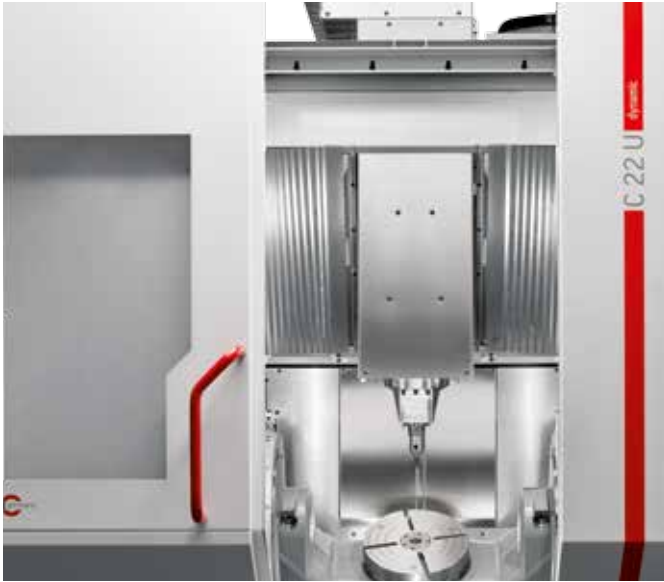


C 22  
[www.hermle.de](http://www.hermle.de)



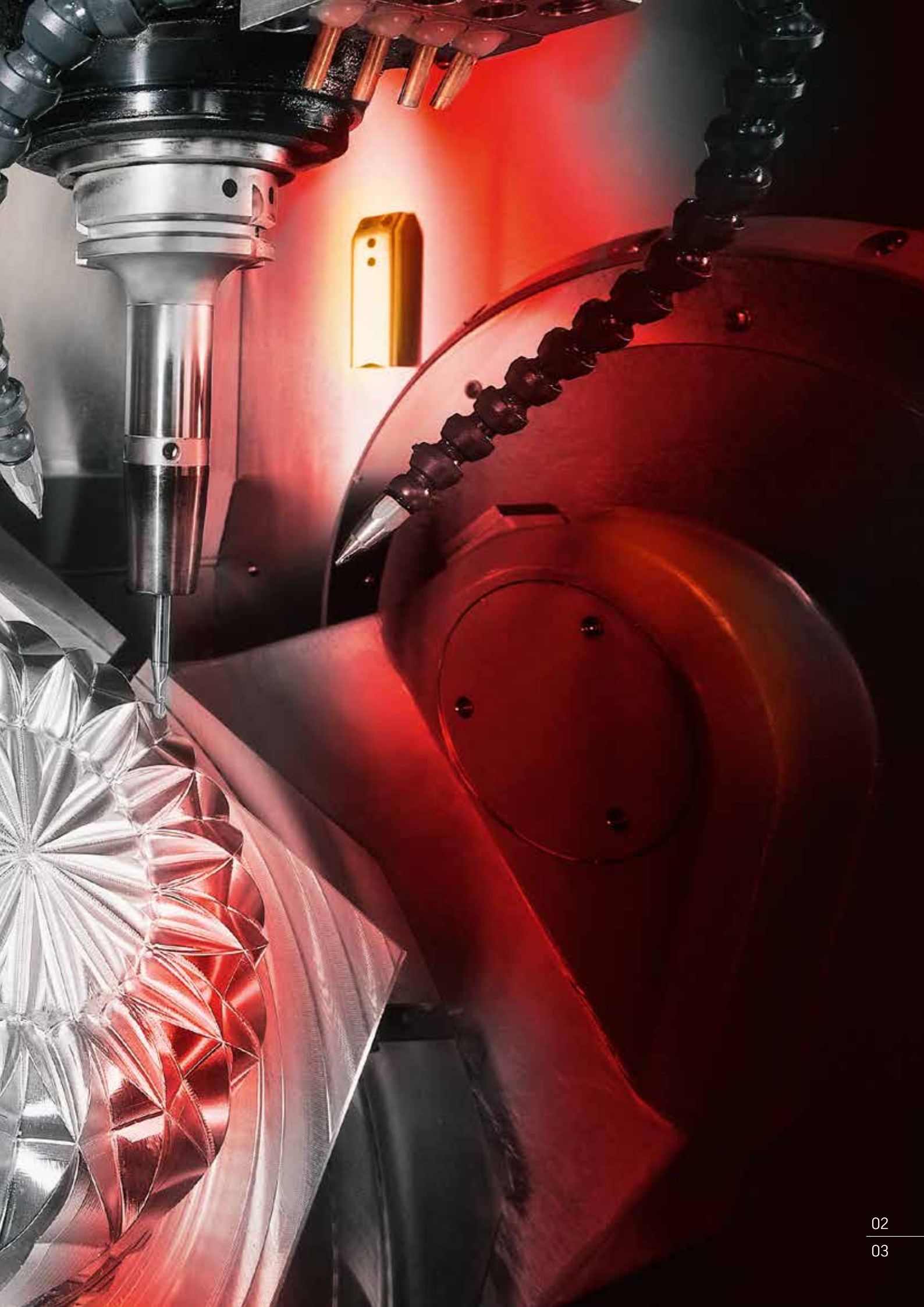
Milling at its best: Hermle machines are often at the forefront when it comes to optimized results.

The proverbial Hermle precision in conjunction with process consultation and project management has made us an important machine manufacturer in nearly all key sectors:

from large complex components to the smallest components in the high-tech area. Versatile applications, uncompromising results – Hermle “The Original”.







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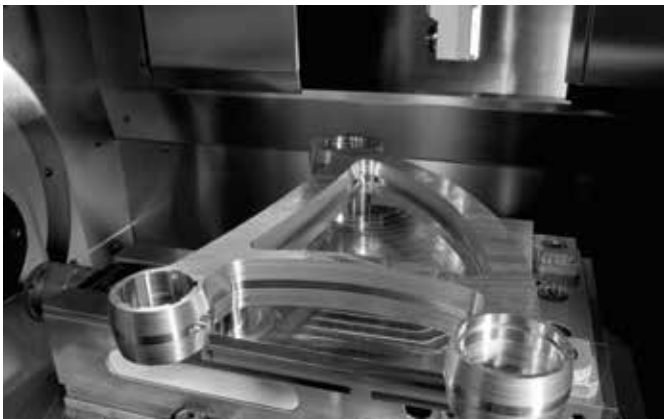




# 01 Industry sectors

Hermle is at home in all sectors. For us, ensuring the highest precision and reliable machining is always paramount. Our machines are made for daily operation, whether as linked linear segments in production or as stand-alone workshop machinery.

*Precision mechanics*



*Aerospace industry*



*Optical industry*



*Tool technology*





*Machine construction*



*Medical engineering*



*Tool and mould construction*



*Subcontractor industry*



# 01.1 Applications

Dynamic, precise and reliable Hermle's C 22 can provide highly dynamic processing of workpieces up to 300 kg in weight simultaneously in 5 axes. In particular, materials which are difficult to machine can be milled in record time and with perfect precision. This is achieved fully automatically right up to entire flexible production systems. Our systems are always extremely precise and ensure high machine availability.



## Maultasche

Simultaneously in 5 axes

Branch: automation  
Material: ABS  
Tool: VHM ball and end milling cutter  
Ø 2/4 mm  
Spindle: 18000 rpm  
Main power/torque: 80 Nm/25 kW

Top left



## Bottle form

Simultaneously in 5 axes with focus on highly polished surfaces

Branch: tool and mould making  
Material: AlMgSi1  
Tool: 0.3 mm finger milling cutter  
Spindle: 30000 rpm  
Main power/torque: 33 Nm/38 kW

Bottom left



## JU rump

Simultaneously in 5 axes

Branch: model making  
Material: AlMgSi1  
Tool: Torus/VHM end milling cutter  
Spindle: 18000 rpm  
Main power/torque: 80 Nm/25 kW

Left

## Shrouded impeller

Simultaneously in 5 axes

Branch: energy technology  
Material: 1.4313  
Tool: ball milling cutter Ø 6/8 mm and end milling cutter Ø 10 mm  
Spindle: 18000 rpm  
Main power/torque: 80 Nm/25 kW

Bottom



## Dental part

Simultaneously in 5 axes

Branch: medical engineering  
Material: chrome-cobalt  
Tool: Torus/VHM end milling cutter  
Spindle: 42000 rpm  
Main power/torque: 80 Nm/25 kW

Top





# 02

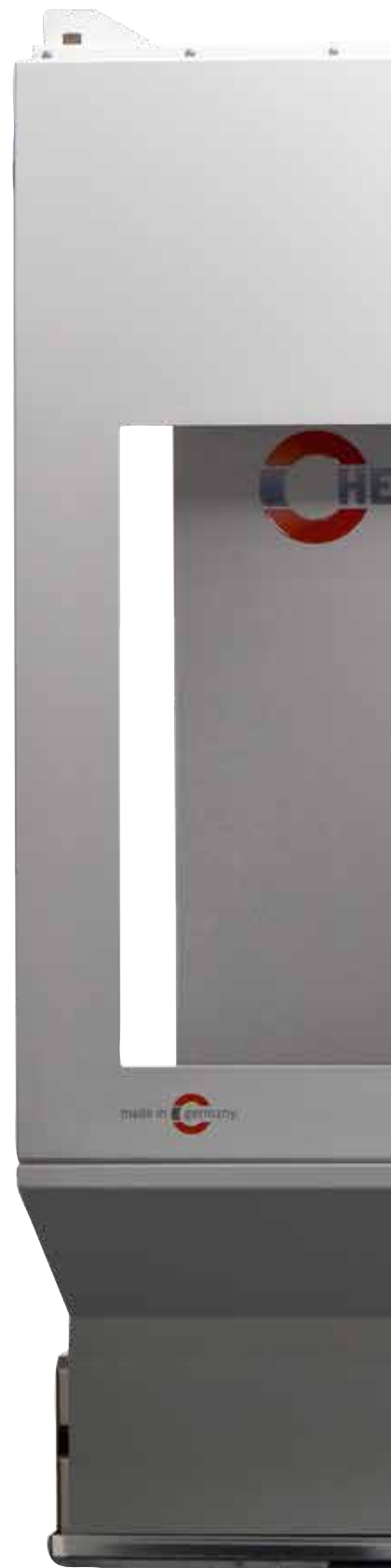
## The machine

The C 22: a highly dynamic machining centre designed consistently for 5-axis/5-side machining. Features galore to ensure high-precision, economical parts production. Numerous automation solutions extend the application range many times over.

