

C 42

The Dynamic

C 42

Unbeatable in 5-axes / 5-sided machining



The C 42 U -
at home in all fields

Tool and mould making

Highly dynamic simultaneous
5-axes machining up to a
component weight of 1,400 kg

Medical engineering

Difficult to machine material -
in record time

Aerospace

Precision in perfection

Mechanical engineering

Fully automatic and flexible
manufacturing systems

Motor sport

Highest precision at
high availability

Subcontract industry

Dynamic, precise and reliable



C 42

Dynamic in a new dimension

Collision protection
with collision monitor

3 axes in the tool
component independent dynamics

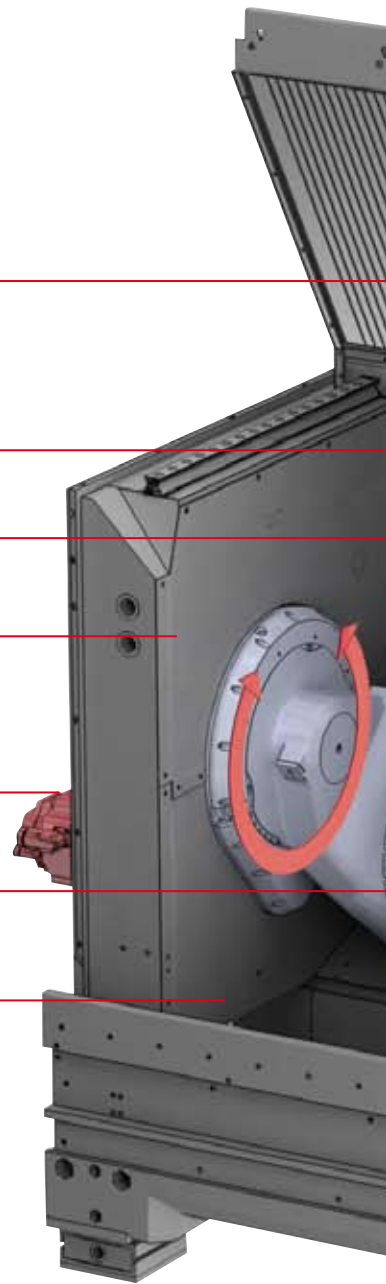
Pick-up magazine
integrated in the base, thereby saving space

Ideal chip clearance
dry machining / stainless steel version

Tandem drive
avoidance of torsion and high accuracy

Large working area
relative to the machine footprint

Accessibility
very good ergonomics



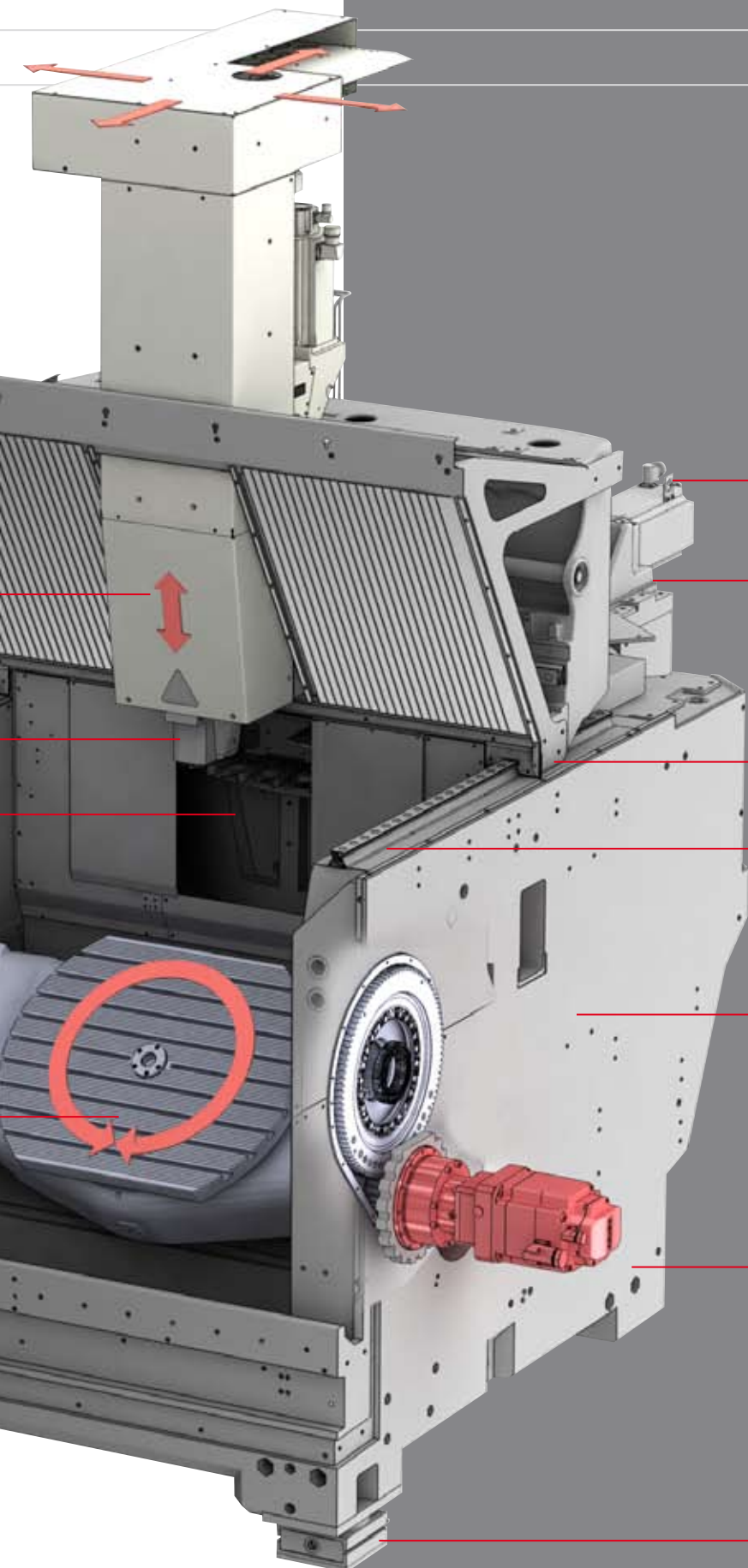
DYNAMICS

ACCURACY

COMPACTNESS

SURFACE QUALITY

AVAILABILITY



Central drive
centrally arranged Y axis main drive

Easy to service
ideal accessibility to the auxiliary units

Force characteristics
four guideways with one guideshoe
for ideal force balance

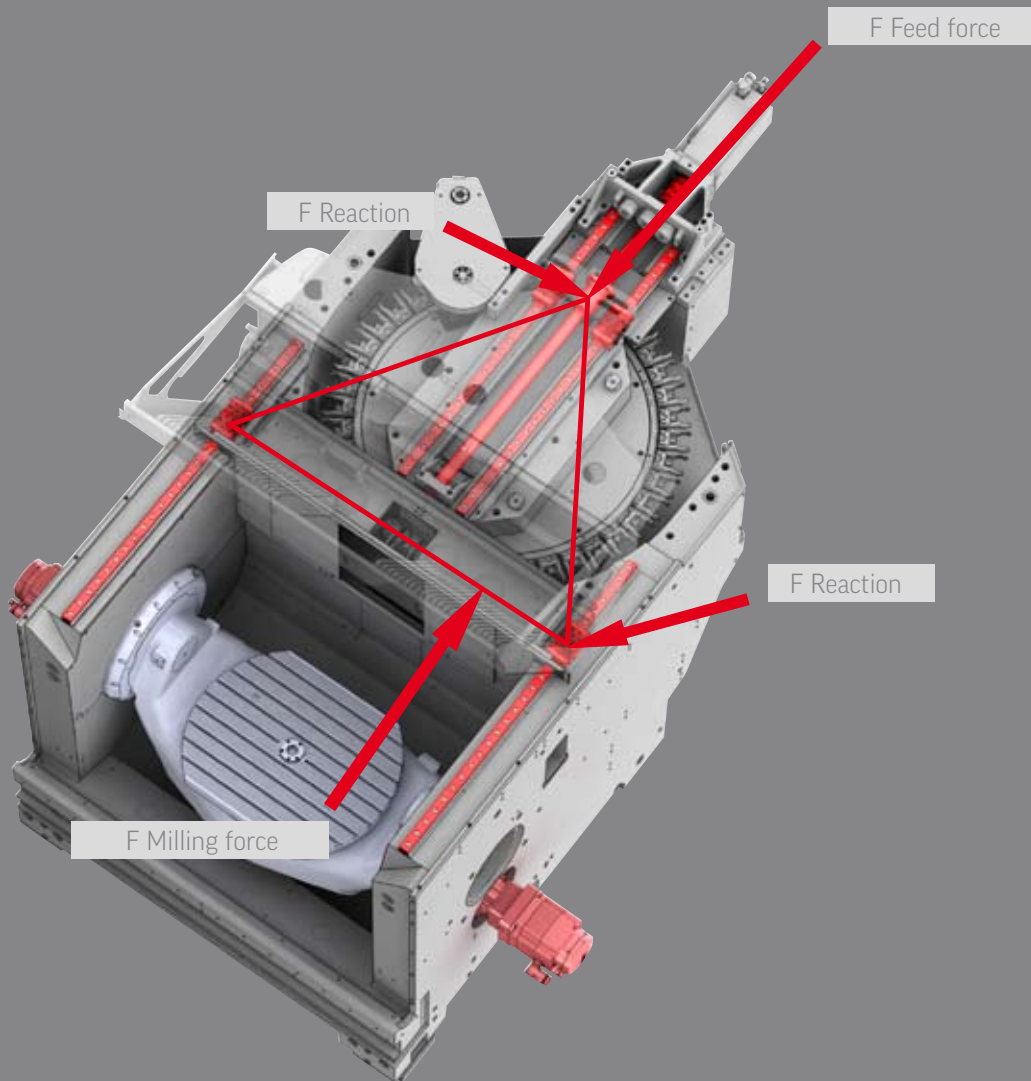
Linear axes
above the working area

Modified gantry design
with ideal main axis support

Mineral casting design
very good vibration dampening properties

3-point installation
via wedge mounts with spherical seat

Construction



Ideal power transmission through
four staggered guideways with central drive

Development principle

At Hermle, the static, dynamic and thermal properties of the machine are optimized by means of FEM calculations and machine simulations based on the 3-D CAD data and verified on the real machine using experimental studies.

