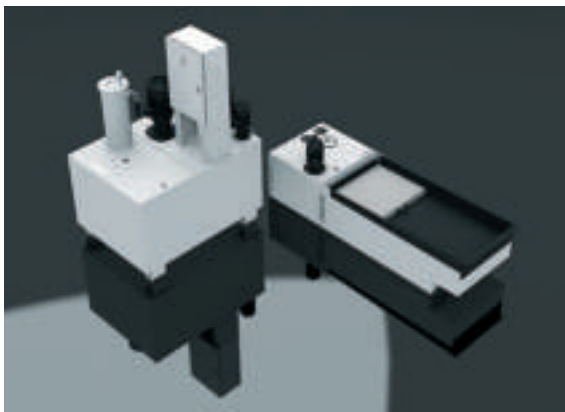
#### Bag filter to standard coolant system (option)

With suction lifting-pump for coolant filtering when working with fine chips.



#### Coolant system with auxiliary tank.

To keep the coolant temperature low even with high production output, an additional tank with 600 litre capacity is used. Consistent coolant quality is ensured through automatically actuated circulation system after two hours of inactivity. A high pressure pump (40 or 80 bar) allows the use of internally cooled tools.



#### Coolant system with auxiliary tank and chip conveyor.

The use of a coolant system (capacity 700 l) with chip conveyors is recommended for large amounts of chips, enabling larger batches to be processed without interruption. A high pressure pump for internally cooled tools is available with 40 or 80 bar.



#### Minimal Lubrication System

Economical cooling and lubrication system. Perfect for milling or high-speed cutting of materials such as aluminium, copper and hardened steels. The device is equipped with 2 nozzles and is controlled via M-functions.

#### Swivelling board

for the storage of measuring tools, work pieces, etc., including holders for 12 tools.

#### Drawers (standard)

Generously dimensioned drawers integrated in the base allow orderliness, good overview and quick access.



# PICOMAX® 60 -M / -HSC

## with 24 tool stations.



### Machine type

PICOMAX 60 -M	PICOMAX 60 -HSC	PICOMAX 60 -HSC
20000	30000	42000

### Travels

X travel	mm	505 for all models
Y travel	mm	355 for all models
Z travel	mm	610 for all models

### Table / work area

Clamping surface (length x width)	mm	920 x 380 for all models
T-slots: (width / spacing / number)		12 / 50 / 7 for all models
Distance between table and spindle nose	mm	84-694 100-720 114-724
Horizontal load	mm	405 for all models
Max. permissible table load	kg	250 for all models

### Spindle

Tool holder		ISO/SK 30	HSK-E50	HSK-E40
Repeatability	mm	0.002 for all models		
Speed range	rpm	50-20000	50-30000	50-42000
Output at S1 (100% ED)	kW	5.6	11.5	13
Output at S6 (40% ED)	kW	8.3	15.0	17
Max. torque at S6 and rated speed	Nm	63.9	32.9	5.4
Nominal rated speed	rpm	1240	4360	30000

### Tool changer

Magazine pockets standard		24	20	24
Magazine pockets optional		—	—	—
Max. tool diameter without free spaces	mm	up to Ø 63 for all models		
Max. tool diameter with free spaces	mm	up to Ø 100 for all models		
Max. tool length (from spindle nose)	mm	175 for all models		
Tool change time	sec	approx. 6 for all models		
Mean chip-to-chip time	sec	approx. 8 for all models		

### Feed rates

Digital AC drive with AC-motors		
X/Y/Z axis	mm/min	1-20000 for all models

### Position accuracies ISO 230, respectively VDI/DGQ 3441

Position tolerance P	mm	0.005 standard/0.003 increased for all models
Position variation range Ps	mm	0.003 standard/0.002 increased for all models

### Measuring system / Resolution

Direct measuring system with glass scale		
Resolution in X/Y/Z	mm	0.001 for all models
Pressurization		incl. for all models