### TECHNICAL DATA

<i>Traverse X-Y-Z:</i>	450 – 600 – 330 mm
<i>Speed:</i>	15000 / 18000 / 30000 / 42000 rpm
<i>Rapid linear traverse X-Y-Z (dynamic):</i>	30 (50) m/min
<i>Linear acceleration X-Y-Z (dynamic):</i>	8 (15) m/s <sup>2</sup>
<i>Control unit:</i>	iTNC 530 / TNC 640 / S 840 D sl
<i>Rigid clamping table:</i>	600 x 630 mm
<i>Max. table load:</i>	750 kg
<i>NC swivelling rotary tables:</i>	
<i>Table with worm:</i>	Ø 320 mm
<i>Swivelling range:</i>	+/- 135°
<i>A-axis speed:</i>	25 rpm
<i>C-axis speed:</i>	40 rpm
<i>Max. table load:</i>	300 kg
<i>Table with torque:</i>	Ø 320 mm
<i>Swivelling range:</i>	+/- 135°
<i>A-axis speed:</i>	25/55* rpm
<i>C-axis speed:</i>	80 rpm
<i>Max. table load:</i>	150 kg

\*with tandem drive

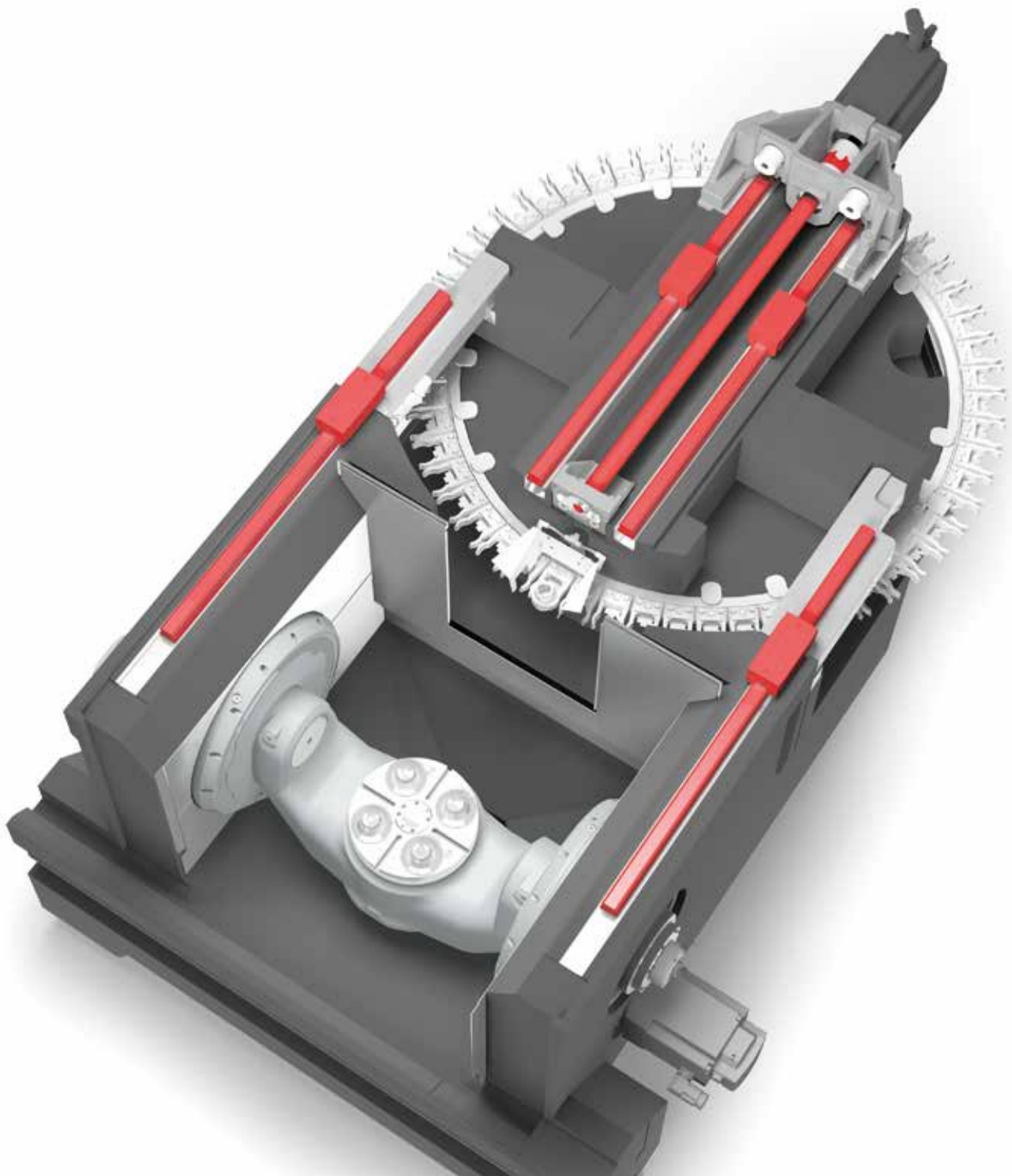




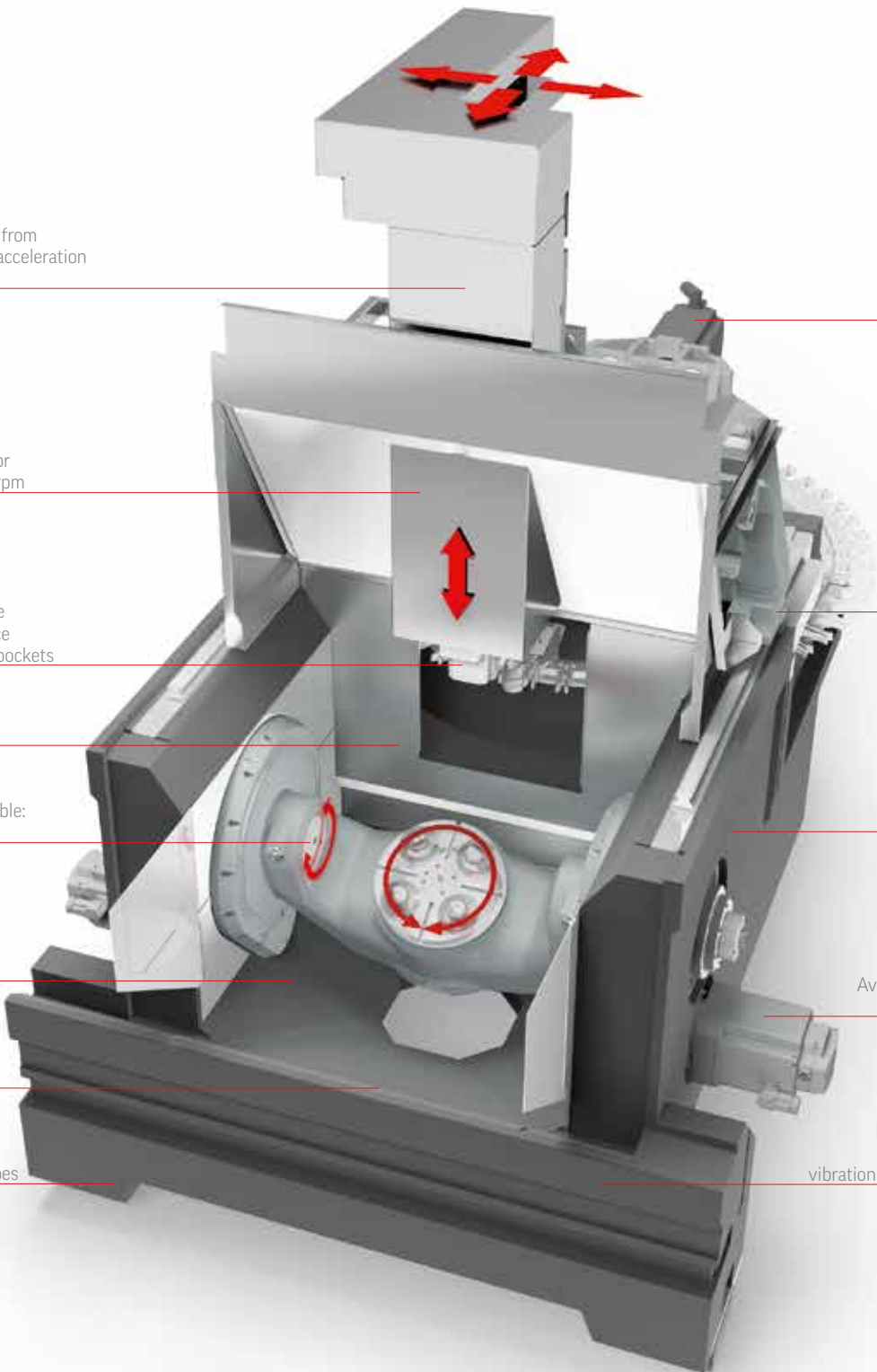


# 02.1

## A new dimension of dynamics







3 axes in a tool  
dynamics independent from  
workpiece with single acceleration  
of up to 15 m/s<sup>2</sup>

Central drive  
Centrally arranged  
Y axis main drive  
(directly driven ball  
screw spindle)

Collision protection  
with collision inquiry for  
spindles up to 18000 rpm

Force characteristics:  
4 guideways  
with one guide  
shoe for ideal  
force balance

Large pick-up magazine  
integrated to save space  
with up to 55/65 tool pockets

Optimum chip ejection,  
no interfering edges,  
made of stainless steel

Swivelling range of the  
NC swivelling rotary table:  
+135° to -135°

Modified gantry  
design with optimum  
main axis support

Large, almost cubic/  
homogeneous  
working area  
for high flexibility  
in 5-axis machining

Tandem drive  
mechanical / Torque  
Avoidance of torsion and  
high accuracy

Accessibility  
750-mm door opening  
and excellent  
ergonomics

4-point installation  
with calotte wedge shoes

Mineral casting design  
with excellent  
vibration dampening properties

# 02.2

## The workpiece

Many important points must be observed in order to guarantee that every workpiece is machined perfectly. For this reason, Hermle has been working on perfecting and optimising the machining process for many years. This is the reason that the C 22 is now equipped with:

- The largest working area relative to the installation area
- The largest swivelling range of workpieces in the working area
- Utilisation of the entire traverse range
- A large collision circle between the table flanges

### THE WORKPIECE DIMENSION

- Unhindered crane loading from directly above the table centre
- When loading the crane the spindle moves to the magazine – this means the working area is completely clear and accessible
- Extensive automation solutions for optimum workpiece handling



*3-axis*

*450 x 600 x 330 mm*

*max. 750 kg*



*5-axis*

*Ø 450 x 370 mm*

*max. 300 kg*

*collision circle Ø 620 mm*

*max. vertical table  
clearance 470 mm*





*3-axis machining*

*5-axis machining*



# 02.3

## Ergonomics

Built for daily use: the Hermle C 22 can be ergonomically adapted for every machine operator for optimum ease of use, simple operation and uncomplicated maintenance.

### HIGHLIGHTS

- *Ergonomic control panel:*
  - Adjustable height +/- 100 mm
  - Tilting screen 0 - 30°
  - 19" screen
  - Control panel pivotable from the tool loading point to the working area
- Optimum loading height
- Crane loading
- Minimum interval between table and operator
- Large door opening
- Lockable fluid box

Screen pivotable  
by up to 30°



Practical,  
slide-in storage

Control panel  
+/-100 mm  
height adjustable



*Door opening 754 mm*

*Max. vertical table clearance 470 mm*

*Loading height 900 mm*

*Control panel pivotable*



## 02.4 Table variants

Hermle's NC swivelling rotary table has revolutionised the concept of 5-axis machining. Also with the C 22, five axis operation is a key attribute, this capability is enhanced through the use of a worm gear driven table on the entry machine, and a torque drive on the highly dynamic version. All tables are manufactured exclusively and entirely at our plant in Gosheim.