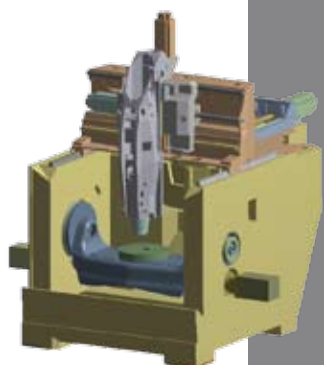
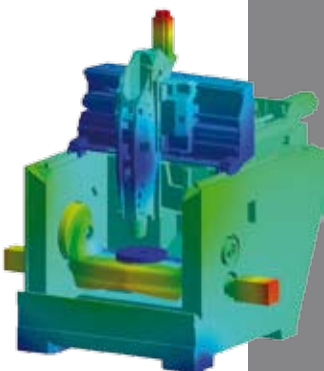
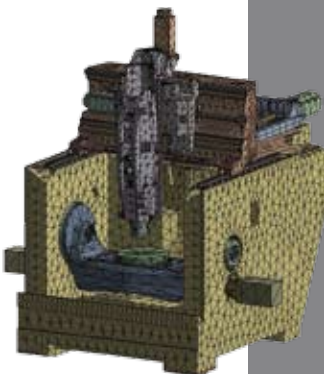
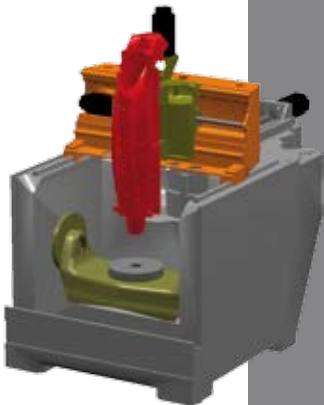
CONSTRUCTION

DESIGN

DRIVE

TOOL

ELECTRONICS



Design principle

- Modified gantry design, the disadvantages of the conventional gantry design have been avoided
- Three axes in the tool, thus workpieces independent dynamics, ideal pre-requisite for rapid traverses and feed up to 60 m/min.
- Modular configuration of the table and expansion variants in the multi-functional machine base
- Drives and guideways outside / above the working area
- Z axis with electrical and mechanical quick stop against uncontrolled drop
- Compact design, thus little space required
- Complete transport
- No foundation required (3-point-support)
- Optimised static and dynamic properties
- Maximum utilisation, positioning and long term accuracy
- High dynamics in the machining process
- Short positioning and start times on account of high acceleration of 10 m/s²

Mineral casting version

- Mineral casting has excellent cushioning properties, very low thermal conductivity and will not absorb moisture
- Extremely high form and contour accuracy in all planes
- Optimum surface finish in combination with very narrow tolerances
- Ecological manufacturing and disposal of mineral casting

Drives and guideways

- Y slide as a traverse rests on four carriages with four staggered guideways
- Good guideway ratio of the traverse through three-point rest and central drive
- Ball screw and position measuring system are in direct vicinity of the central linear guideways
- Very rigid dynamic cross slide rest
- Roller recirculating guideways in all linear axes, thus constant dynamic conditions
- Digital AC servo motors with pretensioned ball screws
- Permanent position monitoring system
- Low-maintenance automatic central grease lubrication system

Tool change

- Automatic tool change in cycle
- Ring magazine for 42 tools as SK 40 or HSK A 63
- Integrated in the machine base unit
- Protected outside the work area and thus minimised risk of tools becoming soiled

Electronics

- Digital drives
- Absolute measuring systems
- Latest control technologies
- All electronics have been integrated in a central cabinet
- Frequency-based recovery of the braking energy into the mains
- Switch cabinet with air-conditioning unit

Machine

ADVANTAGES OF A UNIQUE MACHINE CONCEPT

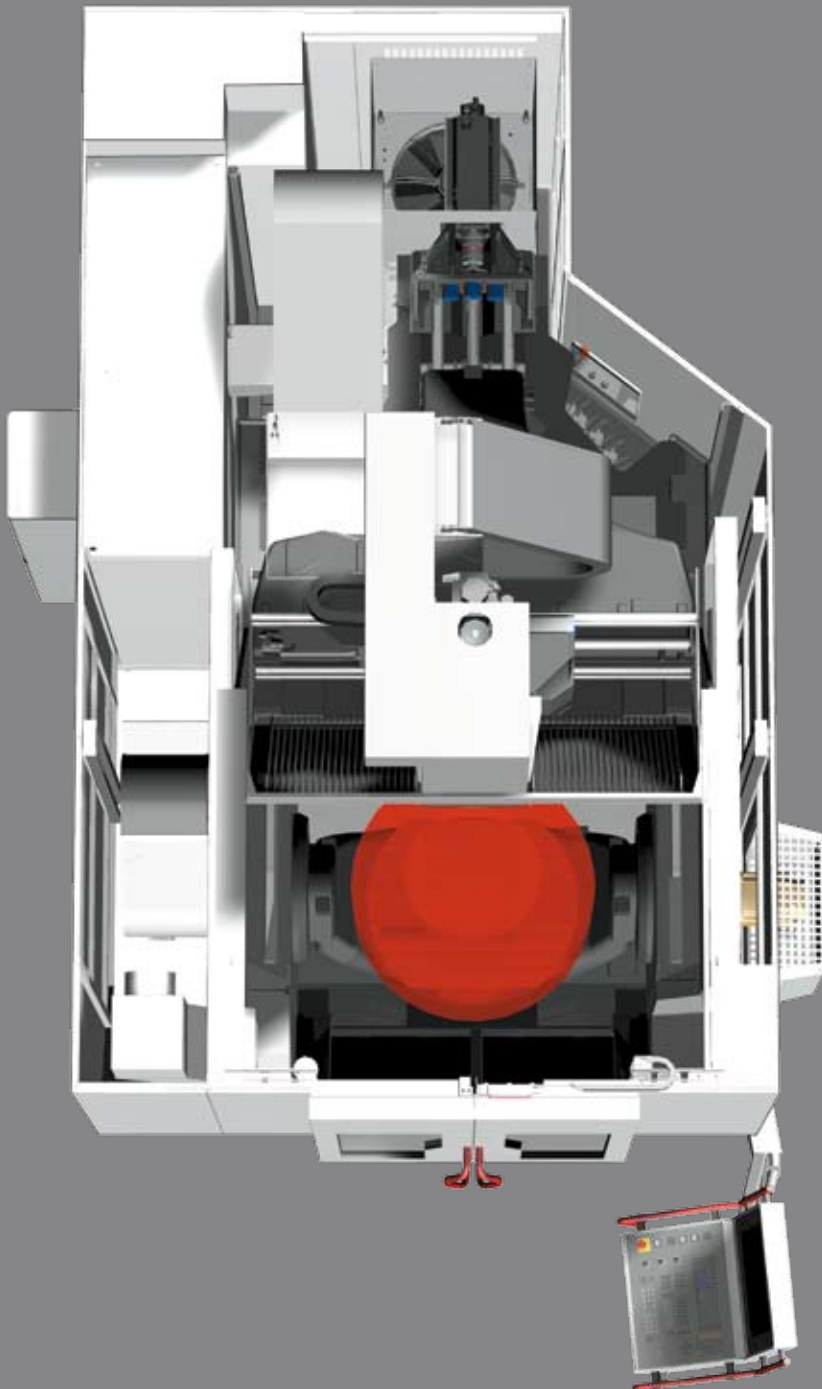
LARGEST WORKING AREA RELATIVE TO THE INSTALLATION SURFACE

UNIQUE AXIS CONCEPT

SHORT CHIP-TO-CHIP TIMES ON ACCOUNT OF INTEGRATED TOOL MAGAZINE

SINGLE LIFT TRANSPORT AND BOLT FREE INSTALLATION

CONSISTENT MODULAR DESIGN FROM THE STANDARD MACHINE
TO THE FLEXIBLE MACHINING CENTRE





Working area

Traverse	
X-Y-Z	800-800-550 mm
Rapid linear traverse	
X-Y-Z	60 m/min
Linear acceleration	
X-Y-Z	10 m/s ²

Main spindle drive

Speed	10,000, 18,000, or 25,000 rpm
Torque	up to 200 Nm
Main power	up to 29 kW

Tool changer (pick-up)

Magazine position	42
Chip-to-chip time*	approx. 4.5 s

Control

Heidenhain	iTNC530
Siemens	S 840 D SL

*(chip-to-chip times were determined in accordance with VDI 2852, sheet 1 in a 3-axis design)

