



## Series MILL

Universal precision machining centres as well for  
combined milling and turning machining

# CHIRON MILL series

Modular machines for customised requirements

The CHIRON MILL series offers optimal conditions for highly productive cutting and accurate machining results. One of the machine's many unique strengths lies in its high milling capacity, while offering stability, reliability and little maintenance.

CHIRON's wide range of versatile options allow for customisations, of machines to adapt the machine configuration to meet your application needs.

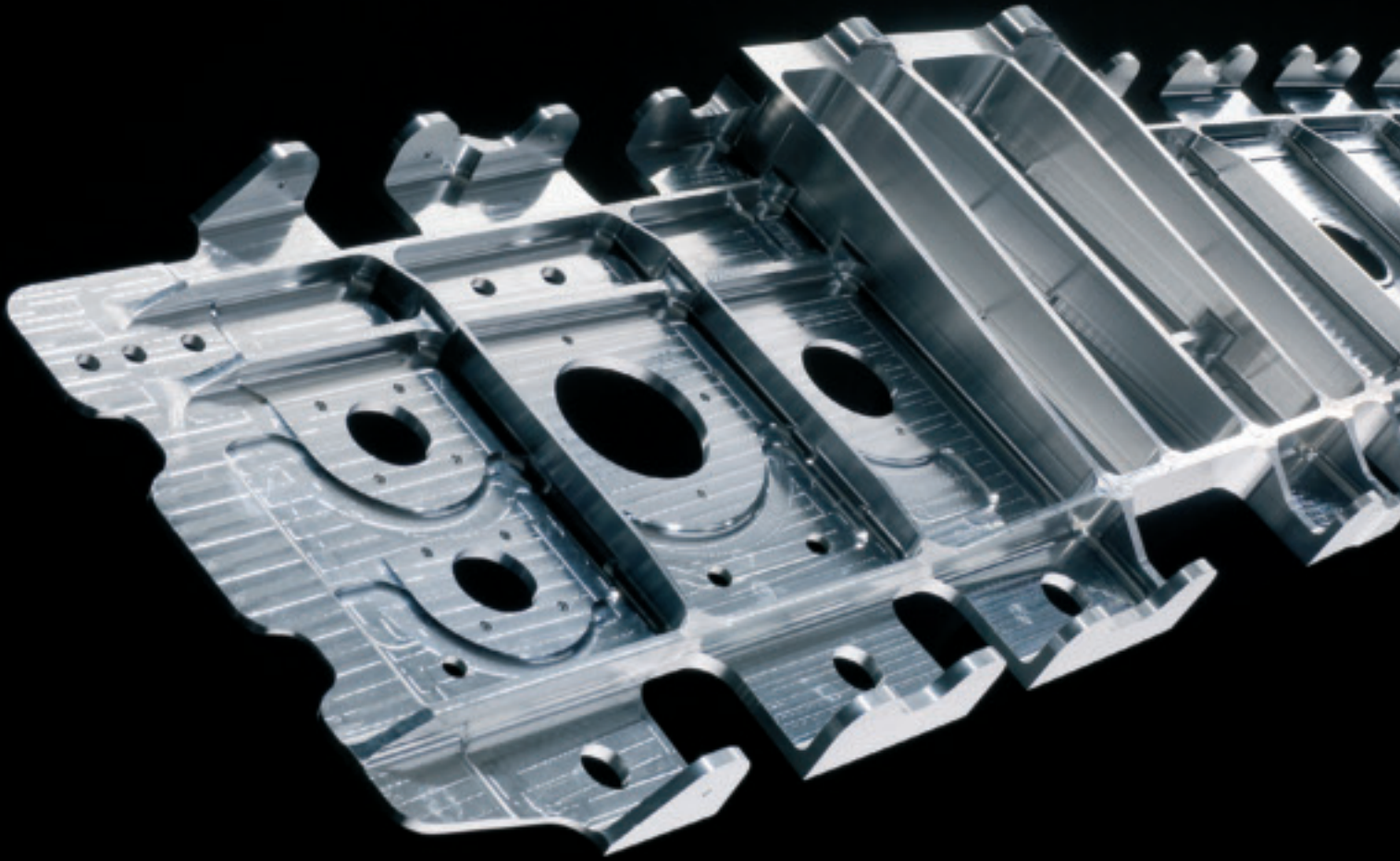


|                    |         |
|--------------------|---------|
| Application ranges | [04-05] |
| Machine design     | [06-09] |
| Variants           | [10-11] |
| Extension options  | [12-17] |
| Services           | [18-19] |



# With every part comes many benefits

Cost effective and precise complete machining from the smallest part to large workpieces

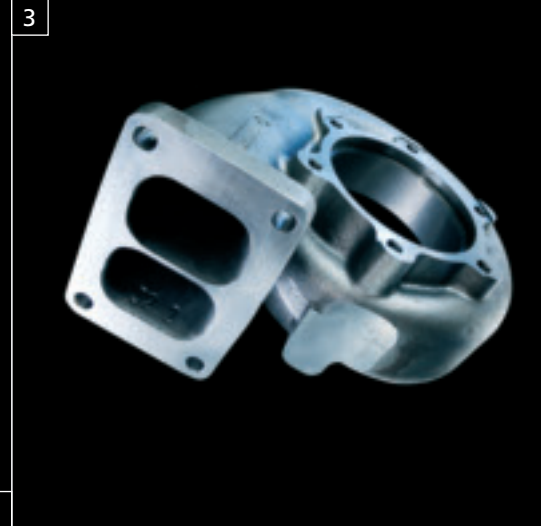
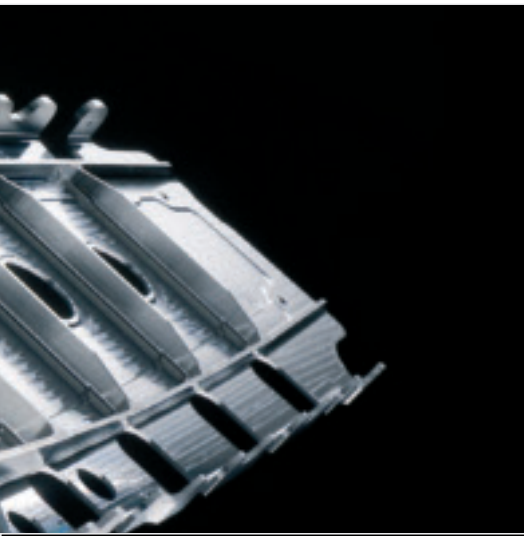


Aerospace: Wing rib: (large cubic workpiece, length: 1,600 mm, with high cutting proportions) support structure for medium-haul jets

For many years, our MILL machine and production concepts have been a reliable partner in several industries, worldwide.