Uncompromised perfection: This drive design accesses the gear on the table housing directly and so completely eliminates shaft torsion. This is the only way to achieve the highest precision for both one-sided and tandem drives.





# 02.4

## Table variants

Made in Germany – made in Gosheim: the C 22 table variants stand for the highest quality and optimum material usage from the cast housing to the installed gearbox and torque motors. At our main plant in Gosheim, these tables are laying the foundations for the precision, accuracy and quality of the machined surfaces.



### TECHNICAL DATA

*High degree of freedom in working area*

- *Very high table load (up to 300 kg with the highest accuracy)*
- *No accumulation of chip on the table (swivel table)*
- *Swivelling axis A and rotary axis C are located within the workpiece (U-shape)*
- *Torsion prevented by tandem drive*
- *Wide spacing between the A axes flanges results in a very large collision circle*
- *High swivelling range for undercuts*

#### Worm table

- *Generously dimensioned worm gear*
- *Low torsion attachment*
- *Direct, absolute measuring system*

#### Torque table

- *High dynamics on the A and C axes*
- *No wear*
- *Direct, absolute measuring system*



Hermle tables are equipped with cutting edge drive technology for high dynamic performance during 5 axis machining, as it is the slowest axis that determines the speed when milling in 5 axes. High-torque motors and the adapted gearbox can position loads of up to 300 kg rapidly and, most importantly, with exceptional precision.

## *DRIVE TECHNOLOGY*

- *Central table load*
- *Drive directly on table housing = low torsion A axis*
- *Direct, absolute measuring system*
- *Good maintenance accessibility*
- *A axis integrated in machine bed*

### *One-sided drive*

- *Mechanical drive on left of table housing*



### *Tandem drive*

- *Mechanical tandem drive to left and right of table housing*



# NC swivelling rotary table

Drive type of C axis: Worm

The NC swivelling rotary table "Worm" equals the standards of the torque table, apart from the dynamics. It is an ideal introduction to the world of 5-axis technology.



Clamping surface:	Ø 320 mm
T-grooves:	star-shaped 4 units / 14 H7
Swivelling range:	+/- 135°
Drive type of C axis:	worm
Speed - rotary axis C:	40 rpm
Speed - swivelling axis A (one-sided drive):	25 rpm
Maximum table load:	300 kg



Table plate with clamping surface . Ø 450 x 360 mm



System table with table plate . Ø 320 mm  
(Ø 450 x 360 mm)



Zero-point clamping systems / pallet clamping systems



Installation clamping device . SK 50



Installation clamping device . HSK 100

# NC swivelling rotary table

Drive type of C axis: Torque



The "Torque" NC swivelling rotary table provides the ideal conditions for highly dynamic 5-axis and 5-axis simultaneous machining.



System table with table plate . Ø 320 mm



Zero-point clamping systems / pallet clamping systems



Clamping surface:	Ø 320 mm
T-grooves:	star-shaped 4 units / 14 H7
Swivelling range:	+/- 135°
Drive type of C axis:	torque
Speed - rotary axis C:	80 rpm
Speed - swivelling axis A (one-sided drive):	25 rpm
Speed - swivelling axis A (tandem drive):	55 rpm
Maximum table load:	150 kg

## Rigid clamping table

Clamping surface: 630 x 600 mm

Equipped with the rigid clamping table, the machine can deal with clamping weights of up to 750 kg – ideal for 3-axis machining of large, bulky and heavy workpieces.  
T-grooves: parallel 10 units / 14 H7





# 02.5 Spindles



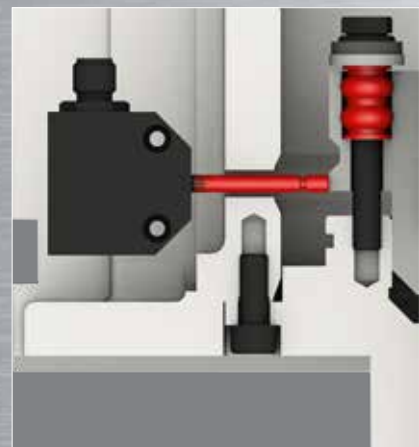
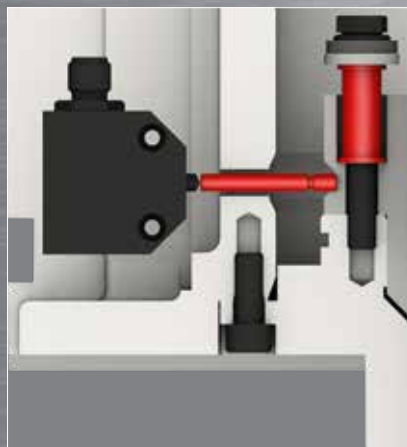
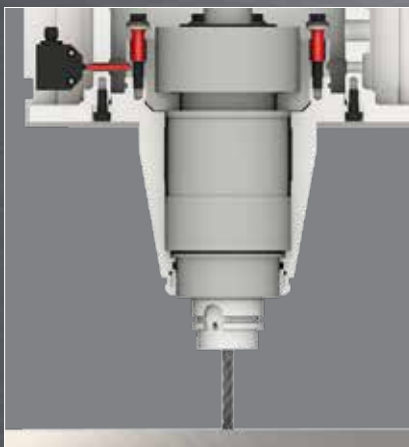
The C 22 can be equipped with two-piece or compact spindles. All spindles can be replaced quickly and easily in case of failure. With the different speed ranges and tool holding fixtures the spindles are suitable for a wide variety of machining tasks. Like the tables, all spindles are manufactured exclusively and entirely at our plant in Gosheim.

## TECHNICAL DATA

- High-tech spindles for demanding milling processes
- Slim-end spindle for machining deep cavities
- Few projecting edges (prevention of collision)
- Two-part spindle (faster, easier replacement)
- Collision protection (collision sleeves) prevents damage in 50 % of collisions

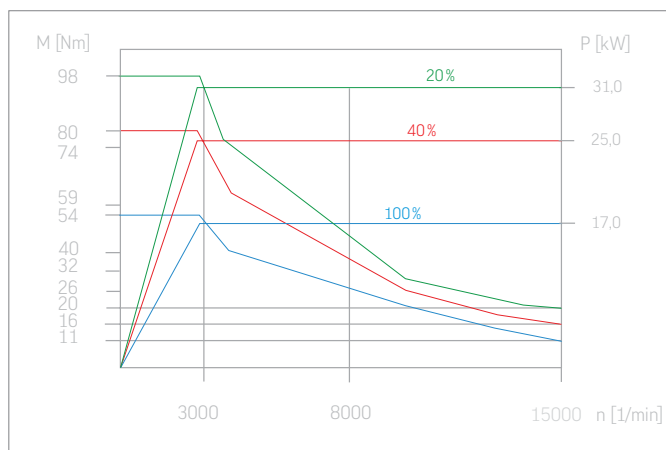
### *Collision protection with collision inquiry*

*Each spindle has several collision sleeves which compensate collision energy in the Z direction.*



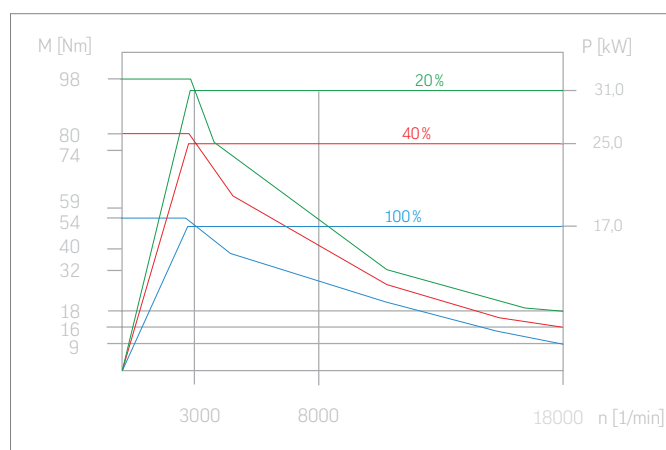


## Spindle 15000 rpm



**Maximum spindle speed:** 15000 rpm  
**Main Power 20 % c.d.f.:** 31 kW  
**Torque 20 % c.d.f.:** 98 Nm  
**Tool holding fixture:** SK 40  
**Spindle:** two-piece  
**Collision protection:** collision sleeves

## Spindle 18000 rpm

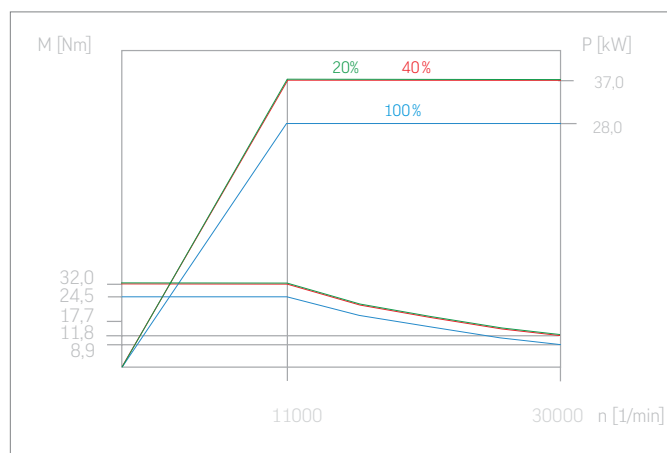


**Maximum spindle speed:** 18000 rpm  
**Main Power 20 % c.d.f.:** 31 kW  
**Torque 20 % c.d.f.:** 98 Nm  
**Tool holding fixture:** HSK A 63 / HSK A 50  
**Spindle:** two-piece  
**Collision protection:** collision sleeves



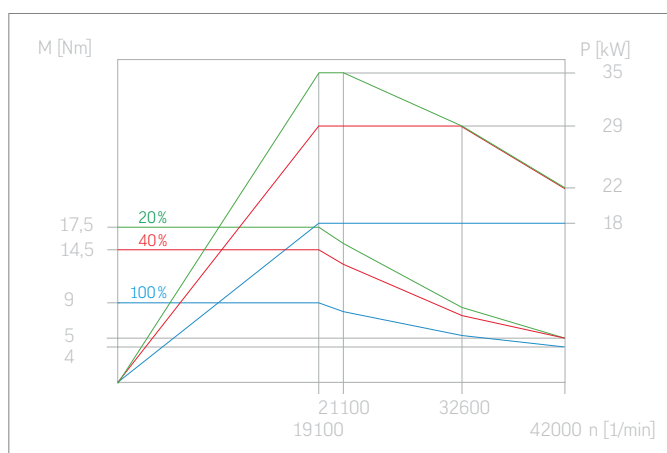


## Spindle 30000 rpm



Maximum spindle speed: 30000 rpm  
 Main Power 20 % c.d.f.: 37 kW  
 Torque 20 % c.d.f.: 32 Nm  
 Tool holding fixture: HSK A 50  
 Spindle: compact

## Spindle 42000 rpm



Maximum spindle speed: 42000 rpm  
 Main Power 20 % c.d.f.: 35 kW  
 Torque 20 % c.d.f.: 17.5 Nm  
 Tool holding fixture: HSK E 40  
 Spindle: compact



# 02.6

## High-performance machining

The C 22 with the 18000 spindle is a machining miracle. 473 cm<sup>3</sup>/min in alloyed heat-treated steel shows what this machining centre can do – and still at the highest levels of precision.