Table variants

HIGH DEGREES OF FREEDOM IN THE WORKING AREA

VERY HIGH TABLE LOAD (UP TO 2,000 KG AT HIGHEST PRECISION)

NO CHIP COLLECTION ON THE TABLE (TABLE SWIVELLING)

SWIVELLING AXIS A AND ROTARY AXIS C ARE IN THE WORKPIECE (U SHAPE)

TORSION PREVENTION THROUGH TANDEM DRIVES

HIGH DYNAMICS THROUGH LINEAR TECHNOLOGY
(HIGH-TORQUE MOTORS IN THE ROTARY AXIS)

WIDE TRUNNION SUPPORT DISPLACEMENT RESULTS
IN A LARGE COLLISION FREE CIRCLE

Important table features

- Indexing device to be used as 4th axis as an option
- Zero-point clamping system / pallet clamping system
- Medium supply lines
- SK 50 / HSK A 100 workpiece clamping device

Rigid clamping table

Clamping surface:	1,050 x 805 mm
Maximum table load:	2,000 kg
T-grooves:	parallel 12 / 14 H7





NC-controlled swivelling rotary table

Clamping surface:	Ø 800 x 630 mm
Collision circle of the table plate:	Ø 800 mm
Swivel range:	+/- 130°
Speed - swivelling axis A:	25 rpm.
Speed - rotary axis C:	65 rpm.
Type of drive axis C:	Torque
Maximum table load:	1,400 kg
T-grooves:	parallel 9 / 14 H7



NC-controlled swivelling rotary table

Clamping surface:	Ø 440 mm
T-grooves:	parallel 5 / 14 H7
Swivel range:	+/- 130°
Type of drive axis C:	Torque
Speed - swivelling axis A :	55 rpm.
Speed - rotary axis C:	65 rpm.
Maximum table load:	450 kg
Adjacent clamping plate (option)	
Clamping surface:	920 x 490 mm
T-grooves:	parallel 8 / 14 H7



NC-controlled swivelling rotary table

Clamping surface:	Ø 420 mm
T-grooves:	parallel 5 / 14 H7
Swivel range:	+/- 130°
Type of drive axis C:	worm
Speed - swivelling axis A:	55 rpm.
Speed - rotary axis C:	35 rpm.
Maximum table load:	600 kg
Adjacent clamping plate (option)	
Clamping surface:	930 x 490 mm
T-grooves:	parallel 8 / 14 H7

Table variants

What makes our table concept so special

- High degrees of freedom in the working area
- Wide trunnion support displacement results in a large collision free circle
- Swivelling axis A and rotary axis C are centred in the component (U shape)
- High dynamics through linear technology (high-torque motors in the rotary axis)
- Very high table load (up to 2,000 kg at highest precision)
- No chip collection on the table (table tilting)
- Prevention of torsion by tandem drive

SWIVELLING AXIS A IN THE COMPONENT

Complicated 5-axis machining processes are carried out by comparatively small traverses of the linear axes

VERY LARGE COLLISION CIRCLE

Optimum utilization of the working area

TANDEM DRIVE

Torsion-free highly dynamic positioning of the swivelling axis A

TORQUE DRIVES

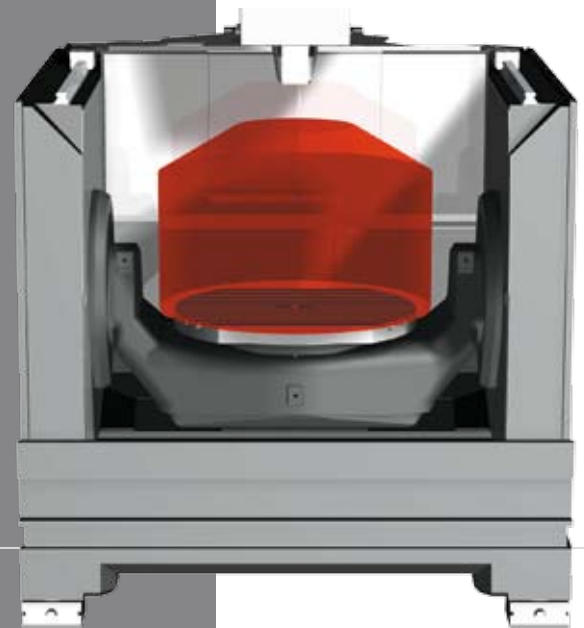
Highly dynamic movements in the rotary axis

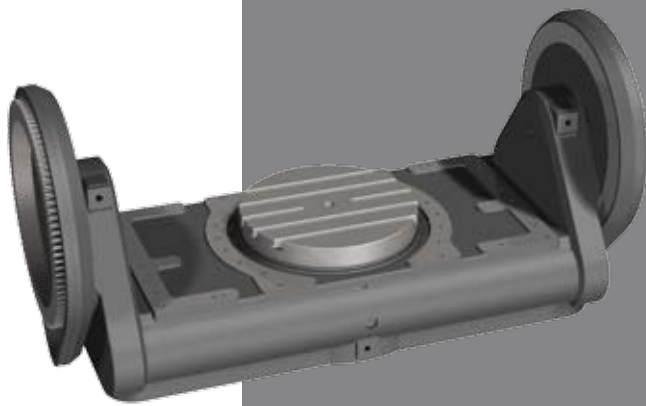
SEPARATION OF THE ROTARY AND SWIVELLING AXES

User and programmer friendly based on easy follow-up of the table movements

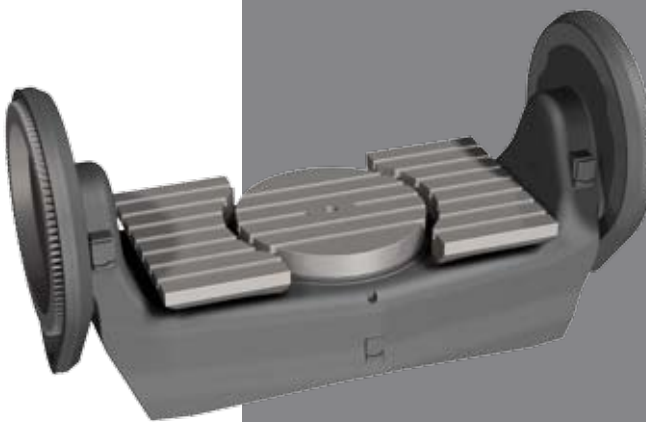
TABLE LOAD

High masses on all table variants

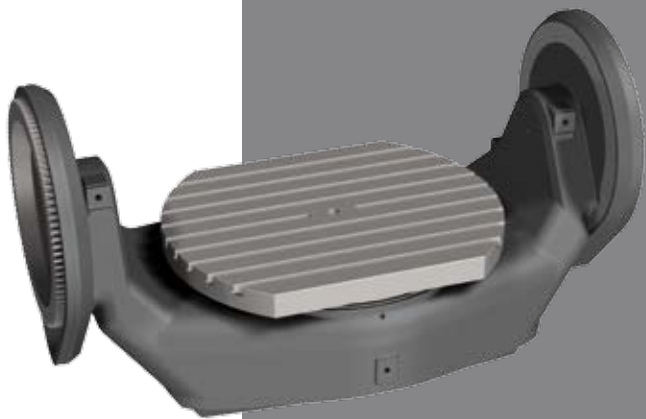




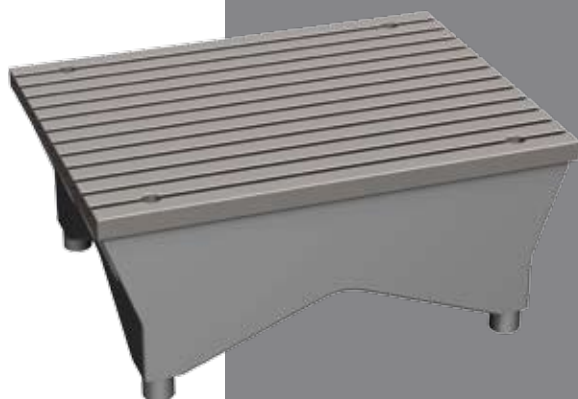
3, 4 OR 5 AXES
Flexibility at a very high torque



3, 4 OR 5 AXES
Flexibility at very high dynamics



1.4 TONNES - 5 AXES
1.4 t to be machined with up to 65 rpm in five axes



2.0 TONNES AND 460 dm³
Workpieces with 1050 x 805 x 550 mm
external dimensions to be machined in three axes
at higher precision

Spindles

HIGH-TECH SPINDLES FOR DEMANDING MILLING PROCESSES

COLLISION PROTECTION WITH COLLISION MONITORING

SLIM-END SPINDLE FOR MACHINING DEEPER CAVITIES

FEW IRREGULAR EDGES (PREVENTION OF COLLISION)

TWO-PART SPINDLE (FASTER EXCHANGE IN THE EVENT OF A SERVICE CALL, MINIMAL TIME AND EXPENSE)