- Automotive industry and supplier companies
- Utility vehicle industry and supplier companies
- Machine construction
- Medical
- Aerospace
- Manufacturers of:
  - tools
  - hydraulic and pneumatic parts
  - fittings
  - metal fittings/closing systems
  - optical devices
  - electric and electronic components
  - ... and much more.

|                      |         |
|----------------------|---------|
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**1** Precision tools: Milling, drilling, thread cutting and turning in one set-up, e.g. complex stepped tools

**2** Mechanical engineering: 5-axis simultaneous machining of workpieces made of high-strength steels with high precision and surface quality, e.g. turbine blades (L x W x H: 200 x 65 x 30 mm)

**3** Automotive: All types of housing parts, e.g. turbolader for combustion motors (weight: 12 kg)

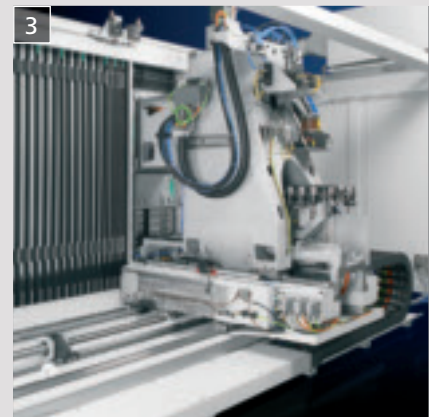
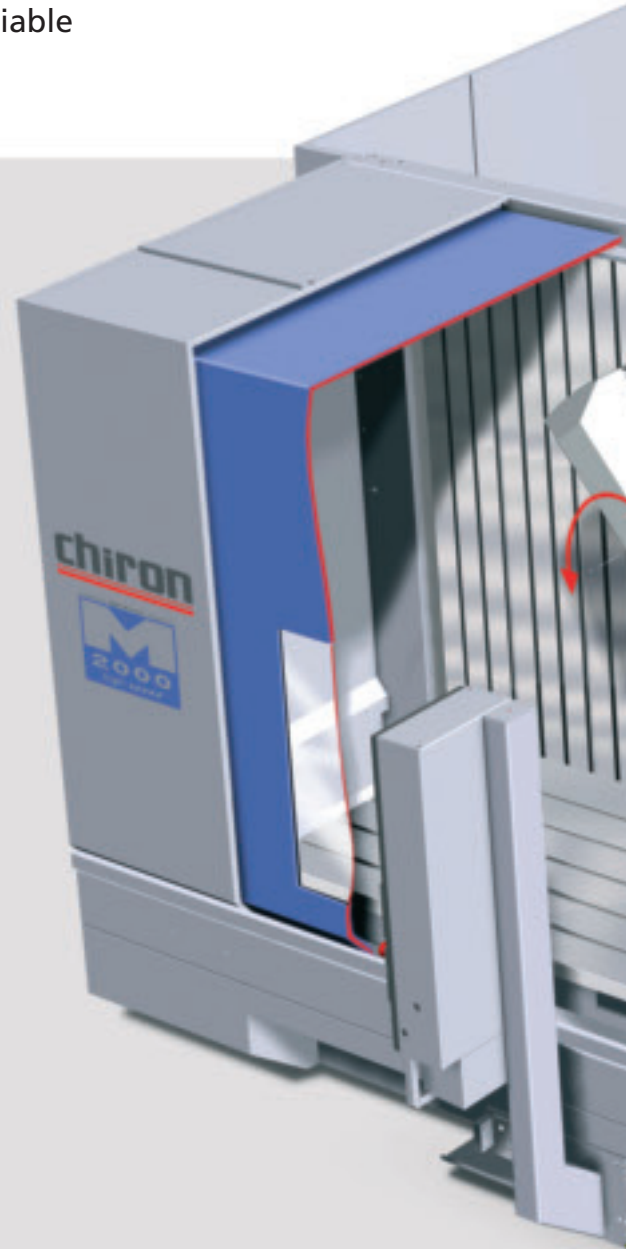
**4** Machine construction: Machining of long profile components, e.g. take-up angle for textile machines (length: 1 700 mm)

# Force, dynamics and precision

CHIRON MILL – developed to be faster and more reliable

## Design advantages:

- Simple robust basic structure
- Low-maintenance and durable
- Long travel with compact external machine dimensions
- High rigidity and thermal stability
- Digital direct drives and guides outside of the work area
- NC rotary table with wear-free TORQUE drive technology
- Fully encapsulated, crane-loadable work area
- Protective covering made with stainless steel slats
- Traversable control panel
- Easy to inspect and access the work area
- Machine bed with integrated coolant and chip removal
- Chip disposal either to the side or to the rear
- Smooth, steep walls allow for ideal chip flow
- Chain magazine for tools that are protected from chips and coolant
- Foundation-free set-up



Application ranges

[04-05]

► **Machine design**

[06-09]