### Main spindle

Speed:	18000 rpm
Torque:	98 Nm
Main power:	31 kW
Interface:	HSK A 63
Collision protection:	collision sleeves

### Material

**42CrMo4V (1.7225)**  
Alloyed heat-treated steel for workpieces with higher stress resistance and larger tempering diameter.  
42CrMo4V is used for gear shafts, gearwheels, worms  
Tensile strength: 1000 – 1200 N/mm<sup>2</sup>  
(see CK 45: 650 – 800 N/mm<sup>2</sup>)

### Face milling

Material:	42CrMo4V
Tool:	face milling head D=63 mm with indexable inserts
Spindle speed:	1515 rpm
Vc:	300 m/min
Feed:	2272 mm/min
Fz:	0.3 mm
Depth of cut:	4.0 mm
Width of cut:	50.0 mm
Material removal rates:	473 cm <sup>3</sup> /min

### High-feed milling

Material:	42CrMo4V
Tool:	high-feed mill D=50 mm with indexable inserts
Spindle speed:	1900 rpm
Vc:	300 m/min
Feed:	9163 mm/min
Fz:	1.2 mm
Depth of cut:	1.2 mm
Width of cut:	42.5 mm
Material removal rates:	467 cm <sup>3</sup> /min

### Solid drilling

Material:	42CrMo4V
Tool:	solid drill D=40 mm with indexable inserts
Spindle speed:	1877 rpm
Vc:	230 m/min
Feed:	282 mm/min
Vu:	0.15 mm
Material removal rates:	337 cm <sup>3</sup> /min



# 02.7

## The magazine

The C 22's tool magazine holds up to 65 tools in the standard version and is integrated into the machine bed to save space. It can be filled from the side by swivelling the control panel to the loading point.

### TECHNICAL DATA

*Pick-up magazine*

*High number of tools with revolving ring magazine*

*Excellent accessibility*

*Control panel pivotable to the loading point*

*Tool change positions with blowing nozzles*

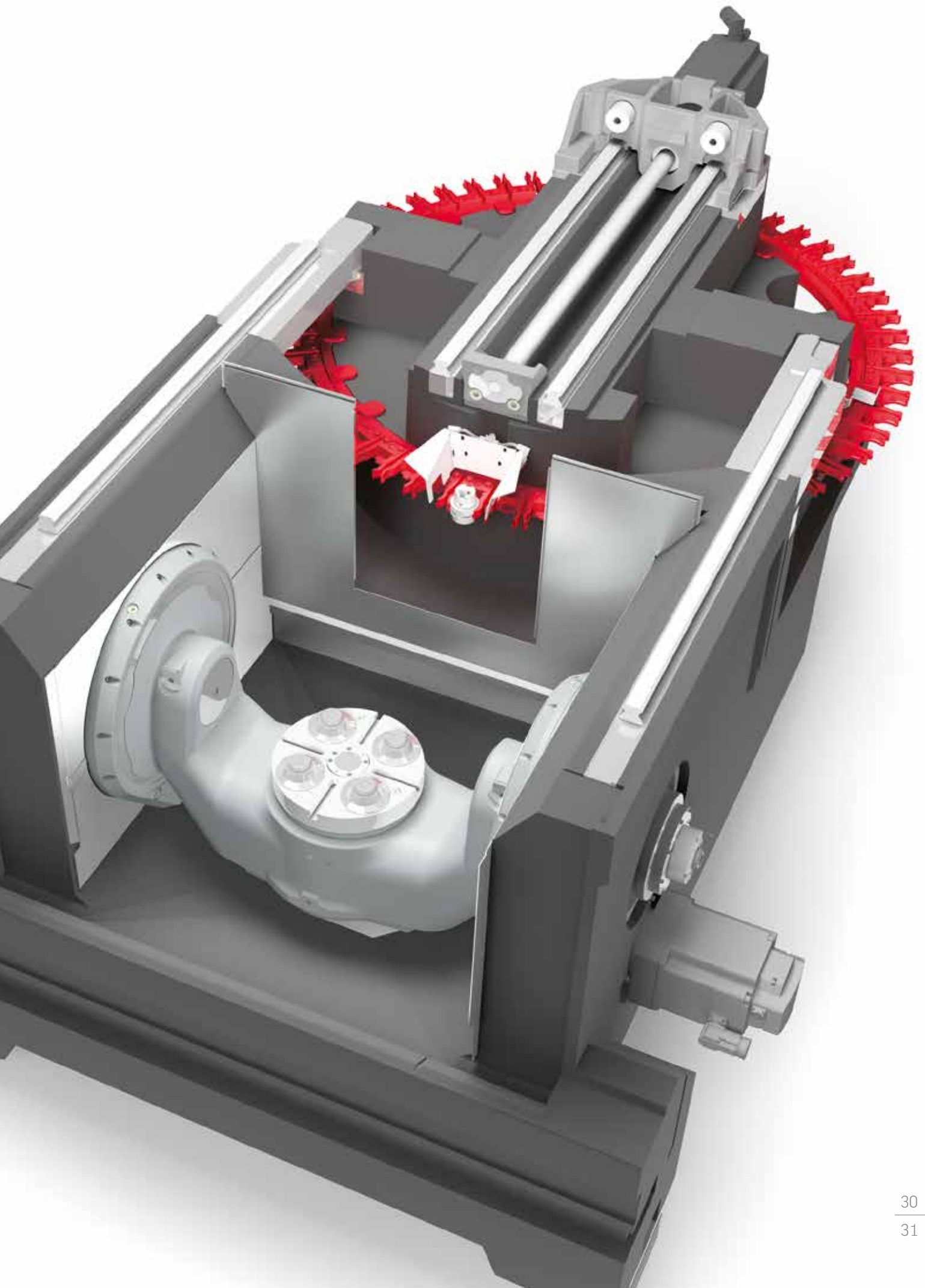
*Tool changer (pick-up)*

Interface:	SK 40 / HSK A 63	HSK A 50	HSK E 40
Magazine pockets:	55	65	65
Max. tool weight:	8 kg	6 kg	2.5 kg
Max. tool diameter:	Ø 80	Ø 65	Ø 65
	(with empty adjacent pockets Ø 125 mm)		
Max. tool length:	250 mm	250 mm	250 mm
Max. magazine load:	220 kg	195 kg	163 kg
Chip-to-chip time*:	4.5 s	4.5 s	4.5 s

\*(chip-to-chip times for 3-axis units calculated in keeping with German standard VDI 2852, page 1)







### Additional magazine ZM 43 / ZM 87



Magazine pockets:	43 / 87
Max. tool weight:	
SK 40 / HSK A 63:	8 kg
HSK A 50:	6 kg
HSK E 40:	2.5 kg
Max. tool diameter:	
SK 40 / HSK A 63:	Ø 80
HSK A 50 / HSK E 40:	Ø 65
with empty adjacent pockets:	Ø 125 mm
Max. tool length:	250 mm

### Additional magazine single



Magazine pockets:	192
Max. tool weight:	
SK 40 / HSK A 63:	8 kg
HSK A 50:	6 kg
HSK E 40:	2.5 kg
Max. tool diameter:	
SK 40 / HSK A 63:	Ø 80
HSK A 50 / HSK E 40:	Ø 65
with empty adjacent pockets:	Ø 125 mm
Max. tool length:	250 mm

### Additional magazine double



Magazine pockets:	462
Max. tool weight:	
SK 40 / HSK A 63:	8 kg
HSK A 50:	6 kg
HSK E 40:	2.5 kg
Max. tool diameter:	
SK 40 / HSK A 63:	Ø 80
HSK A 50 / HSK E 40:	Ø 65
with empty adjacent pockets:	Ø 125 mm
Max. tool length:	250 mm





# 02.8

## Control unit

The C 22 can be equipped with two types of control unit. All control units provide diverse program functions. Hermle simplifies programming and operation still further with comprehensive extra features.

### Heidenhain

#### Heidenhain TNC 640

- The TNC 640 comes with all the following functions of the iTNC 530
- Incl. Dynamic Efficiency – Active Chatter Control (ACC), Adaptive Feed Control (AFC), trochoidal milling
- Incl. Dynamic Precision – Cross Talk Compensation (CTC), Active Vibration Damping (AVD)

#### Heidenhain iTNC 530 HSCI

- 19" TFT colour flat screen
- Keyboard unit with full keyboard, integrated trackball, USB and Ethernet interfaces
- Fully digital with HSCI interface and EnDat interface
- Programming in Heidenhain plain text with smarT.NC or per DIN/ISO
- Standard drilling and milling cycles
- Touch probe system cycles
- Free contour programming
- Special functions for fast 3D machining
- Automatic calculation of cutting data
- Pallet management
- Software option Kinematic Opt (Measurement cycle for improving accuracy of rotational and swivelling operations)



For further advantages and detailed technical data, please see the Heidenhain brochures.

### Siemens

#### Siemens S 840 D sl

- 19" TFT colour flat screen
- Keyboard unit with full keyboard, additional panel with integrated trackball, key-operated switch and buttons, USB and Ethernet interfaces
- Complete and flexible diagnostics and service concept
- All inverter and control components are connected with each other by the Drive-Cliq-Interface
- Including shell transformation, 5-axis transformation, process-oriented measuring, 3D tool radius compensation and Spline-Interpolation
- Incl. software option Kinematic Opt (Measurement cycle for improving accuracy of rotational and swivelling operations)
- Tool management for all machines HTDI
- Operating Interface OPERATE with ShopMill
- SINUMERIK MDynamics incl. Advanced Surface
- High Speed Settings - CYCLE832



For further advantages and detailed technical data, please see the Siemens brochures.





# 02.8

## Control unit

### Hermle control tools



#### Hermle "Tool Management Control"

Simple, Hermle tool management for Heidenhain controls.



#### Hermle "Adaptive Feed Control"

In adaptive feed control (AFC), the feed rate is automatically controlled (depending on the percentage of spindle output).



#### Hermle "Tool Data Information"

Simple, Hermle tool management for the Siemens S 840 D sl.



#### Hermle "Wear Diagnosis System"

Machine status is continually monitored by the Hermle wear diagnosis system. It facilitates rapid machine diagnostics and status-oriented detection of maintenance tasks.