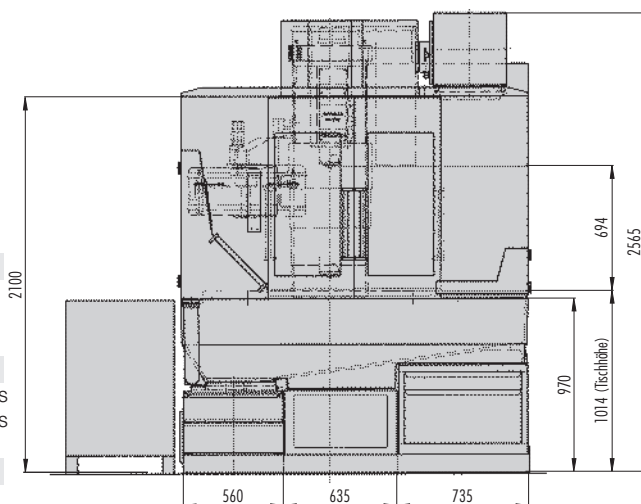
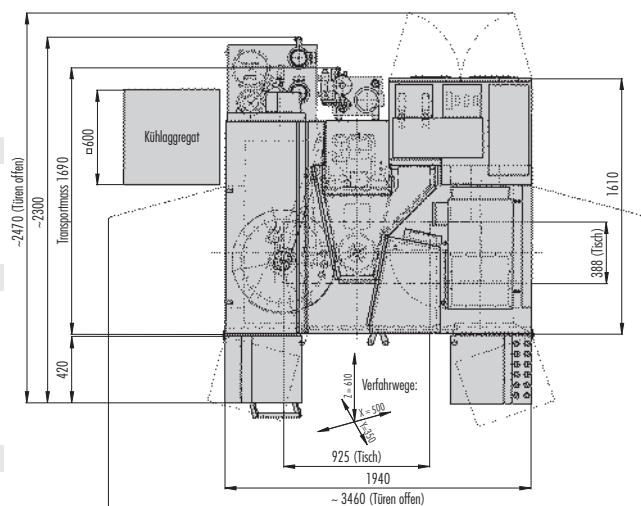
### Connecting data

Operating voltage and frequency	V/Hz	3x400/50 for all models
Recommended pre-fusing	A	32 AT 40 AT 32 AT
Pneumatics, operating pressure	bar	6 for all models

### Weight

Machine tool (excl. cooling medium)	kg	approx. 3350 for all models
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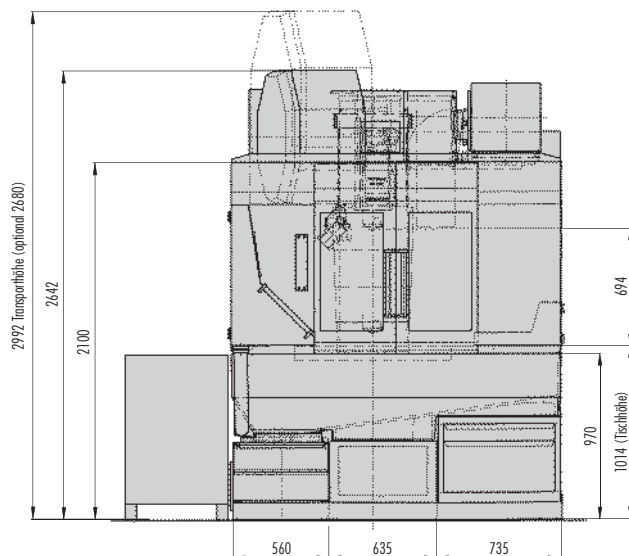
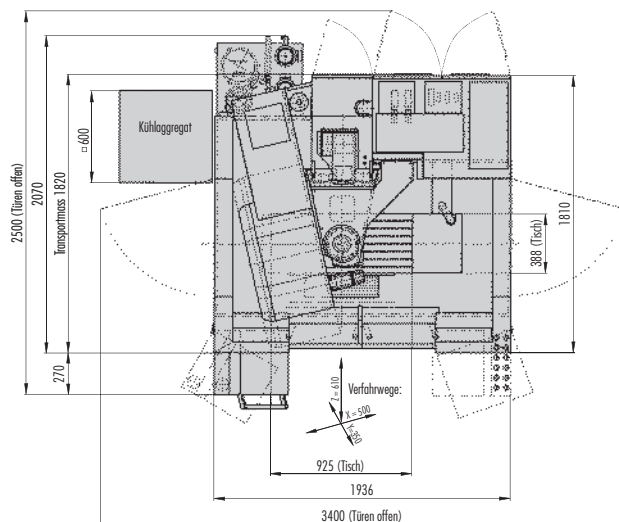
Subject to technical modifications.