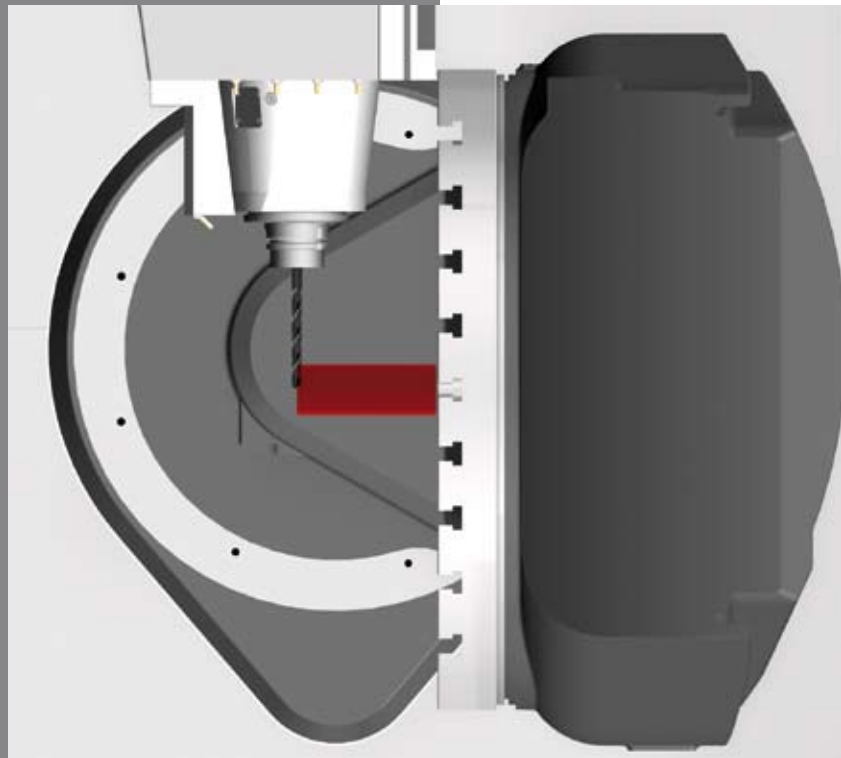
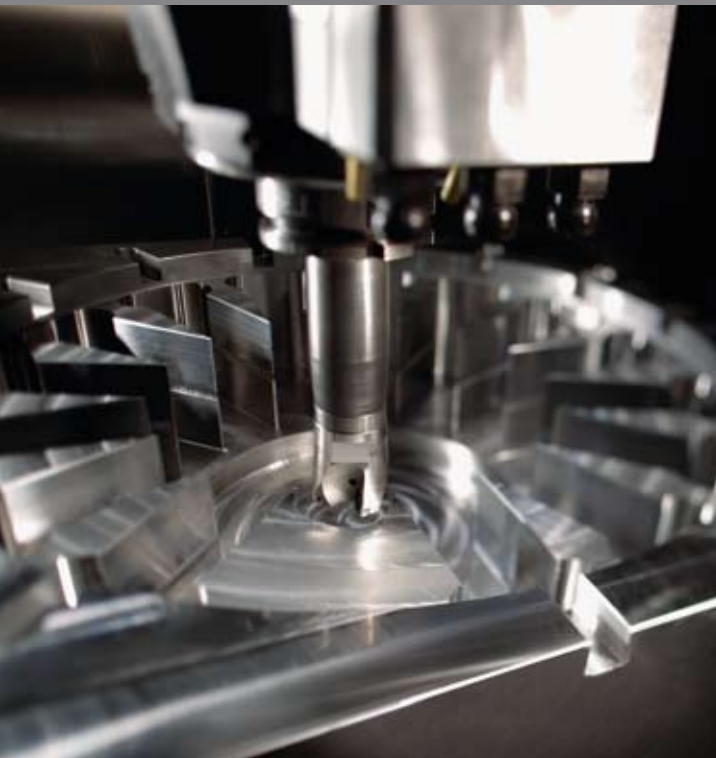
Each spindle has six displacement sleeves to compensate the collision energy in case of a collision in the Z-direction

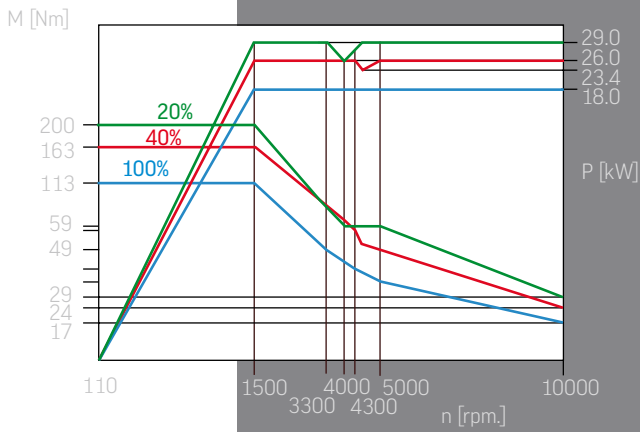
Prior to a collision

After a collision



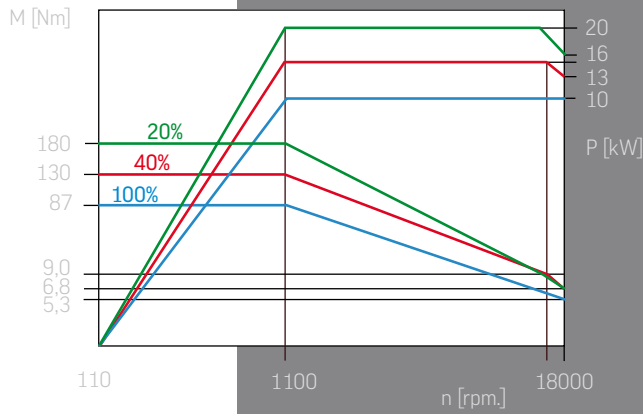
Very slender spindle end.





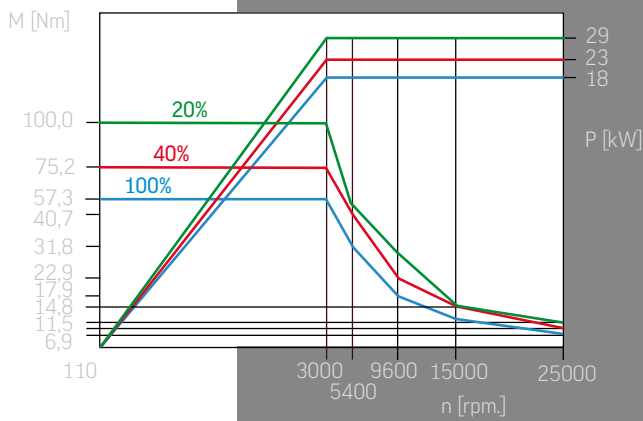
Spindle

Spindle speed:	10,000 rpm.
Torque:	200 Nm
Main power:	29 kW
Interface:	SK 40 / HSK A 63
Collision protection:	Upsetting sleeves



Spindle

Spindle speed:	18,000 rpm.
Torque:	180 Nm
Main power:	20 kW
Interface:	SK 40 / HSK A 63
Collision protection:	Upsetting sleeves



Spindle

Spindle speed:	25,000 rpm.
Torque:	100 Nm
Main power:	29 kW
Interface:	HSK A 63
Collision protection:	-

Magazine

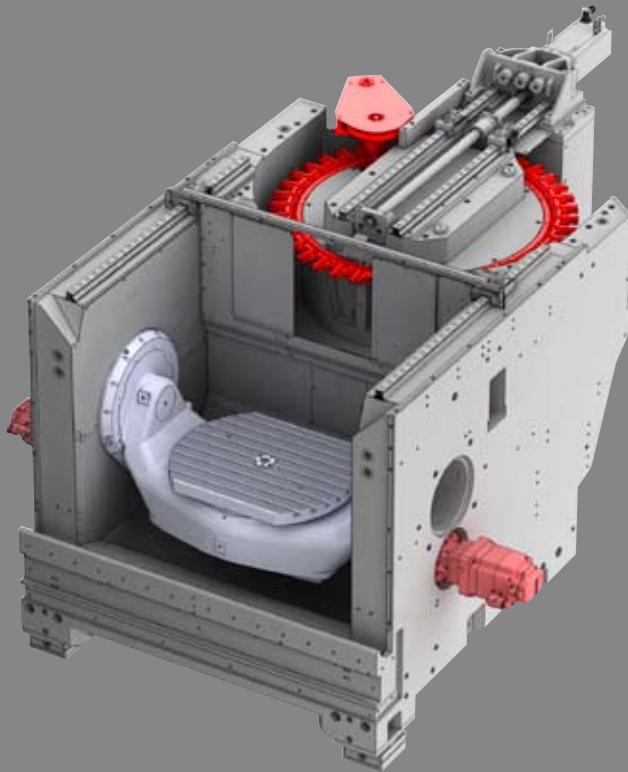
PICK-UP MAGAZINE

INTEGRATION INTO THE MACHINE BASE

VERY GOOD ACCESSIBILITY

CONTROL PANEL MOVEABLE TO THE LOADING POINT

COVERS FOR THE SPINDLE TAPERS



Tool changer (pick-up)