Variants

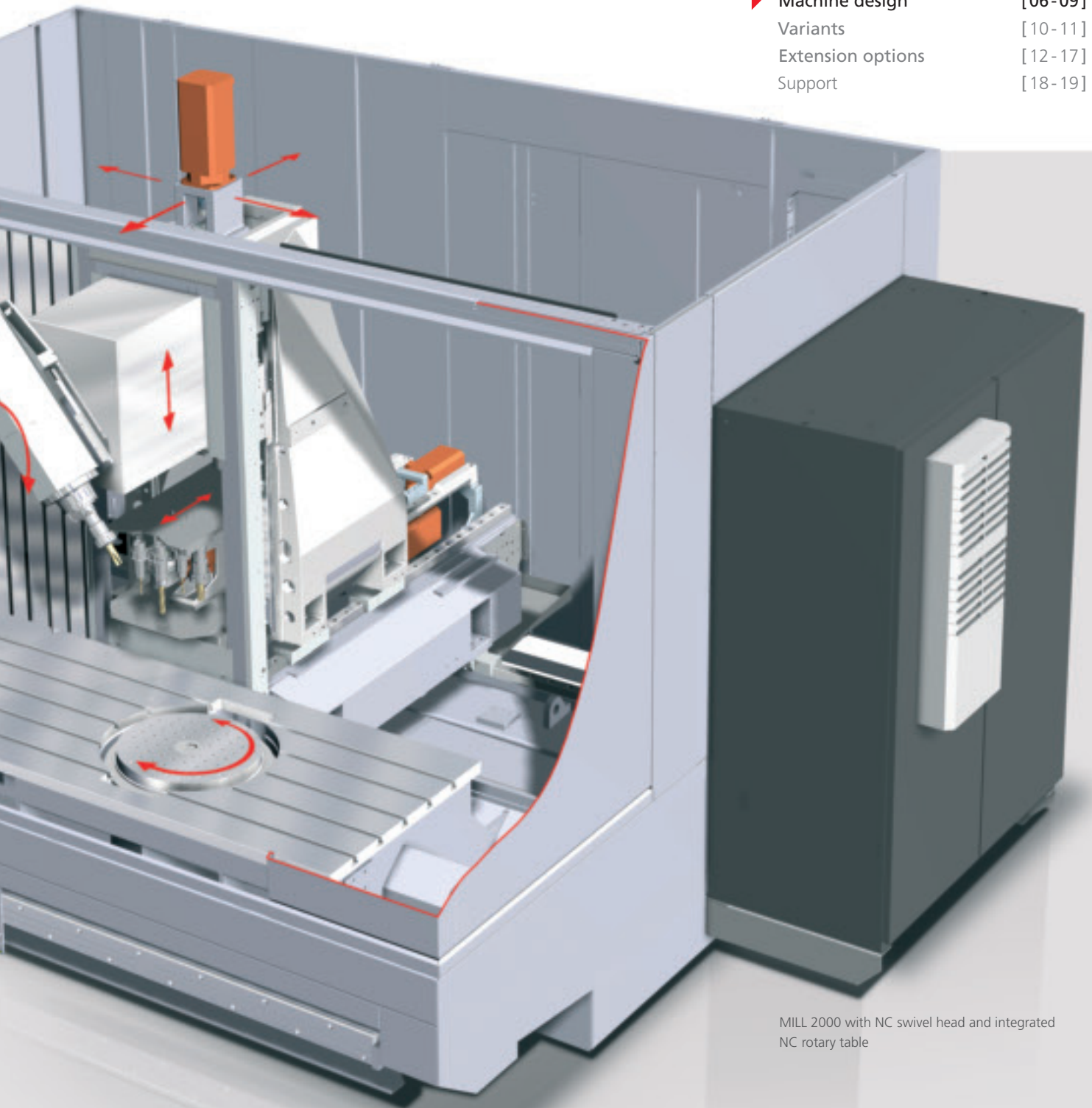
[10-11]

Extension options

[12-17]

Support

[18-19]



MILL 2000 with NC swivel head and integrated NC rotary table

4



**1** High milling capacity and dynamics  
in the machining process

**2** Highest precision  
high running, positioning and long-term precision

**3** Maintenance friendly, easy-to-access

**4** Crane loading  
Easy loading of large and heavy devices,  
as well as workpieces

# High-tech solution for intensive demands

Variants to meet all requirements



MILL 3000: Pendulum mode with inserted, chip-proof central splash guard

## MILL process advantages:

- High milling capacity
- Outstanding precision
- Excellent surface quality
- Powerful spindle, up to 75 kW drive power
- Spindle speed, up to 20,000 rpm
- Short positioning and approach times, thanks to rapid feeds up to 60 m / min
- Chip-to-chip time approx. 2.9 s
- Number of tools, up to 163
- Tool interface ISO / CAT 40 or HSK-A 63
- Tool diameter, up to 160 mm
- Tool length, up to 370 mm
- Suitable for dry machining and minimum lubrication (mql)

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|--------------------|---------|
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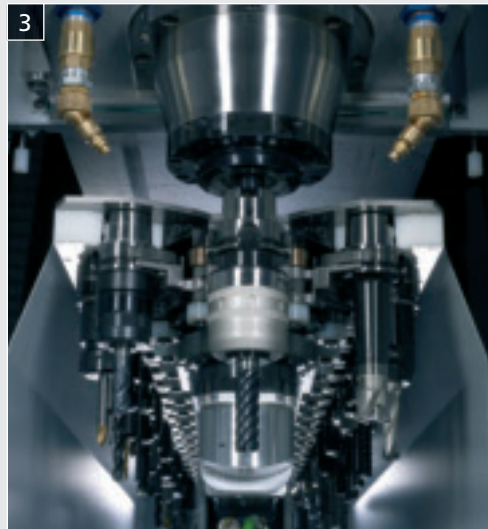


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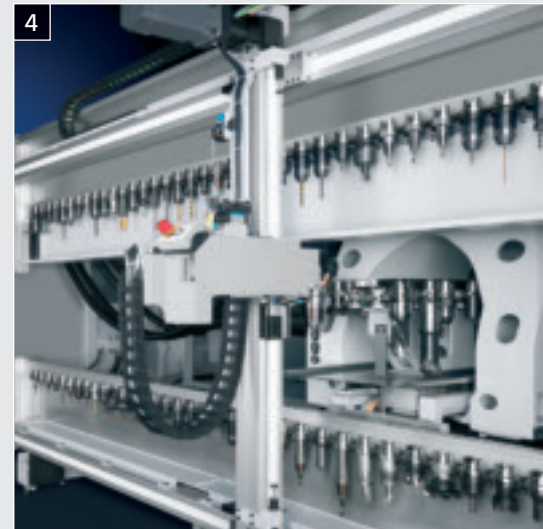
- 1 NC swivel head with a continuous swivel range up to  $\pm 110^\circ$ . This option distinguishes itself by its exceptionally high rigidity and speed.
- 2 The MILL series can be delivered with a Siemens, Fanuc or Heidenhain CNC control
- 3 Automatic tool change using the pick-up method, starting from 1.5 s (24 / 40 / 60 tool places)
- 4 Tools are made available from the background magazine (92 or 163 ISO / CAT 40 or HSK-A 63 tool places) during machining



2



3



4



5



6



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- 5 The C axis can be designed as a NC rotary table or as a turning spindle, up to 1,000 rpm.