# PICOMAX® 60 -M / -HSC

## with up to 48 tools.



### Machine type

PICOMAX 60 -M	PICOMAX 60 -HSC	PICOMAX 60 -HSC
20000	30000	36000

### Travel

X Travel	mm	505 for all models
Y Travel	mm	355 for all models
Z Travel	mm	610 for all models

### Table / work area

Clamping surface (length x width)	mm	920 x 380 for all models
T-slots: (width / spacing / number)		12 / 50 / 7 for all models
Distance between table and spindle nose	mm	84 - 694 100 - 720 100 - 720
Horizontal load	mm	405 for all models
Max. permissible table load	kg	250 for all models

### Spindle

Tool holder		ISO/SK 30	HSK-E50	HSK-E50
Repeatability	mm	0.002 for all models		
Speed range	rpm	50-20000	50-30000	50-36000
Output at S1 (100% ED)	kW	5.6	11.5	15.6
Output at S6 (40% ED)	kW	8.3	15.0	17.8
Max. spindle torque at S6 and rated speed	Nm	63.9	32.9	14.6
Nominal rated speed	rpm	1240	4360	11650

### Tool changer

Magazine pockets standard		32	28	28
Magazine pockets optional		48	42	42
Max. tool diameter without free spaces	mm	up to Ø 63 for all models		
Max. tool diameter with free spaces	mm	up to Ø 100 for all models		
Max. tool length (from spindle nose)	mm	260 for all models		
Tool change time	sec	approx. 5 for all models		
Mean chip-to-chip time	sec	approx. 8 for all models		

### Feed rates

Digital AC drive with AC-motors		
X/Y/Z axis	mm/min	1 - 20000 for all models

### Position accuracies ISO 230, respectively VDI/DGQ 3441

Position tolerance P	mm	0.005 standard / 0.003 increased for all models
Positioning variation range Ps	mm	0.003 standard / 0.002 increased for all models

### Measuring system / Resolution

Direct measuring system with glass scale		
Resolution in X/Y/Z	mm	0.001 for all models
Pressurization		incl. for all models

### Connecting data

Operating voltage and frequency	V/Hz	3x400/50 for all models
Recommended pre-fusing	A	32 AT 40 AT 40 AT
Pneumatics, operating pressure	bar	6 for all models

### Weight

Machine tool (excl. cooling medium)		
Standard changer	kg	approx. 3750 for all models
Optional changer	kg	approx. 3850 for all models

Subject to technical modifications.



## PICOMAX® 60 GRAPHITE

Fast, precise, clean.

For regular working of graphite and hardened parts, FEHLMANN offers these special GRAPHITE models.

These models include guideways and spindles with special scrapers. The complete machining area is cleaned by means of a blow and suction procedure and the switchgear cabinet is equipped with closed cooling system.



Suction of complete machining area by means of blow and suction procedure.



**Your Precision Advantage.®**

Please contact us. We shall be glad to supply you with further information.

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**Made in Switzerland**

# FEHLMANN