#### Hermle "Automation Control System"

Simple, Hermle pallet management software.

### Hermle setups

#### Standard

##### Standard

- Standard setting.
- Switches back to the standard setting after a different setup has been used.

#### Heavy Duty Machining

##### Heavy duty machining

- For roughing in conjunction with high milling power.
- Greater machining performance possible thanks to reduced machine vibration (depending on the tool and the selected technology data).

#### High Production

##### Production

- Quicker machining with programs which have many cycle calls or subprograms.





# 02.9

## The details

The C 22 is built using an elegant cassette panel construction. This high-tech building block concept is used throughout from the standard machine to the flexible manufacturing system. The machining centre can be transported without any disassembly and set up without a foundation. Furthermore, all units are arranged for easy maintenance and servicing.

*Comprehensive fluid technology*

*Optimised chip management*

*Diverse cooling lubricant units*

*Cooling units, fluid box and switch cabinet integrated in the compact machine enclosure*

*Space-saving chip conveyor ejector for maintenance and service*



Space-saving chip conveyor arrangement





Chip drawer, left



Chip drawer, right



Chip conveyor, left



Chip conveyor, right



Chip conveyor, rear



Chip conveyor  
with internal cooling lubricant supply, left



Chip conveyor  
with internal cooling lubricant supply, right



Chip conveyor  
with internal cooling lubricant supply, rear



Chip conveyor with recoiling unit  
and internal cooling lubricant supply, left



Chip conveyor with recoiling unit  
and internal cooling lubricant supply, right

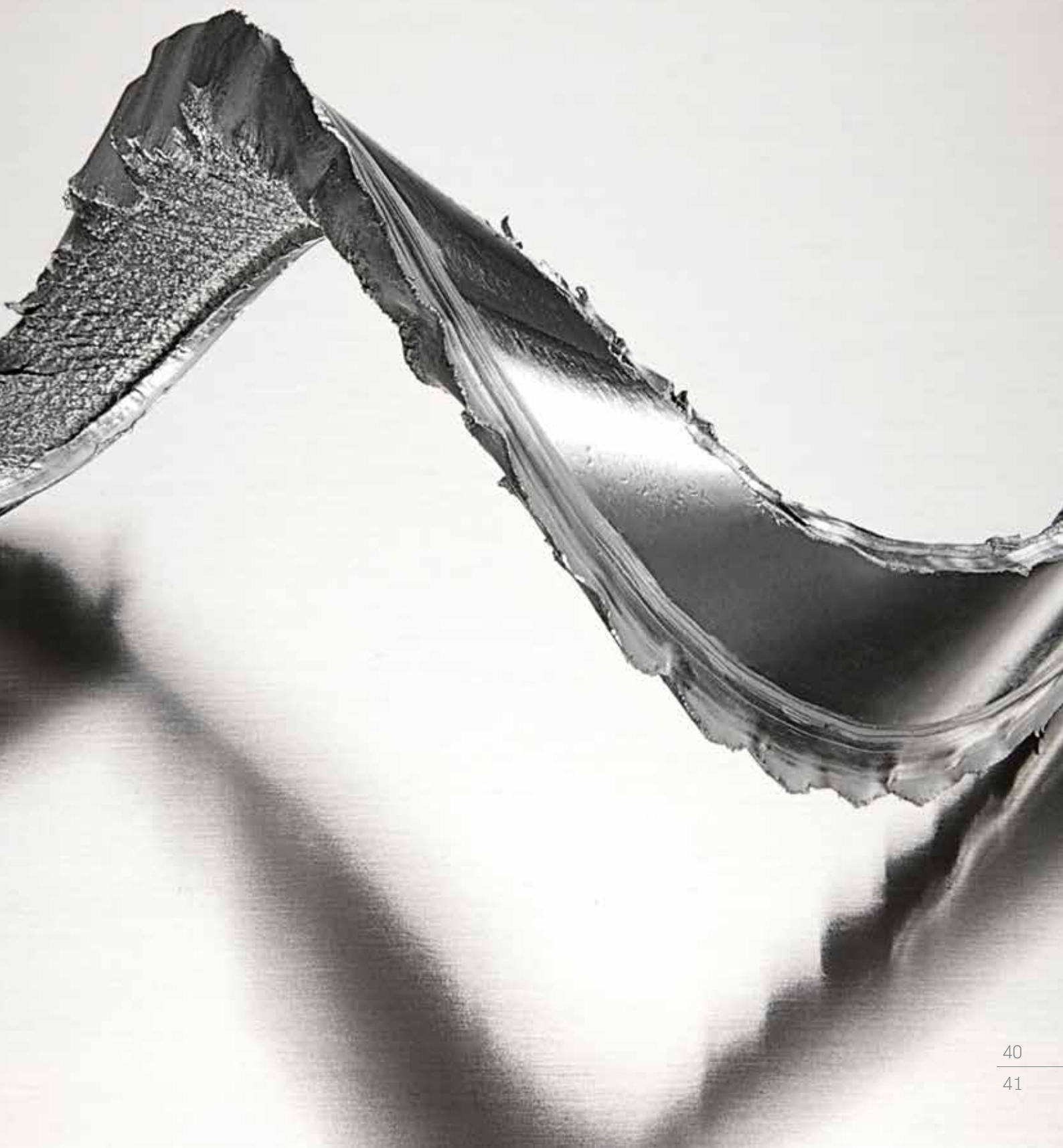


Chip conveyor with recoiling unit  
and internal cooling lubricant supply, rear

03

Technical data . C 22





# 03.1

## Technical data . C 22

<b>Working area</b>	Traverse	X axis	450 mm
	Traverse	Y axis	600 mm
	Traverse	Z axis	330 mm
	Rapid linear traverse (dynamic)	X-Y-Z	30 (50) m/min.
	Linear acceleration (dynamic)	X-Y-Z	8 (15) m/s <sup>2</sup>
	Linear feed force	X-Y-Z	4500 N
	Max. vertical table clearance		470 mm
	Max. workpiece diameter		Ø 450 mm
	Max. workpiece height		370 mm
<b>Main spindle drive</b>	Speed	15000 rpm	SK 40 ●
	Main power/Torque	20% c.d.f.	31 kW / 98 Nm
	Speed	18000 rpm	HSK A 63 / HSK A 50 ○
	Main power/Torque	20% c.d.f.	31 kW / 98 Nm
	Speed	30000 rpm	HSK A 50 ○
	Main power/Torque	20% c.d.f.	37 kW / 32 Nm
	Speed	42000 rpm	HSK E 40 ○
	Main power/Torque	20% c.d.f.	35 kW / 17.5 Nm
<b>Control unit</b>	Heidenhain	iTNC 530 / TNC 640	●
	Siemens	Sinumerik 840 D sl	○
<b>Tool changer (pick-up)</b>	Interface	SK 40 / ● HSK A 63 ○	HSK A 50 ○ HSK E 40 ○
	Magazine pockets	55	65
	Chip-to-chip time*	approx. 4.5 s	approx. 4.5 s
	*(chip-to-chip times for 3-axis units were calculated in keeping with German standard VDI 2852, page 1)		
	Max. tool length	250 mm	250 mm
	Max. tool diameter	Ø 80 mm	Ø 65 mm
	with empty adjacent pockets	Ø 125 mm	Ø 125 mm
	Max. magazine load	220 kg	195 kg
			163 kg



<b>Extension of tool storage capacity</b>	Additional magazine ZM 43		Additional 43 pockets	○
	Additional magazine ZM 87		Additional 87 pockets	○
	Additional magazine single ZM 192		Additional 192 pockets	○
	Additional magazine double ZM 462		Additional 462 pockets	○
	Interface	SK 40 / HSK A 63	HSK A 50	HSK E 40
	Max. tool length	250 mm	250 mm	250 mm
	Max. tool diameter with empty adjacent pockets	Ø 80 mm Ø 125 mm	Ø 65 mm Ø 125 mm	Ø 65 mm Ø 125 mm
	Max. tool weight	8 kg	6 kg	2.5 kg
<b>Table variants*</b>	NC swivelling rotary table	Ø 320	Ø 320	
	Table plate with clamping surface	Ø 320 mm	Ø 320 mm	
	Swivelling range	+/- 135°	+/- 135°	
	C-axis drive mode	torque	worm	
	Swivelling axis A speed			
	One-sided drive	25 rpm	25 rpm	
	Tandem drive	55 rpm	-	
	Rotary axis C speed	80 rpm	40 rpm	
	Max. table load	150 kg	300 kg	
	T grooves	4 units / 14 H7 star-shaped	4 units / 14 H7 star-shaped	
	Table plate with clamping surface	-	Ø 450 x 360 mm	
	System table (can be extended with table plate)	Ø 320 mm	Ø 320 mm / Ø 450 x 360 mm	
	Zero-point system / pallet clamping system			
	Installation clamping device	-	SK 50	
	Installation clamping device	-	HSK 100	
	Rigid clamping table			●
	Clamping surface		600 x 630 mm	
	Max. table load		750 kg	
	T grooves		10 units / 14 H7 parallel	

\*All tables available on demand

- Included in standard delivery
- Available upon request

<b>Position measuring system, direct</b>	Resolution	0.0001 mm ●
<b>Positional tolerance</b>	Tp in X-Y-Z axes according to VDI/DGQ 3441 (calculated at a constant ambient temperature of 20 °C +/- 1 °C. Our products are subject to the German Export Law and require authorization since the attainable precision may be less/greater than 6 µm.)	0.008 mm
<b>Chip slide</b>	Space-saving mounting on the left or right Capacity	210 l ●
<b>Chip conveyor</b>	Scraper belt or hinge conveyor Chip conveyor, left or right (short version) Capacity Chip conveyor to the rear (long version) Capacity Chip conveyor ejection height Chip cart	○ 280 l 280 l 1100 mm 450 l
<b>Internal cooling lubricant supply with Paper band filter</b>	Capacity of standard tank Capacity of cooling lubricant tank Pressure (manually adjustable up to) Mains connection (ICS) Power consumption (ICS)	100 l 570 l max. 40 bar / 20 l/min - max. 80 bar / 29 l/min 400 V / 50 Hz 12 kVA
<b>Hydraulics</b>	Operating pressure	120 bar ●
<b>Central lubrication</b>	Minimum grease lubrication quantity	●
<b>Connected loads (machine)</b>	Mains connection Power consumption Compressed air	400 V / 50 Hz 46 kVA 6 bar
<b>Weight</b>	(standard version without optional extras, workpieces and cooling lubricant)	Approx. 8.7 t