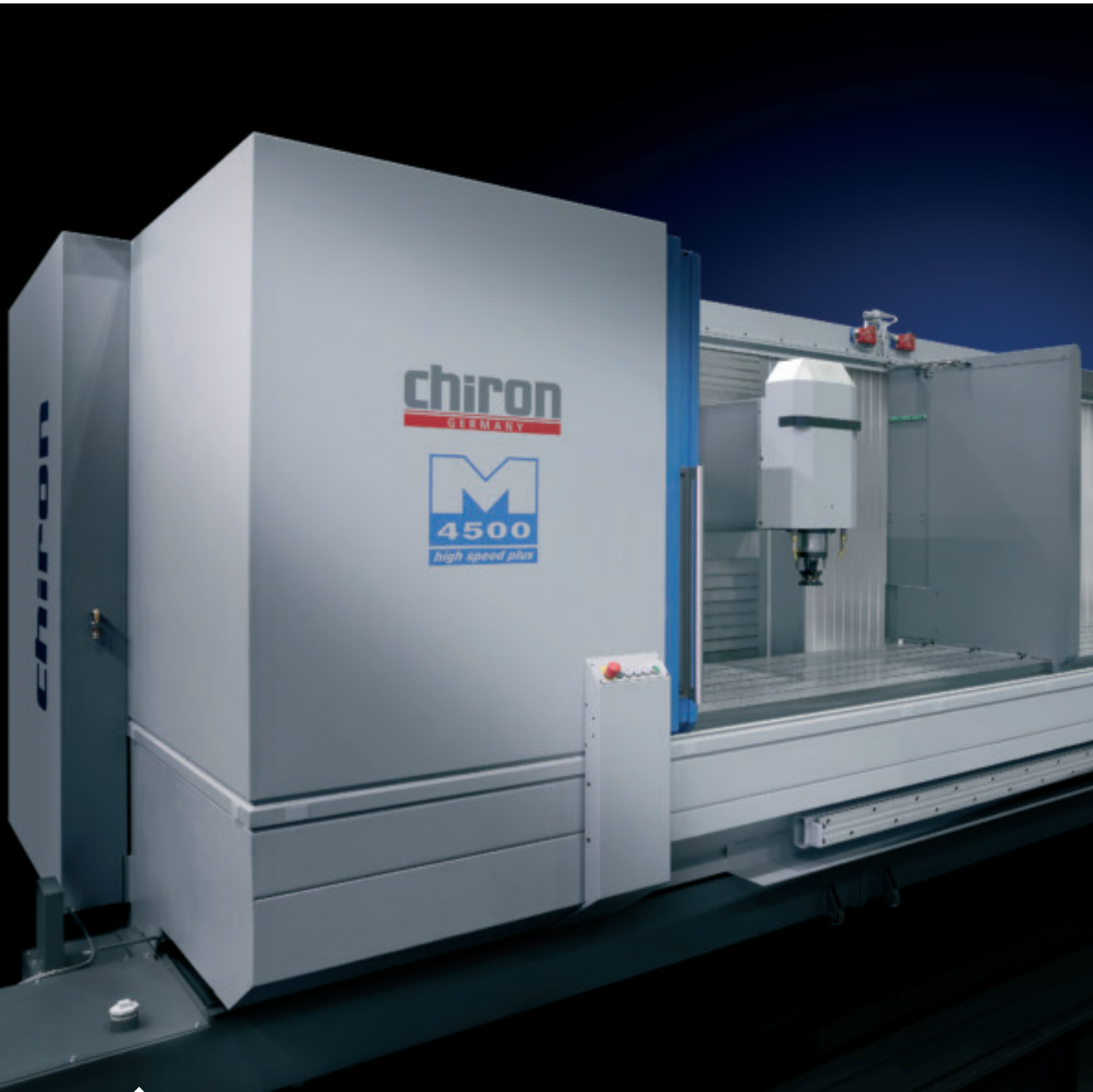
- 6 Standard rotary table- basic trunnion fixture with counterbearings, cheeks with connection coupling and quick locator for taking up clamping devices

- 7 Integrated 2-axis swivel rotary table with 2 face plates. The face plates provide the option of hydraulic or pneumatic workpiece clamping



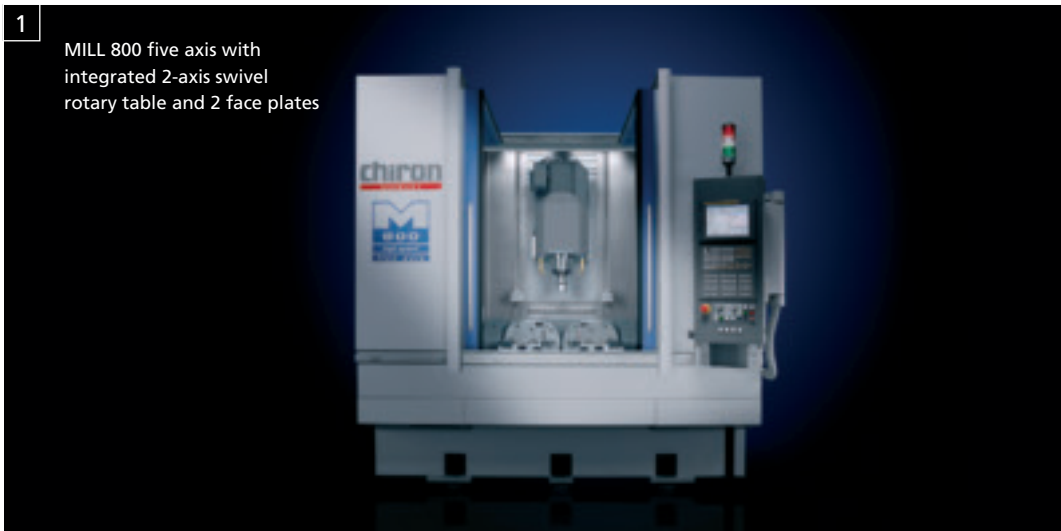
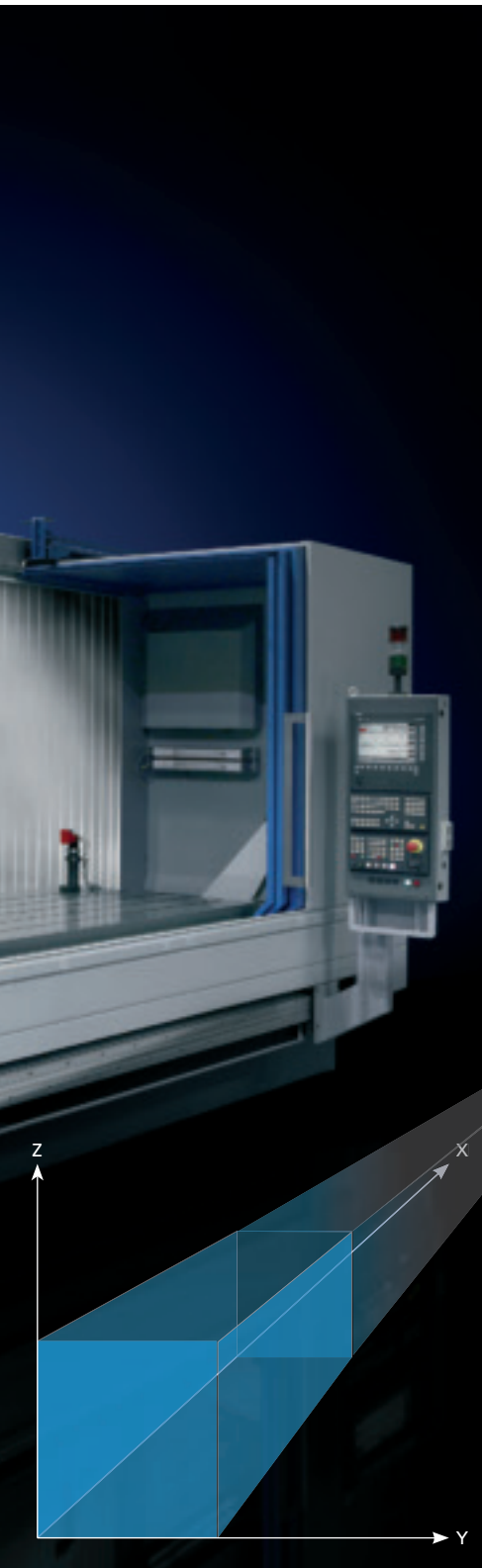
# The right machine for each part