Magazine positions: 42

Chip-to-chip time*: approx. 4.5 s

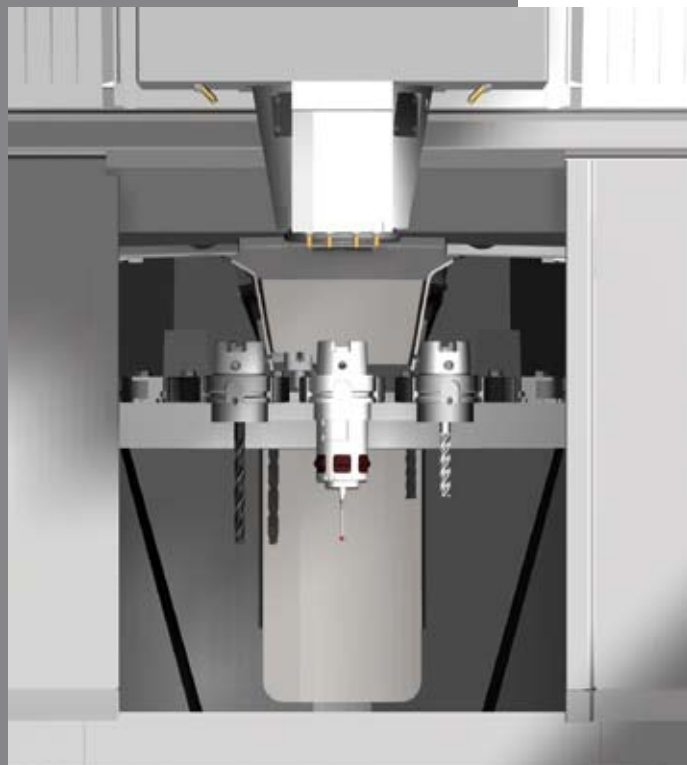
Maximum tool length: 300 mm

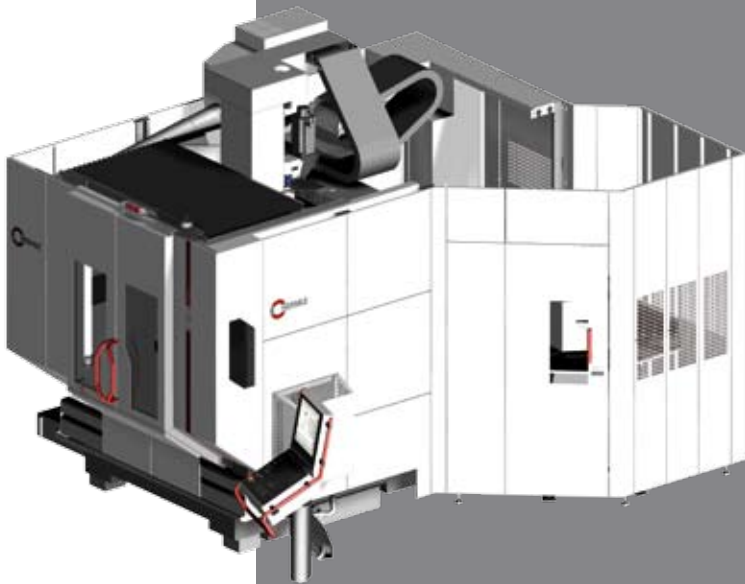
Maximum tool diameter: Ø 90 mm

Maximum tool diameter
with corresponding adjacent
pocket allocation: Ø 125 mm

Maximum magazine load at 42 units: 168 kg

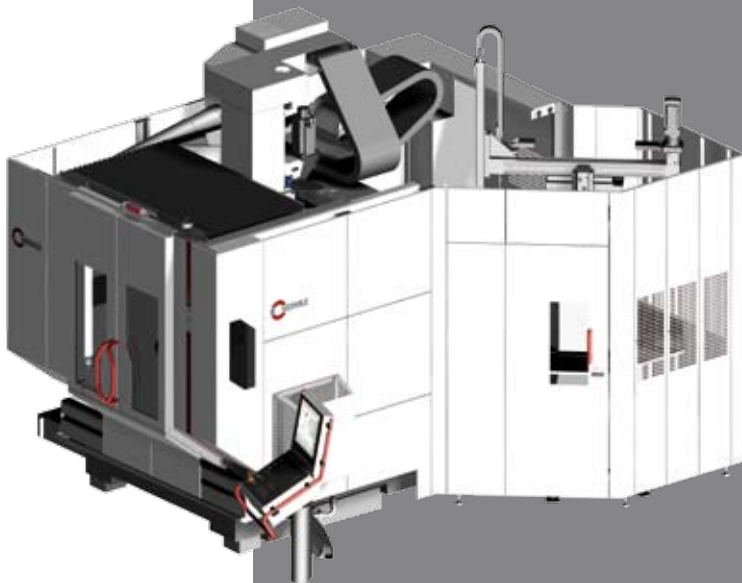
*[chip-to-chip times were determined in accordance
with VDI 2852, sheet 1 in a 3-axis design]





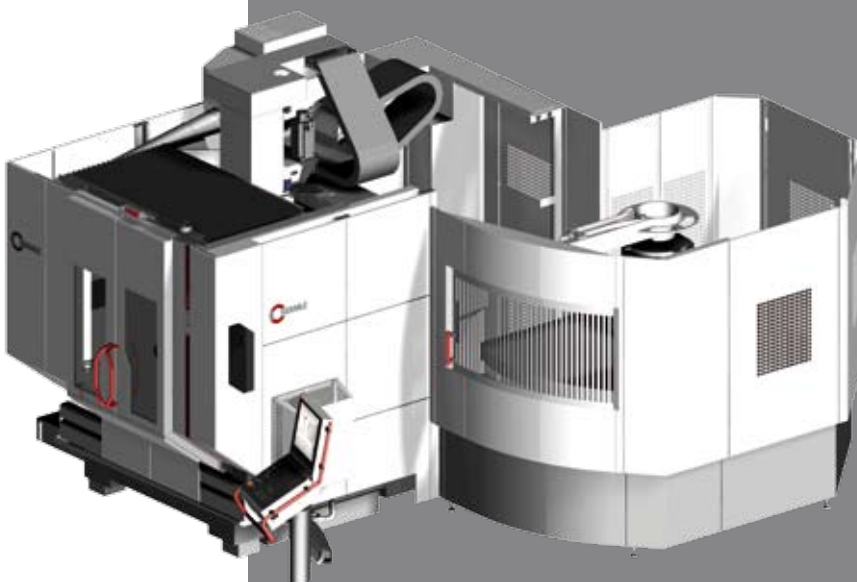
**Additional magazines
for complex machining processes**

- Own tool management software integrated in the control
- Adapted to magazine loading point
- Control panel moveable up to the machining point of the additional magazines
- Up to eight loading points for fast loading of the magazine ZM 160



**Expansion of the
tool storage capacity by:**

Additional magazine:	43 pockets
Additional magazine:	87 pockets
Additional magazine:	160 pockets
Maximum tool length:	300 mm
Maximum tool diameter:	Ø 80 mm
Maximum tool diameter with corresponding adjacent pocket allocation:	Ø 125 mm
Maximum tool weight:	8 kg



Options

OPTIONS FOR

INCREASING THE SAFETY FEATURES

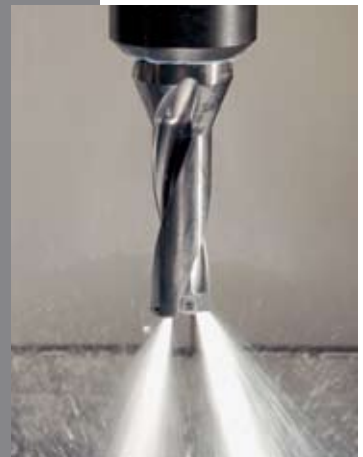
THE INDIVIDUAL APPLICATION POSSIBILITIES

THE PROCESS SAFETY

THE ECONOMIC EFFICIENCY

Options in detail

- Coolant system without high-pressure pump with sieve basket
- Coolant system without high-pressure pump with paper ribbon filter
- Through the spindle coolant supply (paper tape filter)
- Chip conveyor (scraper belt or hinged belt conveyor)
- Minimal quantity lubrication internal + external
- Blowing attachment / bed flushing
- Oil mist extractors
- Accuracy packages
- Graphite machining packages
- Tool breakage monitoring system
- Tool measurement
- Automatic front doors / automatic cabin roof
- Laminated safety glass panes
- Switch cabinet with locking door



Controls

HEIDENHAIN iTNC 530 OR SIEMENS S 840 D SL

3D SOFTWARE

19" TFT-TECHNOLOGY

USER-DEFINED SOFTKEYS

ERGONOMIC CONTROL PANEL

CONTROLS FOR DEMANDING MILLING PROCESSES

Whether for tool and mould making, in production or in high-speed machining, they stand out for their many advantages.

SAFE CONTROLS

Controls with integrated safety technology keeping with category 3 described in European standard EN 954-1.