● Included in standard delivery

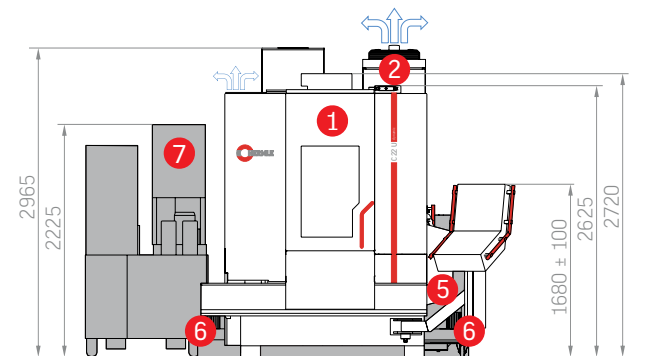
○ Available upon request



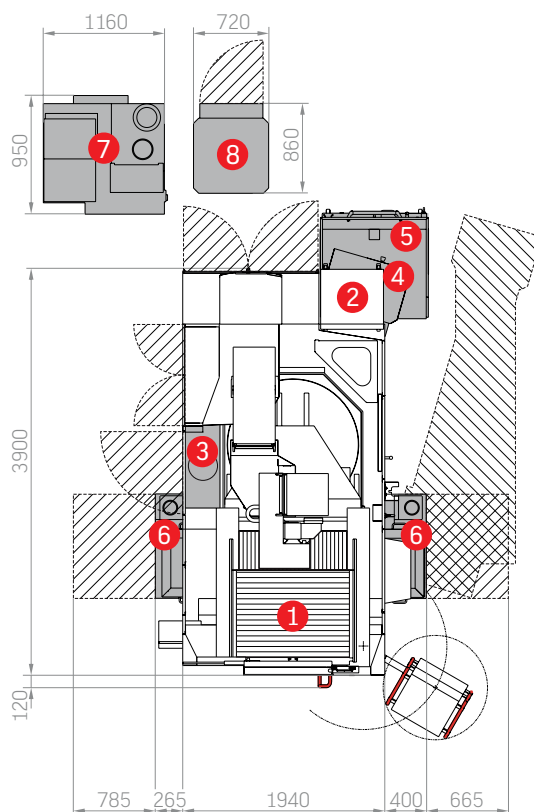
# 03.2 Options

The C 22 is prepared for anything: Numerous optional extras make machining even more efficient and powerful in real applications and enable you to optimise your work with the machining centre still further.

## C 22 dimensions



- 1 Standard machining centre
- 2 Cooling unit integrated into base machine
- 3 Emulsion mist extraction integrated into base machine
- 4 Chip conveyor rear
- 5 Chip cart
- 6 Chip slide left or right
- 7 Internal cooling lubricant supply
- 8 Recooling unit to internal cooling lubricant supply

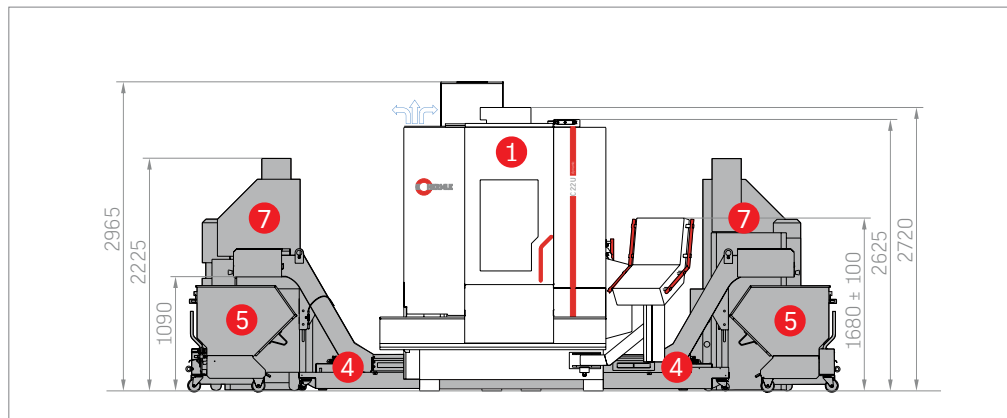




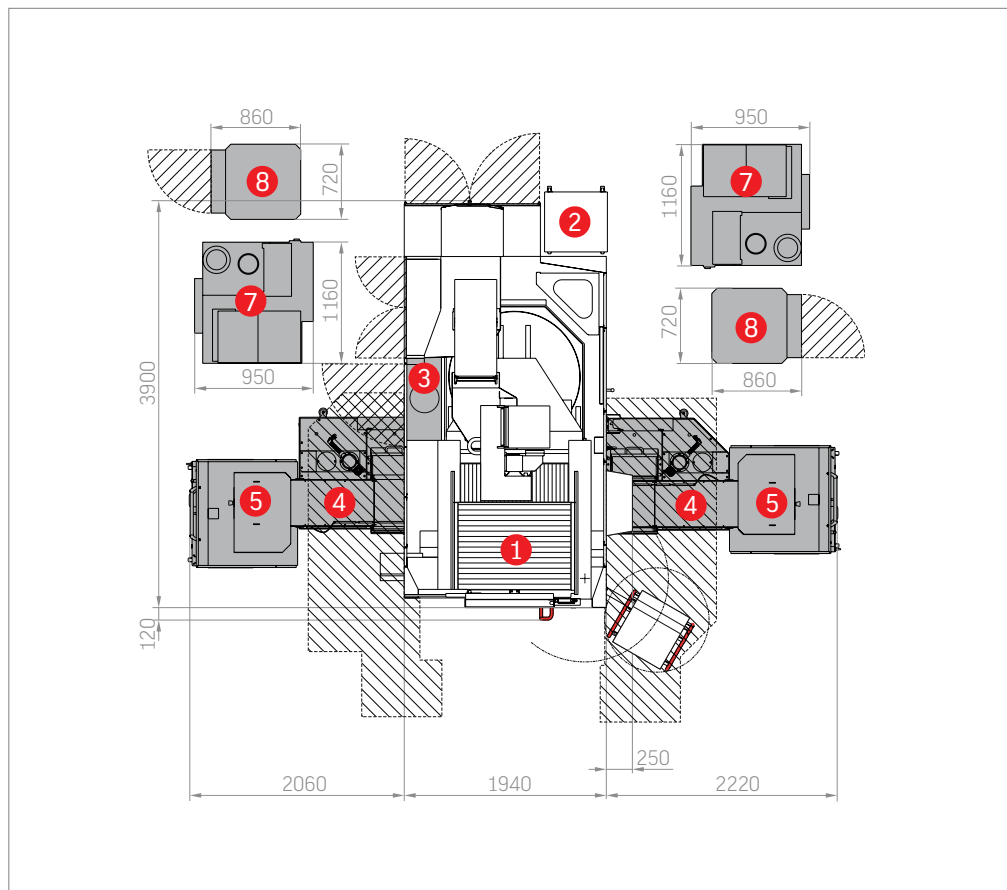
## Options

- Additional magazine
- Automatic cabin door
- Automatic cabin top
- Bed flushing
- BDE-signal
- Blow air through spindle centre
- Chip cart
- Chip conveyor
- Chip drawer
- Chip slide
- Control panel height adjustable with 19" swivel screen
- Cooling lubricant nozzle
- Electr. hand-held control module
- Electr. heat compensation
- Emulsion mist extraction
- External minimum quantity lubrication
- Graphite machining packages
- Internal cooling lubricant supply
- Laminated safety glass panes
- Pallet clamping system
- Pallet storage
- Pallet changer
- Precision packages
- Preparation button
- Recooling unit for ICS
- Rotating transparent window
- Sealing air for scales
- Stainless steel production booth
- Status lamp
- Touch probe with preparation
- Tool breakage monitoring / measuring

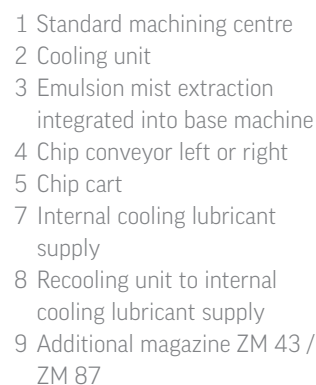
## C 22 dimensions



- 1 Standard machining centre
- 2 Cooling unit
- 3 Emulsion mist extraction integrated into base machine
- 4 Chip conveyor left or right
- 5 Chip cart
- 7 Internal cooling lubricant supply
- 8 Recooling unit to internal cooling lubricant supply



1 Standard machining centre



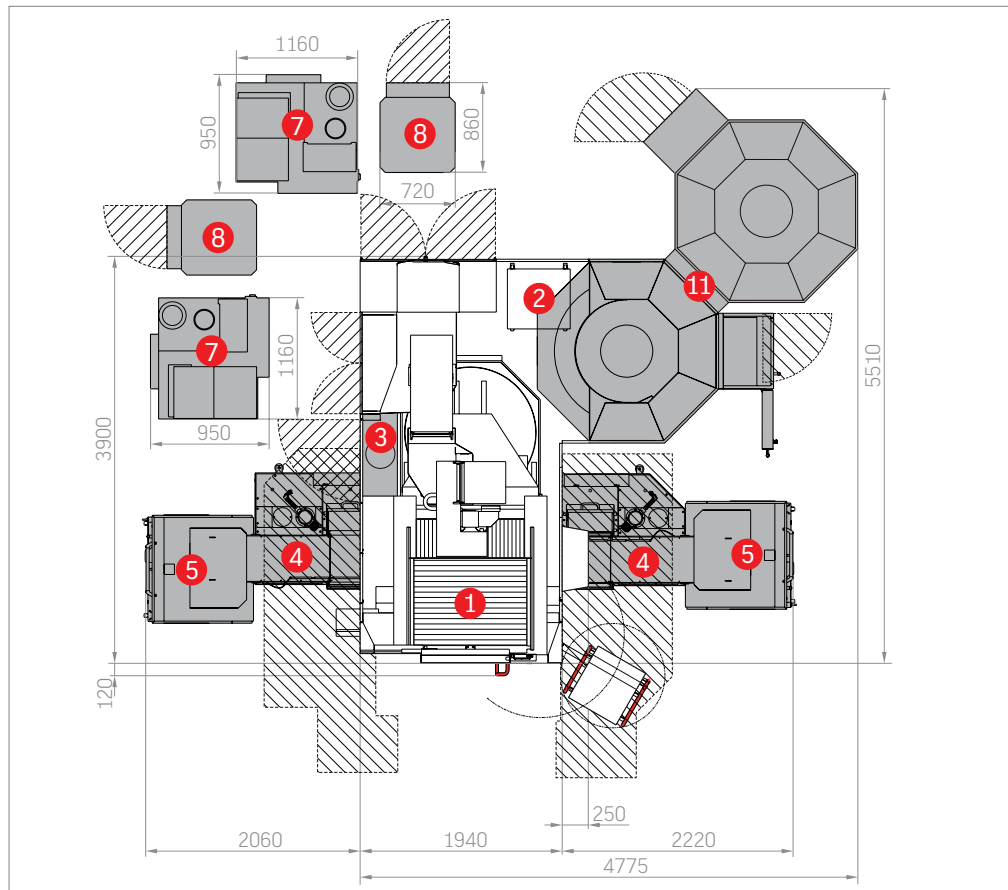
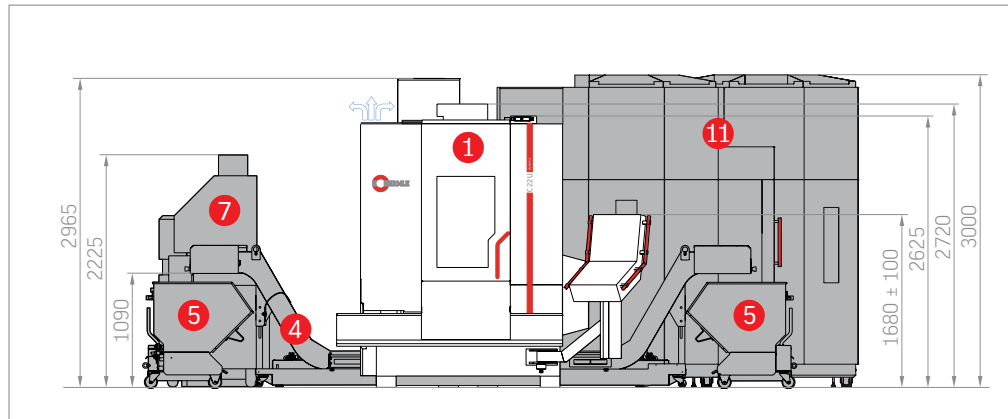
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- 
- Technical drawing of the front view of a machine. The drawing includes the following dimensions and numbered components:
- Dimensions:**
    - Overall width: 3965
    - Overall height: 3900
    - Top left section width: 1160
    - Top left section height: 950
    - Top right section height: 360
    - Top right section width: 720
    - Left side section height: 1160
    - Left side section width: 950
    - Bottom left section width: 2060
    - Bottom middle section width: 1940
    - Bottom right section width: 2220
    - Bottom right section height: 250
    - Bottom left section height: 120
  - Numbered Components:**
    - 1: Central horizontal slot
    - 2: Top right circular component
    - 3: Top left circular component
    - 4: Bottom left and right rectangular components
    - 5: Bottom left and right rectangular components
    - 7: Top left and right rectangular components
    - 8: Top left and right rectangular components
    - 10: Top right circular component