CHIRON MILL – Variations



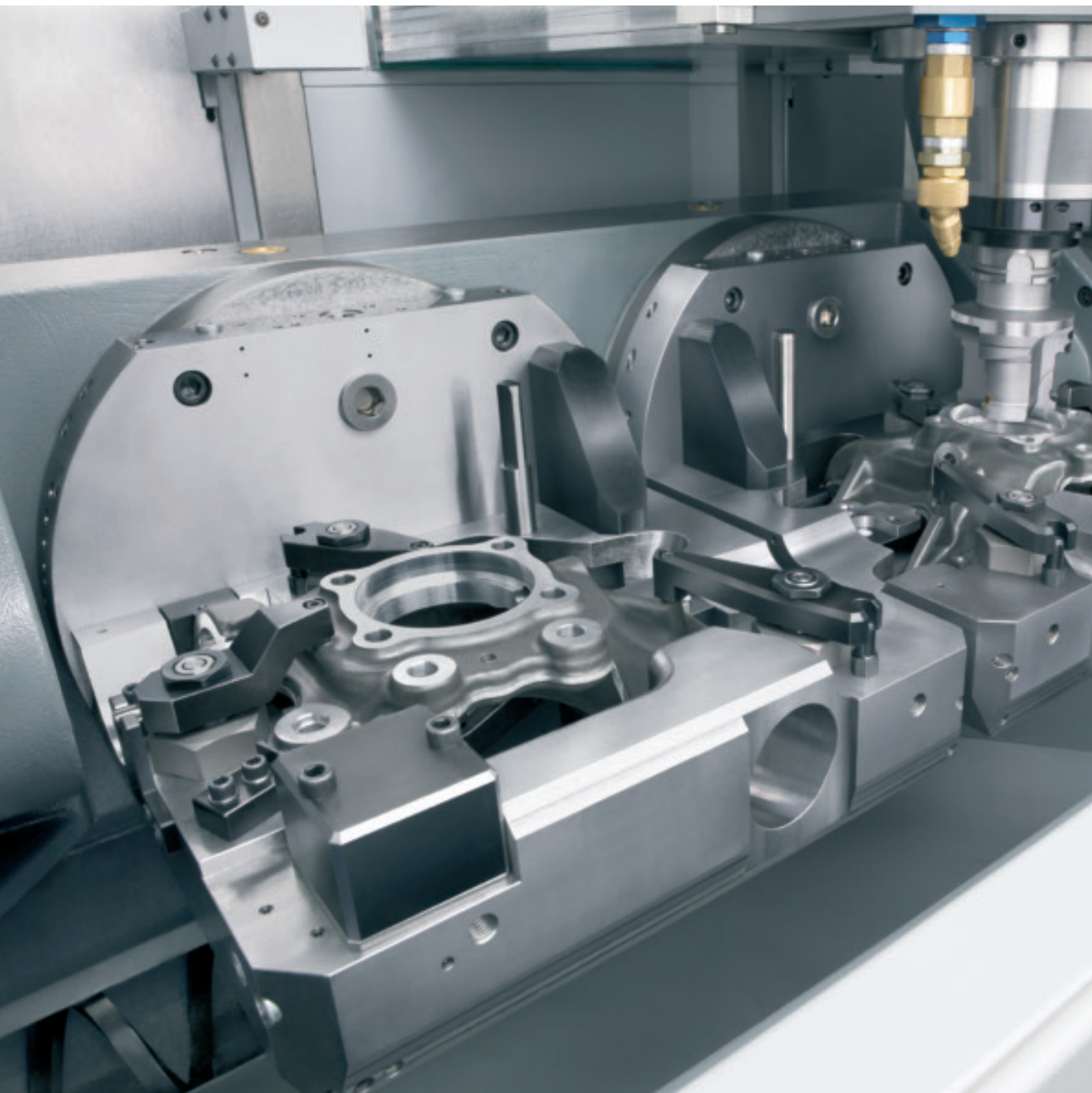
The MILL models 3000 / 4500 / 6000 / 8000 are distinguished by their large work areas.

|                    |         |
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# Our response to the need for precision