E-MESSENGER

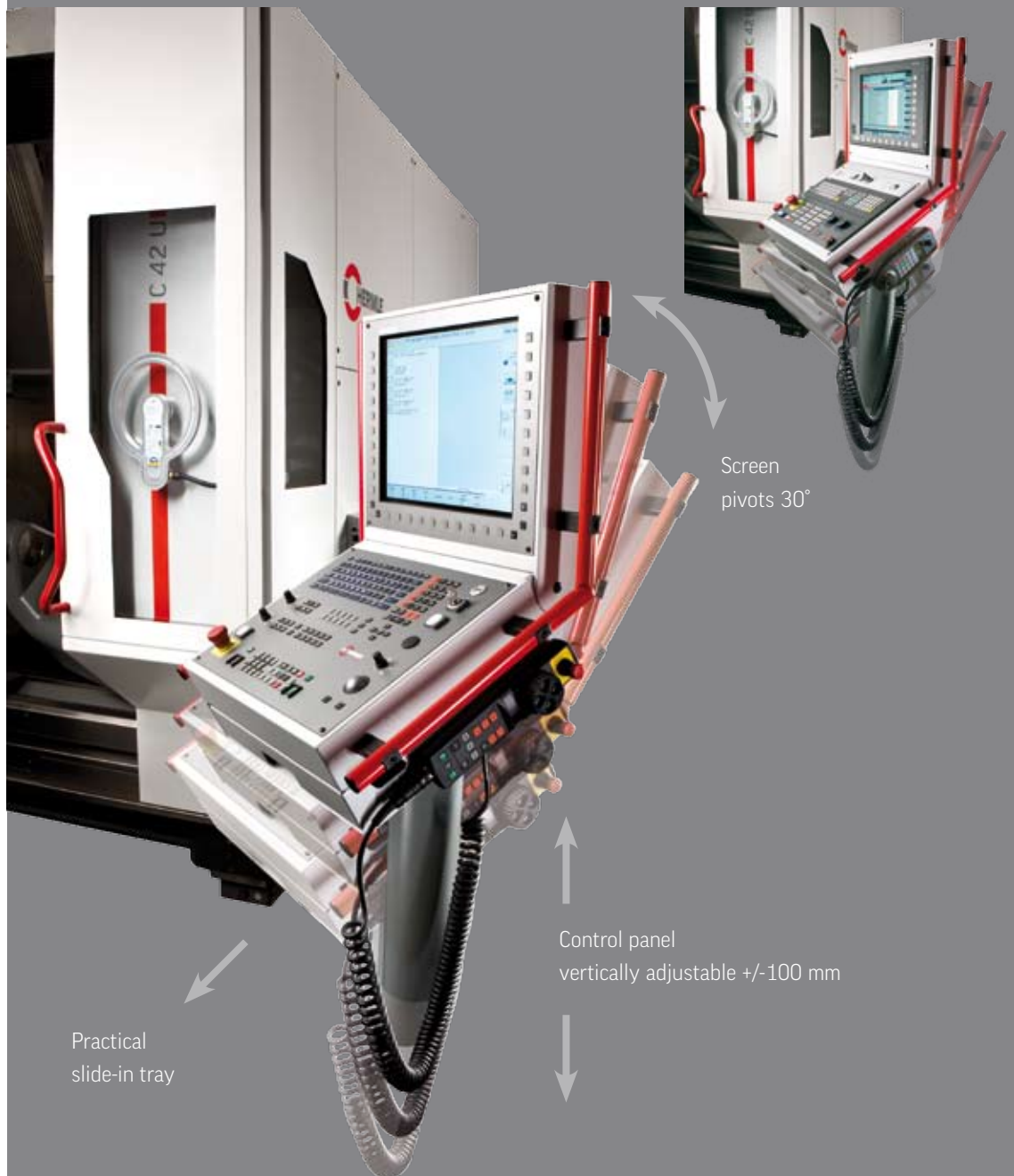
Increases the availability of the machines and minimises production failures.

TELESERVICE

Teleservice ensures even faster support in case of programming and operating problems.

FINGERPRINT

Recording of meaningful variables and evaluation of them by specialists permit preventive and forward-looking maintenance as well as efficient diagnosis in the event of a malfunction.



Automation

PALLET CHANGER

PALLET STORAGE SYSTEMS

TO BE EXTENDED TO A FLEXIBLE MANUFACTURING CELL

HANDLING SYSTEMS

ROBOT SYSTEM SOLUTIONS

TURN-KEY SOLUTIONS

Flexible manufacturing cell - manufacturing system

The machining centre may be set up for production by means of a pallet storage system for unmanned / minimal manning machine production times or by means of a customised system with various component ranges.

By linking several machining centres, the machining centres can be extended to a complete manufacturing system.





Technical Data

Working area	Traverse	X axis	800 mm	
	Traverse	Y axis	800 mm	
	Traverse	Z axis	550 mm	
	Linear rapid traverse	X-Y-Z	60 m/min	
	Linear acceleration	X-Y-Z	10 m/s ²	
	Linear rapid traverse	X-Y-Z	8500 N	
Main spindle drive	Speed	10,000 rpm.	SK 40 / HSK A 63	■
	Main power / torque	20% c.d.f.	29 kW / 200 Nm	
	Speed	18,000 rpm.	SK 40 / HSK A 63	●
	Main power / torque	20 c.d.f.	20 kW / 180 Nm	
	Speed	25,000 rpm.	HSK A 63	●
	Main power / torque	20% c.d.f.	29 kW / 100 Nm	
Control unit	Heidenhain		iTNC 530	■
	Siemens		Sinumerik 840 D SL	■
Tool changer (pick up)	Magazine pockets		42	■
	Chip-to-chip time*		approx. 4.5 s	
	*(chip-to-chip times were determined in accordance with VDI 2852, sheet 1 in a 3-axis design)			
	Maximum tool length		300 mm	
	Maximum tool diameter		Ø 90 mm	
	Maximum tool diameter with corresponding adjacent pocket allocation		Ø 125 mm	
	Maximum magazine load at 42 units		168 kg	
	Extension of tool storage	Additional magazine		43 pockets
Additional magazine			87 pockets	●
Additional magazine			160 pockets	●
Maximum tool diameter in additional magazine			Ø 80 mm	
Maximum tool diameter with corresponding adjacent pocket allocation in additional magazine			Ø 125 mm	
Maximum tool weight			8 kg	
Connection-values (machine)	Mains connection		400 V / 50 Hz	
	Power consumption		45 kVA	
	Compressed air		6 bar	
Weight	(Standard version)		approx. 13.0 t	
Transport dimensions C 42 (basic machine)	Width		2,450 mm	
	Depth		5,000 mm	
	Height		3,165 mm	

Hermle AG reserves the right to carry out modifications without prior notification, which may lead to deviating technical data.

Table variants

NC-controlled swivelling rotary table	Ø 800 ●	Ø 440 ●
Clamping surface	Ø 800 x 630 mm	Ø 440 mm
Collision circle of the table plate	Ø 800 mm	-
Swivel range	+/- 130°	+/- 130°
Type of drive axis C	torque	torque
Speed - swivelling axis A	25 rpm.	55 rpm.
Speed - rotary axis C	65 rpm.	65 rpm.
Maximum table load	1,400 kg	450 kg
T-grooves parallel	9 / 14 H7	5 / 14H7
Adjacent clamping plates	-	920 x 490 mm ●
T-grooves parallel	-	8 / 14 H7

NC-controlled swivelling rotary table	Ø 420 ●	Rigid clamping table ●
Clamping surface	Ø 420 mm	1050 x 805 mm
Swivel range	+/- 130°	-
Type of drive axis C	worm	-
Speed - swivelling axis A	55 rpm.	-
Speed - rotary axis C	35 rpm.	-
Maximum table load	600 kg	2,000 kg
T-grooves parallel	5 / 14H7	12 / 14H7
Adjacent clamping plates	930 x 490 mm ●	-
T-grooves parallel	8 / 14 H7	-

In another version the clamping table can be fitted 130 mm lower.

NC indexing device	Clamping chuck	Ø 200 / Ø 315 mm	●
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Position measuring system direct	Resolution	0.0001 mm	■
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Position tolerance	Tp in X-Y-Z axis keeping with German standard VDI/DGQ 344-1 (determined at 20° Celsius +/- 1° Celsius constant ambient temperature. Our products are subject to German export laws and exports have to be approved as the achievable accuracy may be smaller / equal than 6 µm.)	0.008 mm	■
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External coolant supply	ECS with swarf pan and cooling lubricant tank		■
	Capacity of base container	88 l	
	Capacity of cooling lubricant tank	350 l	
	Coolant system without high-pressure pump with sieve basket		●
	Capacity of base container	88 l	
	Capacity of cooling lubricant tank	500 l	
Through the spindle coolant supply with paper tape filter	Coolant system without high-pressure pump with paper ribbon filter		●
	Capacity of base container	88 l	
	Capacity of cooling lubricant tank	500 l	

Through the spindle coolant supply with paper tape filter	Capacity of base container	88 l	●
	Capacity of cooling lubricant tank	900 l	
	Pressure (infinitely variable manuel)	max. 80 bar / 20 l/min	
	Mains connection	400 V / 50 Hz	
	Power consumption	17 kVA	

Chip pan	Removable chip pan	●
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Chip conveyer	Scraper belt or hinged belt conveyer		●
	Ejection height of swarf conveyer	1,160 mm	
	Chip cart	450 l	●

Hydraulic system	Operating pressure	120 bar	■
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Central lubrication system	Minimum quantity lubrication	■
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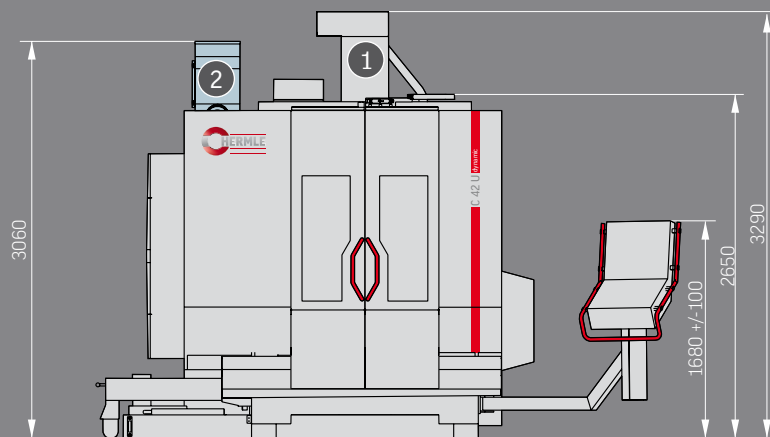
Options