## Options

- Additional magazine
- Automatic cabin door
- Automatic cabin top
- Bed flushing
- BDE-signal
- Blow air through spindle centre
- Chip cart
- Chip conveyor
- Chip drawer
- Chip slide
- Control panel height adjustable with 19" swivel screen
- Cooling lubricant nozzle
- Electr. hand-held control module
- Electr. heat compensation
- Emulsion mist extraction
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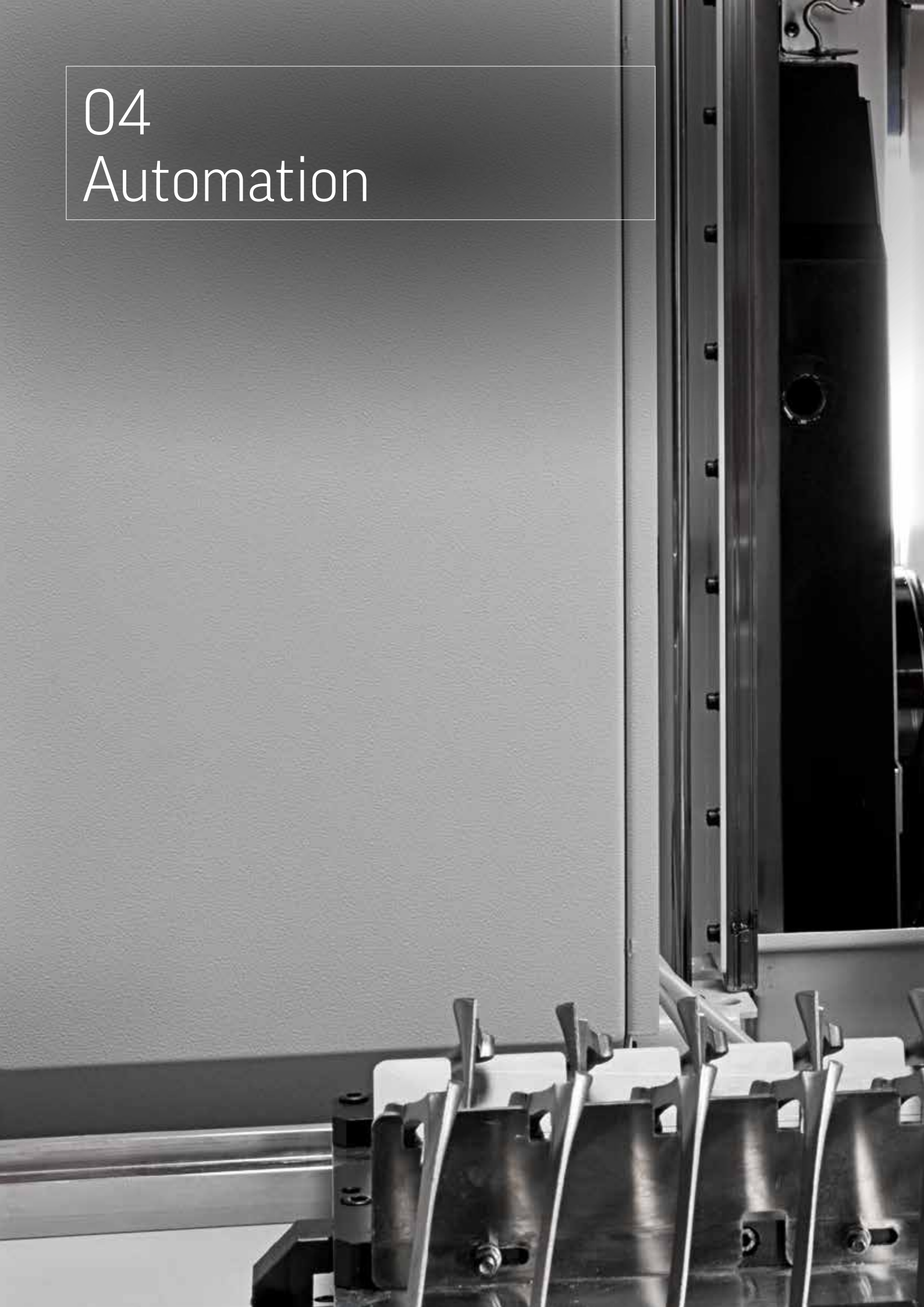
### C 22 dimensions . Additional magazine double







# 04 Automation







# 04.1 Automation . C 22

Everybody is talking about automation, but it's much more than just a trend. We ourselves have developed from a machine manufacturer to a process provider because we believe that the decisive criterion for automated efficiency is integration of the entire environment. In keeping with this philosophy, what began with economical pallet changing and intelligent handling systems, continues now with highly advanced robot solutions. Therefore, we have long been capable of converting machines into flexible manufacturing cells.



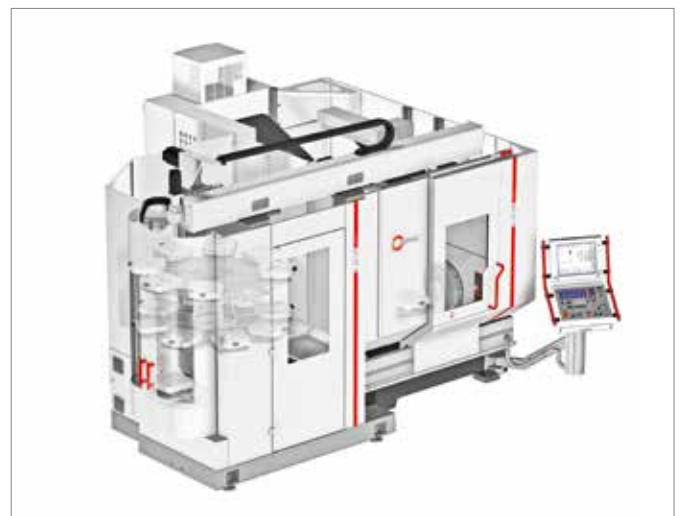
IH system . Parking position



RS 1 robot system



Pallet changer PW 150



Pallet changer PW 150 with 15x pallet storage





# 04.1

## Automation . C 22

Our pallet changer is setting new standards for parallel setup in our highly dynamic machining centres. A further increase in productivity allows for more adaptable storage systems. Machining centres can be set up via pallet storage for production-oriented machine runs with minimum operator interference/without operator interference or for customer-specific runs using a wide range of parts. Furthermore, multiple machining centres can be linked to form a complete manufacturing system.



Double gripper for 2 x 150 kg



Pallet changer PW 150 with setup station and 8x pallet storage



Optionally rotatable setup station



Pallet changer setup station

## THE ADVANTAGES

- Completely free access to the machining centre
- Quick and easy installation
- No floor anchorage required
- Complete transport (no disassembly)
- Side-mounted setup station
- Setup station optionally rotatable
- Large pallet storage
- Additional pallet storage space

### PW 150 . Compact pallet changer:

Pallet changer	3x pallet storage double gripper	3x pallet storage single gripper	8x pallet storage double gripper	8x pallet storage single gripper	15x pallet storage double gripper
Pallet storage	6 units	4 units	11 units	10 units	18 units
Pallet dimensions	400 x 320 mm 320 x 320 mm	400 x 320 mm 320 x 320 mm	400 x 320 mm 320 x 320 mm	400 x 320 mm 320 x 320 mm	- 320 x 320 mm
Max. workpiece diameter	Ø 400 x 360 mm	Ø 400 x 360 mm	Ø 400 x 360 mm	Ø 400 x 360 mm	Ø 320 mm
Max. workpiece height	360 mm	360 mm	360 mm	360 mm	305 mm
Max. transport weight (incl. pallet)	2 x 150 kg	1 x 250 kg	2 x 150 kg	1 x 250 kg	2 x 150 kg
Pallet change time	approx. 18 s	approx. 45 s	approx. 18 s	approx. 45 s	approx. 18 s

Repeating accuracy < 0.01 mm



## 04.2 All components. From a single source.

Hermle - milling at its best. We stand for

- Machining centres and automation solutions from a single source.
- High system expertise during planning, installation and maintenance.
- 3-, 4- and 5-axis machining centres for which we ourselves manufacture and install all components including table units, main spindles and entire sheet metal enclosures.
- Automation solutions from pallet changing systems and pallet storage, tool magazines and flexible manufacturing systems to custom turnkey solutions.