5-axis complete machining

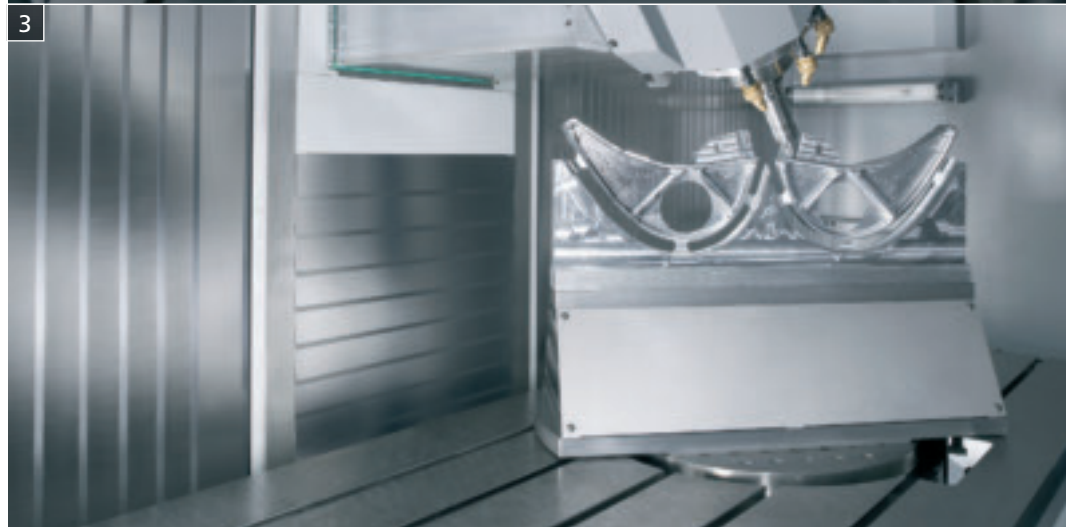
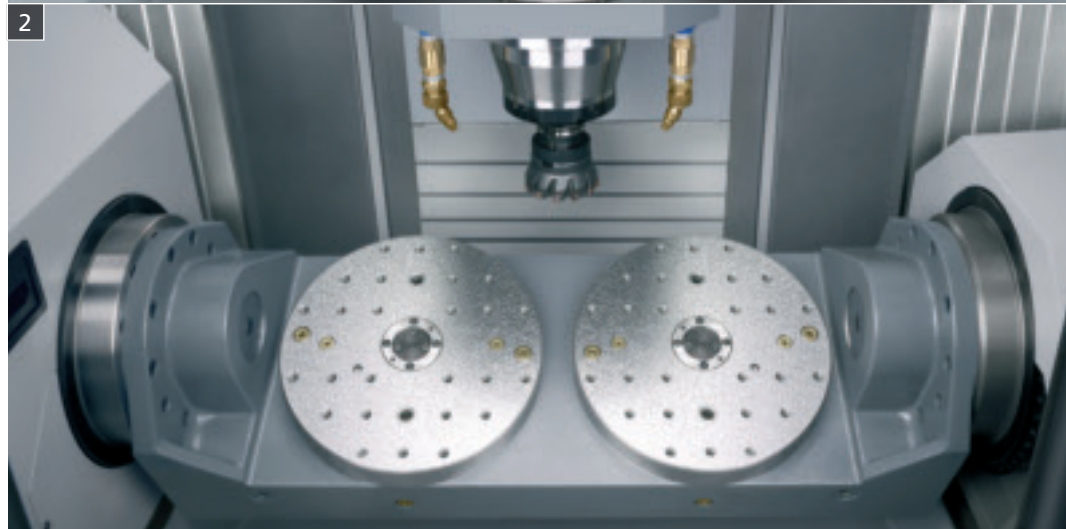
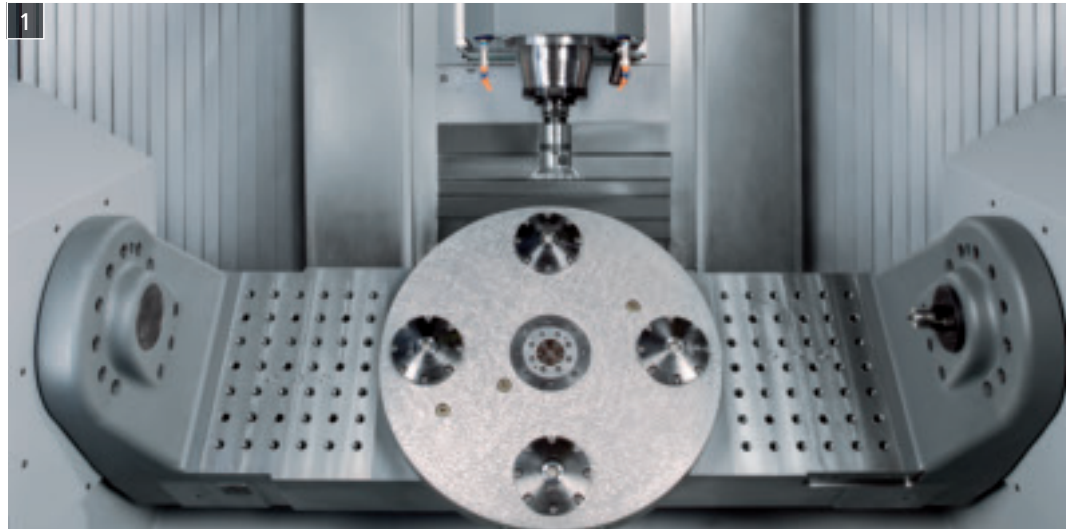


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The 2-axis swivel rotary table offers the option of machining workpieces on 5 sides, in one set-up

- Swivel range  $\pm 110^\circ$
- Turning range  $360^\circ$
- Face plates of  $\varnothing 280$  to  $630$  mm
- Direct measuring systems
- 6-line energy feed



- 1** Integrated 2-axis swivel rotary table with additional clamping surfaces to the right and left of the face plate
- 2** Integrated 2-axis swivel rotary table with two face plates
- 3** Combination of NC swivel head and NC rotary table with  $\varnothing 500$  mm face plate built into the rigid table

# Quality in every meter

Automated 6-side complete machining from the bar



Bar machining: Automatic, precise machining of complex parts due to the combination of a swivel head spindle and rotary axis.