Automatic cabin door	●
Automatic cabin top	●
Laminated safety glass panes	●
Rotating clear-view window	●
Electrical heat compensation	●
Electrical hand-held control module	●
Touch probe including preparation	●
Preparation for touch probe	●
Tool breakage monitoring / measuring system	●
Coolant nozzle	●
Minimal quantity lubrication internal + external	●
Air blast through the spindle centre	●
Bed flushing	●
BDE signal	●
Oil mist extractor	●
Air purge for linear scales	●
Status lamp	●
Accuracy packages	●
Graphite machining package	●
Pallet changer	●
Pallet storage	●
Pallet clamping system	●
Handling System HS 30	●

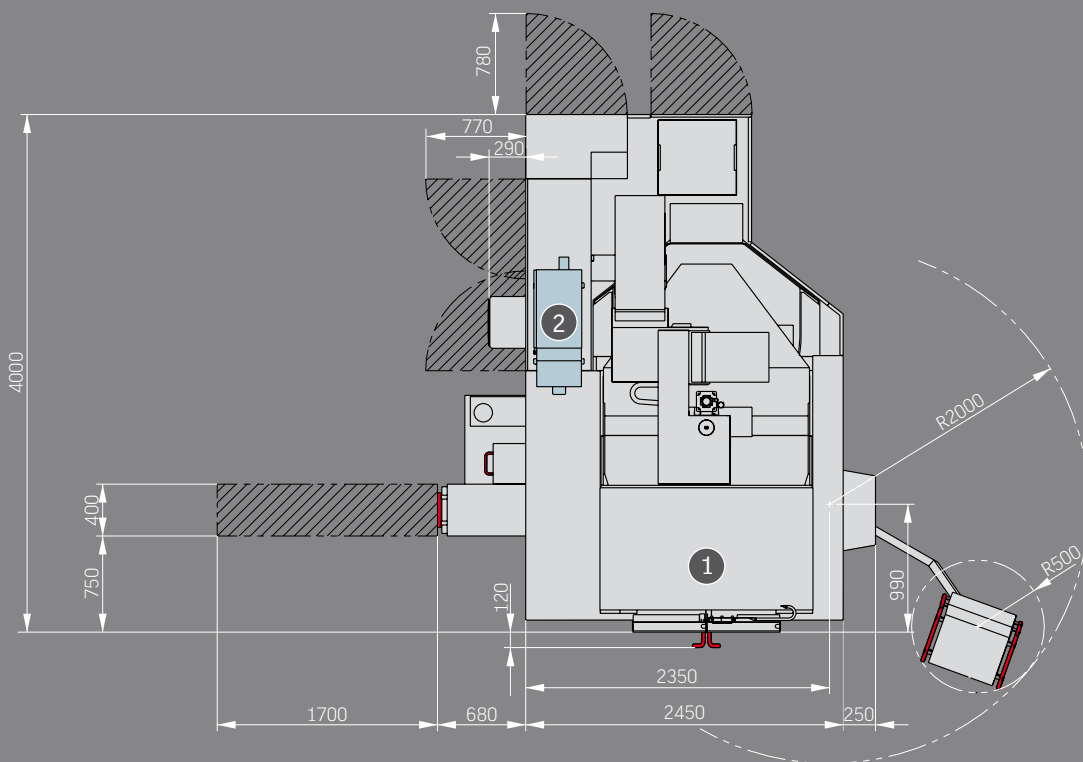
■ standard equipment

● to order

Dimensions C 42

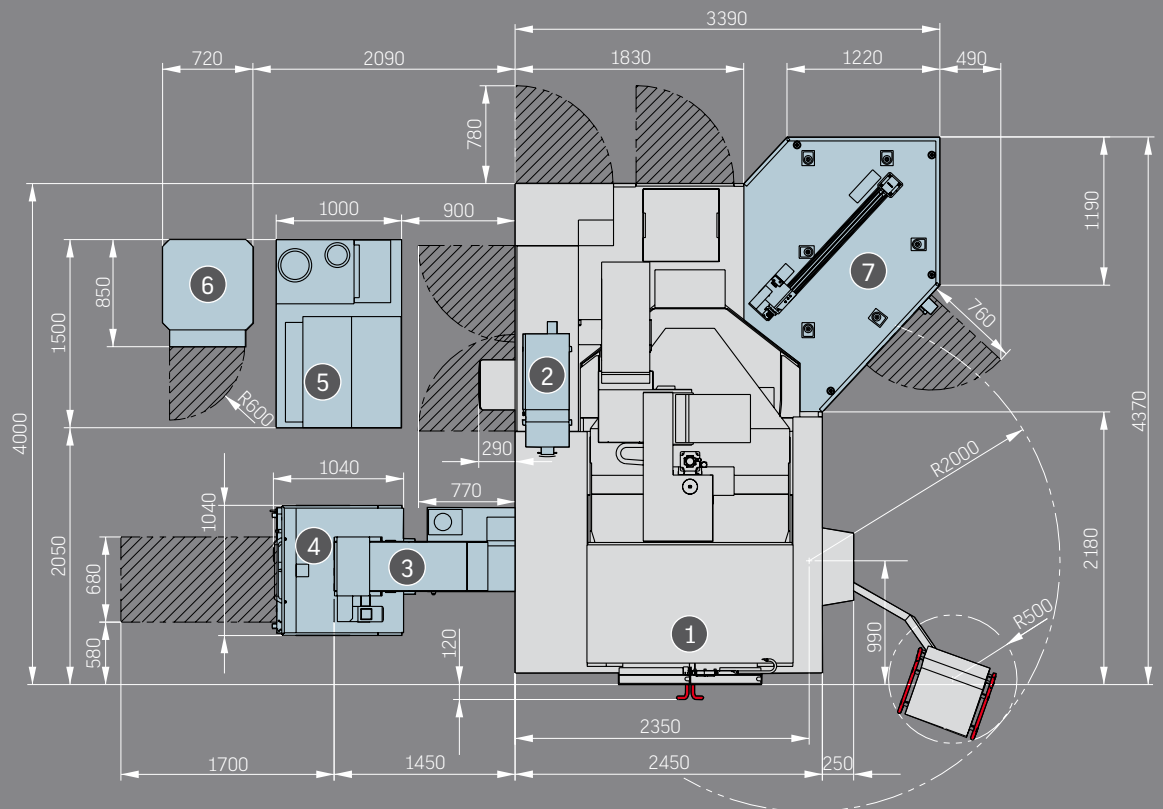
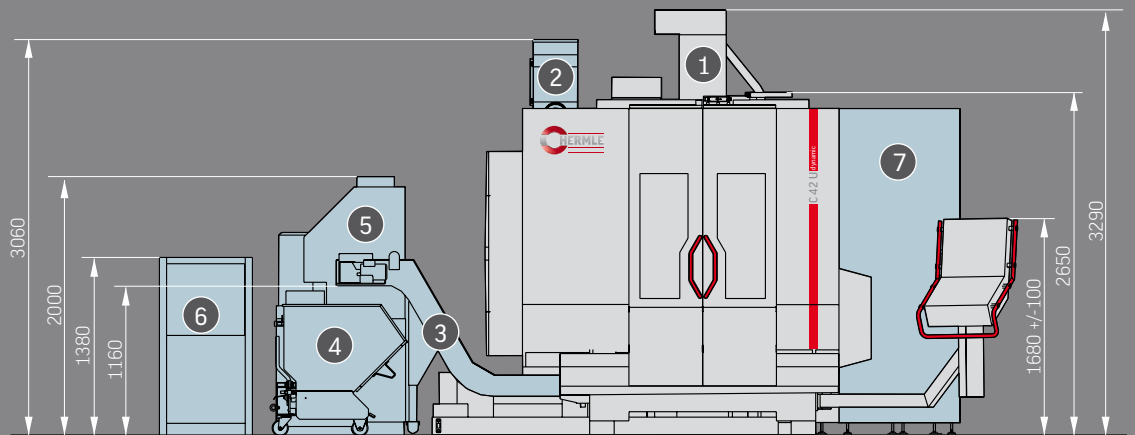


- | | |
|---|------------------------------------|
| 1 | Standard machine |
| 2 | Oil mist extractor |
| 3 | Chip conveyor |
| 4 | Chip cart |
| 5 | Through the spindle coolant supply |
| 6 | Spindle motor cooling unit |
| 7 | Magazine extension ZM 43 |
| 8 | Magazine extension ZM 87 |
| 9 | Magazine extension ZM 160 |