*IH systems*



*Pallet changer PW 150*





*Basic system plus 2 machines . 90°*



*Basic system plus 2 machines . 180°*



*Basic system plus 3 machines*

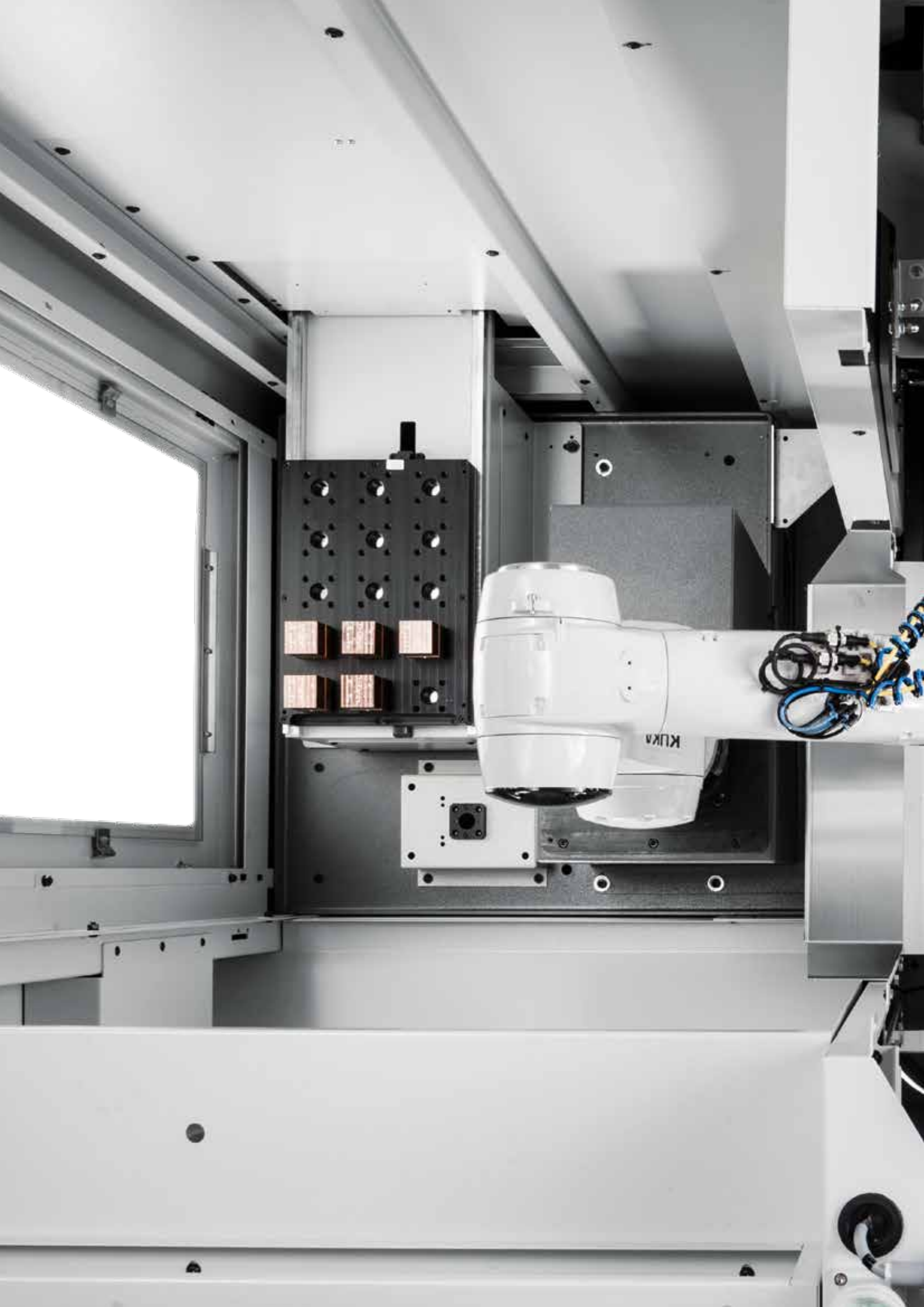


*RS 1 robot system*



*RS 2 robot system (combi)*









# 05 Precision



**PRECISION IN EVERY DIMENSION:** Hermle has a thorough understanding of the requirements for manufacturing high-precision machining centres for processing smaller and larger workpieces of up to 2.5 t in weight. For this reason, "The Original" only uses German machines for production and materials from European suppliers.

Furthermore, the entire machining facility is fully air conditioned and is serviced by a central chip disposal system that ensures the highest levels of cleanliness.

Hermle machining centres are put through extensive endurance protocols and are also exposed to demanding production processes within our own manufacturing department. Our meticulous manufacturing requirements allow Hermle to achieve levels of precision that are superior to those demanded by the DIN/ISO 10791 standard in every way.

At Hermle, we distinguish between positioning precision (accuracy with which a certain position within the working area can be pinpointed on one axis) and geometric precision.

The latter relates to the precision of the entire machine – it encompasses the following factors:

- Positioning of linear and rotary axes
- Straightness and angular deviation of the linear axes
- Rectangularity and parallel alignment of all axes, one to another
- Concentricity and axial run-out of the table
- Concentricity of the working spindle

The precision of Hermle machining centres originates during mechanical production and is not produced by subsequent electronic compensation. This further improves the precision of the individual axes (precision package 1 and 2).





## PRECISION LEVELS

### Hermle standard:

X-Y-Z: Pos. tolerance  $\leq 8 \mu$

A: Pos. tolerance  $\leq 16''$

C: Pos. tolerance  $\leq 9''$

### Hermle improved precision\*:

X-Y-Z: Pos. tolerance  $\leq 5 \mu$

A: Pos. tolerance  $\leq 10''$

C: Pos. tolerance  $\leq 6''$

\*To achieve improved precision, components must be selected with care. Tolerances must also be taken into account whilst the machine is still being constructed. Hermle also recommends the HSK A 63 tool holding fixture, electric heat compensation, an ICS recooling unit and two-sided A axis drive.

Test and operating conditions are as follows: air conditioned room ( $+20^{\circ}\text{C}$ ,  $\pm 2^{\circ}\text{C}$ ) and temperature fluctuation of only  $0.5^{\circ}\text{C}$  in one hour or max.  $2^{\circ}\text{C}$  within 24 hours.

## IMPROVED PRECISION PACKAGES

### Precision package 1 (linear axes X, Y, and Z)

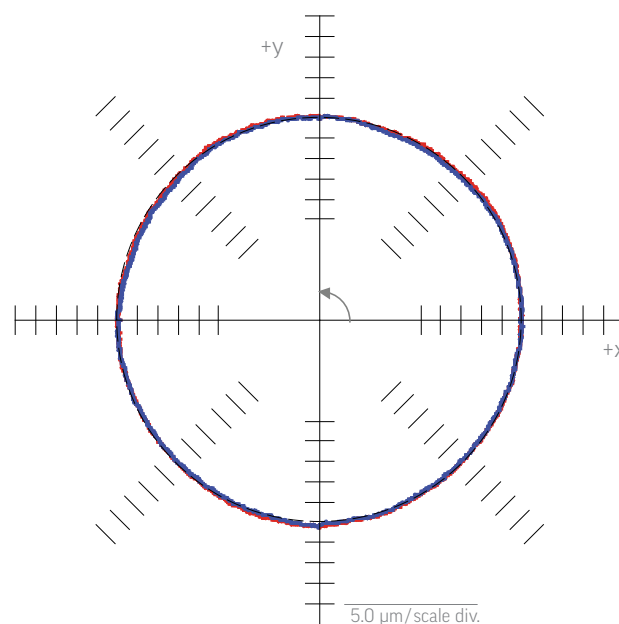
- Straightness optimisation
- Geometry adjustment and optimisation
- Straightness measurement
- X, Y, Z positioning accuracy Pos. tolerance  $\leq 5 \mu$
- Laser measurement according to VDI/DGQ 3441 or ISO 230-2

### Precision package 2 (rotary axes A and C)

- Table geometry
- Axial run-out bearings
- C-axis bearing
- Adjustment of complete table
- Position of A and C axes relative to basic geometry
- Indexing precision A  $10''$
- Indexing precision C  $6''$
- Laser measurement according to VDI/DGQ 3441 or ISO 230-2

 Run 1

 Run 2



# 06

## Energy efficiency

Both manufacturer and customer benefit from efficient production processes. Therefore, Hermle has focused on integrated resource sustainability and energy efficiency for many years. We can rightly claim pioneer status in the Blue Competence initiative founded by the VDW (German Machine Tool Builders Association).

From development to low-energy manufacturing (with a high level of in-house production) to the operation of CNC machining centres – Hermle has stood for a principle of sustainable environmental protection combined with economic considerations for many years. Energy recovery is just one of the advantages enjoyed by our customers.

BLUECOMPETENCE

Machine Tools



## EFFICIENT MANUFACTURING

*We use energy efficient manufacturing methods not because it is the current trend or because it is required of us, but on principle. And we always have.*

*Low energy component manufacture*

- Mineral casting technology
- Lightweight construction

*Virtual machine optimisation /  
machine development*

*Reduction in the energy required for transport  
through:*

- High levels of in-house production
- Just one production plant
- Locally sourced components  
and materials
- No material tourism

*High-quality, high-efficiency components*

- Ball screws
- Guideways
- Antifriction bearing etc.

## EFFICIENT OPERATION

*Our machining centres are energy efficient both during  
their manufacture and during operation.*

*Energy recovery has been standard  
at Hermle for over 20 years*

*High quality servo axes*

*Ideal drive design for  
the respective application*

*Demand-based cooling technology  
both for dimensioning and  
in application*

*De-energize system:  
Up to 80% less energy consumption  
in stand-by mode*

*Very long machine service life*



# 07 Services

The perfection we insist on for the development and production of our machines is also mirrored by our service department. Our service team provides more than just spare parts and rapid response support within hours. At Hermle, we see ourselves as a comprehensive service provider which provides customers with numerous benefits.

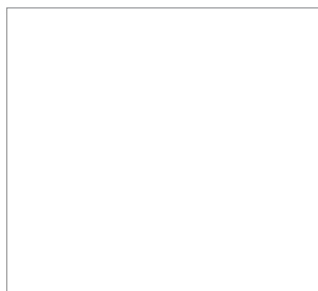
Alongside standard services, these include:

- Our superior, cost-effective, practical and flexible training programmes carried out by sales representatives directly at the customers' premises.
- Our continual pursuit of optimisation and perfection. Our motto – those who stop improving today will not make the grade tomorrow.
- Intensive expert consultation on milling in general, programming and handling of our products.
- Our application technicians who are experts in machining processes and who are quick to assist and advise our customers.





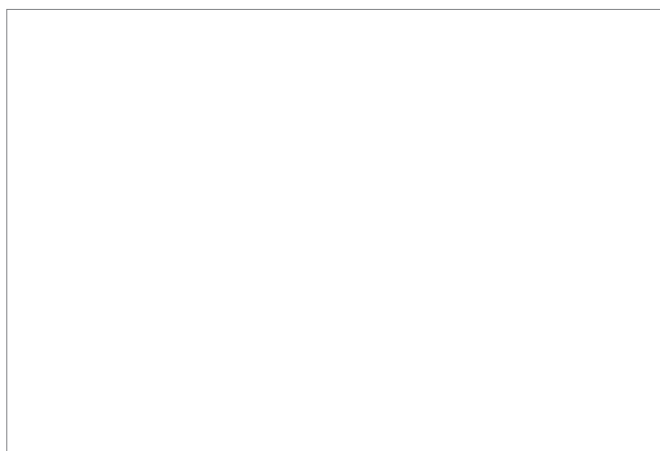




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