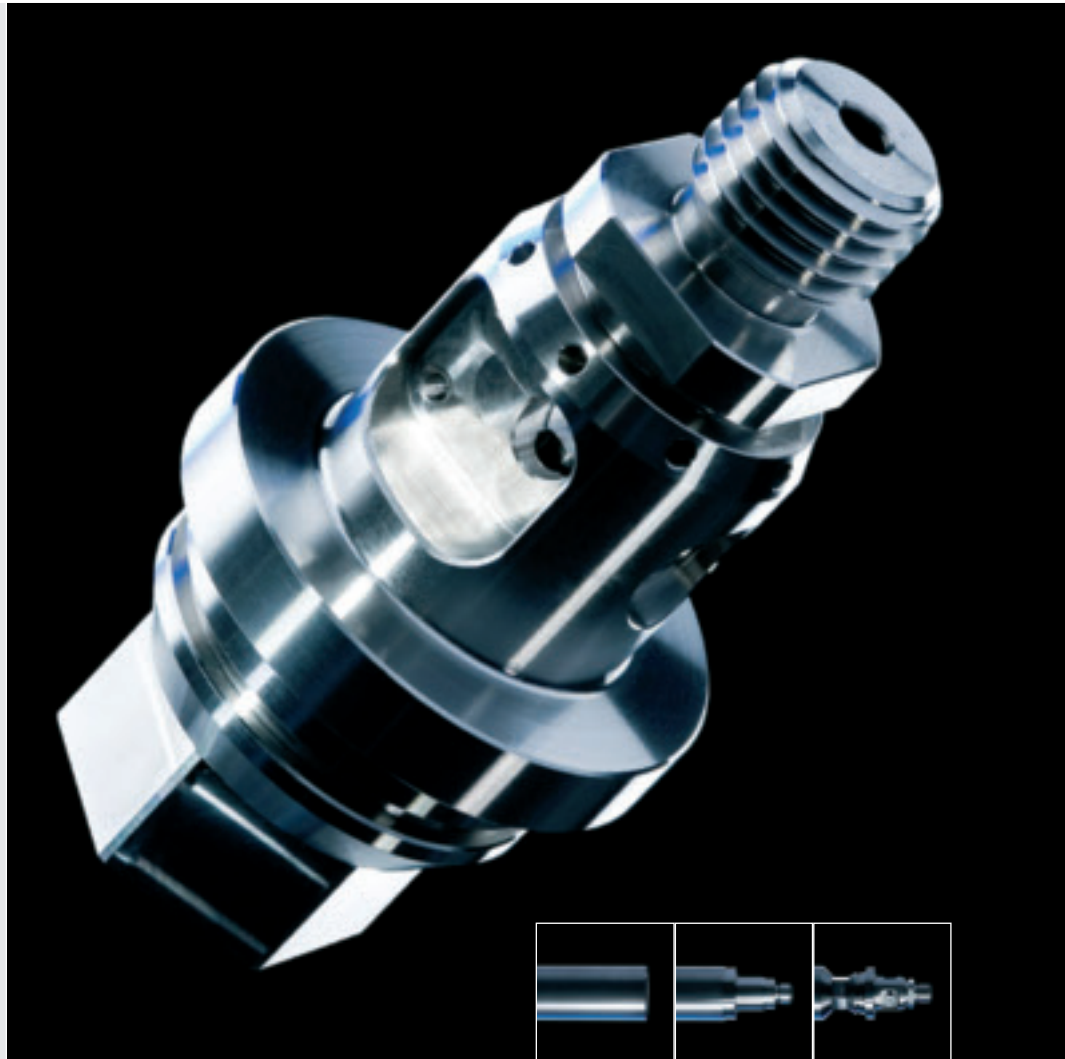
## Advantages:

- Multi-functional machining centre: Milling, turning, drilling, tapping and measuring all happen on one machine
- Six-sided complete machining in two set-ups
- Enhanced machining quality due to the reduced number of reclamping operations.
- Reduced job run-through and machining times, as well as in-plant logistics processes
- Reliable running autonomy
- Multi-functional machining, incl. back side of workpiece
- Individual material feed solutions (bar loader / bar loading magazine)
- Bar diameter up to 100 mm



Turning up to 4,500 rpm

|                     |         |
|---------------------|---------|
| Application ranges  | [04-05] |
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Drilling and thread cutting



Milling the back side

# Automatically a step ahead

Automation solutions and options for complete machining



## Individual automation solutions:

- Task-specific feeding: Workpiece magazines (e.g. pallets) and feeding units (e.g. loading magazine)
- Articulated arm or portal robot
- Machine-integrated grippers
- In-process measurement of the workpieces
- Tool breakage check
- Tool measurement



Spindle gripper for machine-integrated workpiece handling

|                     |         |
|---------------------|---------|
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Space saving integration of an articulated arm robot for removing finished parts



Reliable running autonomy, due to the integration of workpiece pallet magazines using loading/unloading robots



Machine integrated workpiece measurement by using a 3D probing system



CHIRON Laser Control for tool breakage checks, tool measurement and for machine compensation



Stationary 3D probing system for tool length measurement and tool breakage checks, as well as machine compensation

# The perfect solution

for maximum productivity and process reliability

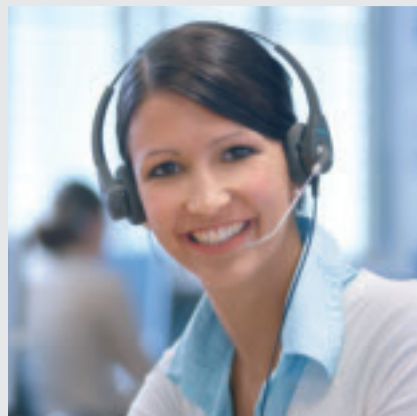


CHIRON turnkey solutions  
... customised and ready to use

- Comprehensive process design
- Expert engineering
- Experienced project management
- Validation of statistical processes
- Securing of productivity objectives
- Production assistance during initial phase
- Training for machine operation and programming
- CHIRON services available worldwide



|                    |         |
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Service 24/7  
... confident and reliable

- Remote diagnostics and teleservice
- High replacement part availability
- Worldwide repair service
- Production accompaniment
- Process optimisation
- Modernisation
- Training