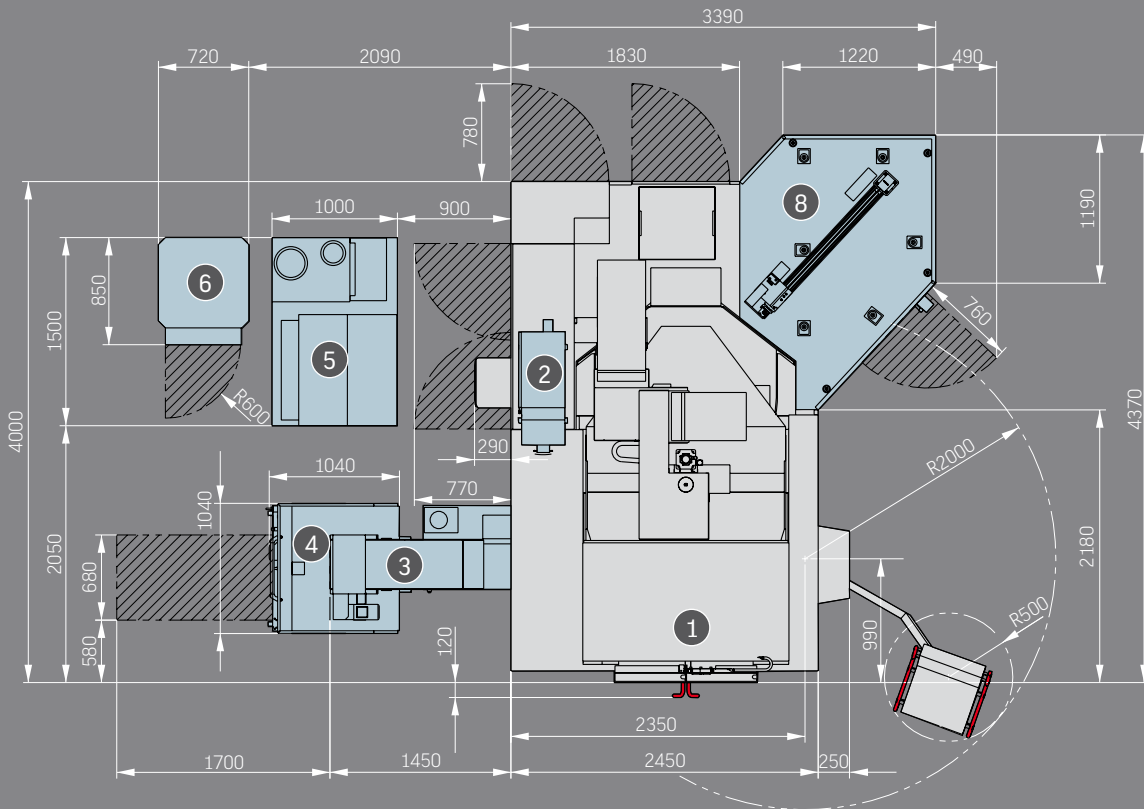
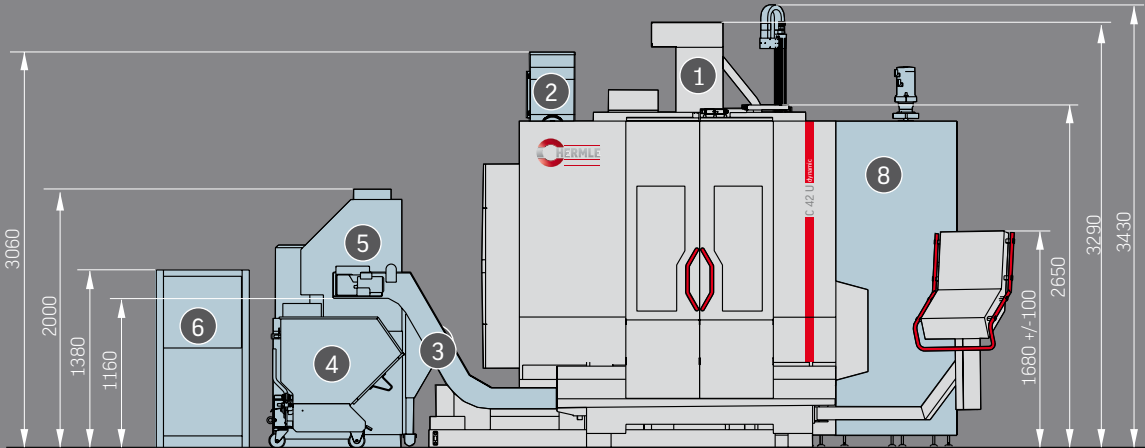
Dimensions C 42

ZM 43



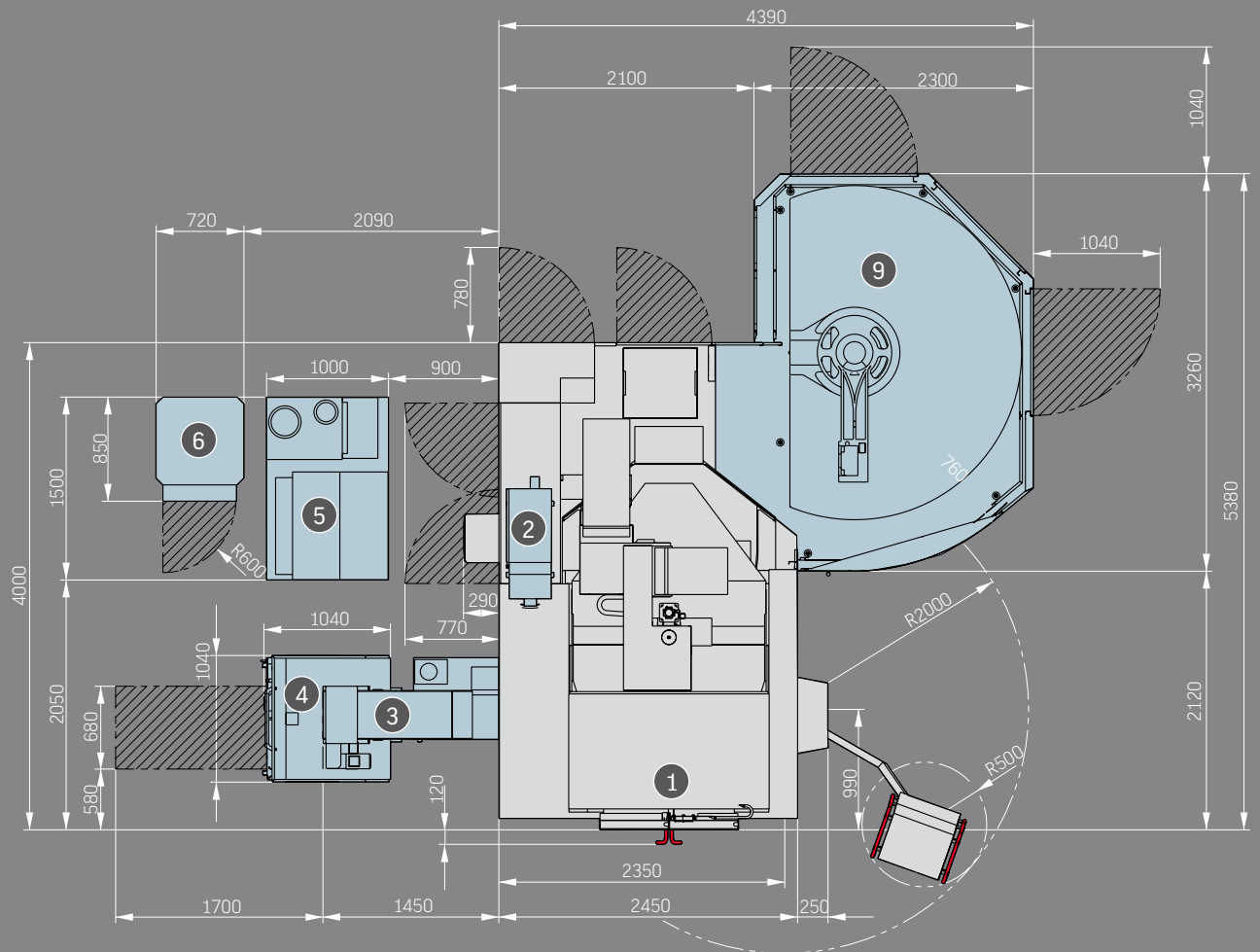
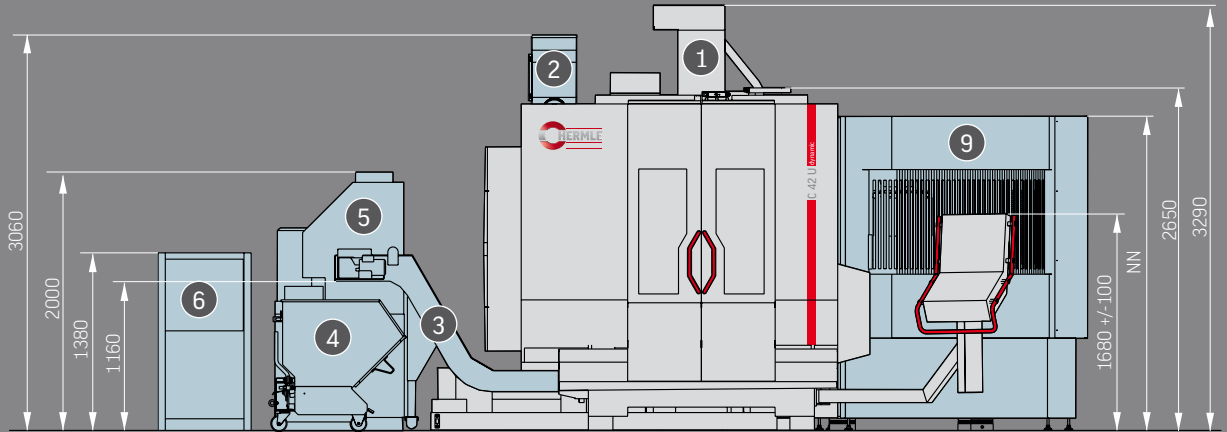
Dimensions C 42

ZM 87



Dimensions C 42

ZM 160



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