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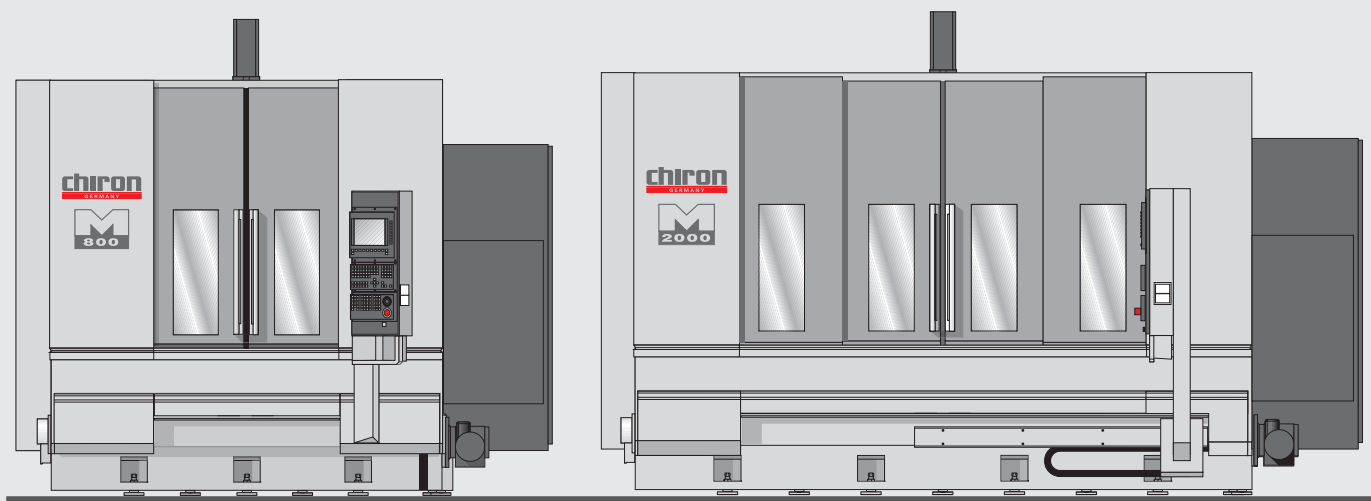
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## Technical data



## Series MILL

Universal precision machining as well for  
combined milling and turning machining

# Standard machines

| Technical Data                                   | MILL 800              | MILL 1250             | MILL 2000    | MILL 3000    | MILL 4500    | MILL 6000    | MILL 8000    |
|--------------------------------------------------|-----------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|
| Drilling capacity in st 60 with inserted drill   | Ø 42 mm               | Ø 42 mm               | Ø 42 mm      | Ø 42 mm      | Ø 42 mm      | Ø 42 mm      | Ø 42 mm      |
| Tapping                                          | M 30                  | M 30                  | M 30         | M 30         | M 30         | M 30         | M 30         |
| Milling capacity in st 60                        | 600 cm³/min           | 600 cm³/min           | 600 cm³/min  | 600 cm³/min  | 600 cm³/min  | 600 cm³/min  | 600 cm³/min  |
| Tool storage capacity                            | 24                    | 24                    | 24           | 24           | 24           | 24           | 24           |
| Tool taper ISO 7388                              | ISO/CAT 40            | ISO/CAT 40            | ISO/CAT 40   | ISO/CAT 40   | ISO/CAT 40   | ISO/CAT 40   | ISO/CAT 40   |
| Max. tool diameter                               | 75 mm                 | 75 mm                 | 75 mm        | 75 mm        | 75 mm        | 75 mm        | 75 mm        |
| If adjacent places are free                      | 160 mm                | 160 mm                | 160 mm       | 160 mm       | 160 mm       | 160 mm       | 160 mm       |
| Max. tool length                                 | 320 mm                | 320 mm                | 320 mm       | 320 mm       | 320 mm       | 320 mm       | 320 mm       |
| Max. tool weight                                 | 8 kg                  | 8 kg                  | 8 kg         | 8 kg         | 8 kg         | 8 kg         | 8 kg         |
| Tool change time approx.                         | 1.5 s                 | 1.5 s                 | 1.5 s        | 1.5 s        | 1.5 s        | 1.5 s        | 1.5 s        |
| Chip-to-chip-time approx.                        | 4.2 s                 | 4.2 s                 | 4.2 s        | 4.2 s        | 4.2 s        | 4.2 s        | 4.2 s        |
| Infinitely variable speed range up to            | 9,000 rpm             | 9,000 rpm             | 9,000 rpm    | 9,000 rpm    | 9,000 rpm    | 9,000 rpm    | 9,000 rpm    |
| Spindle drive (Siemens / Fanuc)                  | 22 kW                 | 22 kW                 | 22 kW        | 22 kW        | 22 kW        | 22 kW        | 22 kW        |
| Max. torque                                      | 140 Nm                | 140 Nm                | 140 Nm       | 140 Nm       | 140 Nm       | 140 Nm       | 140 Nm       |
| Diameter front spindle bearing                   | 70 mm                 | 70 mm                 | 70 mm        | 70 mm        | 70 mm        | 70 mm        | 70 mm        |
| Tool clamping                                    | 6,500 N               | 6,500 N               | 6,500 N      | 6,500 N      | 6,500 N      | 6,500 N      | 6,500 N      |
| Distance spindle to column                       | 220 - 720 mm          | 220 - 1,060 mm        | 220 - 720 mm | 220 - 850 mm | 220 - 850 mm | 220 - 850 mm | 220 - 850 mm |
| Distance spindle nose to table surface           | 90 - 640 mm           | 90 - 640 mm           | 90 - 640 mm  | 90 - 640 mm  | 90 - 640 mm  | 90 - 640 mm  | 90 - 640 mm  |
| Travel X-axis                                    | 800 mm                | 1,250 mm              | 2,000 mm     | 3,000 mm     | 4,500 mm     | 6,000 mm     | 8,000 mm     |
| Shuttle operation X-axis max.                    | –                     | –                     | 2 x 750 mm   | 2 x 1,250 mm | 2 x 2,000 mm | 2 x 2,750 mm | 2 x 3,750 mm |
| Travel Y-axis                                    | 500 mm                | 840 mm                | 500 mm       | 630 mm       | 630 mm       | 630 mm       | 630 mm       |
| Travel Z-axis                                    | 550 mm                | 550 mm                | 550 mm       | 550 mm       | 550 mm       | 550 mm       | 550 mm       |
| Feed force X- / Y-axis                           | 5,000N                | 5,000N                | 5,000N       | 5,000N       | 5,000N       | 5,000N       | 5,000N       |
| Feed force Z-axis                                | 10,000N               | 10,000N               | 10,000N      | 10,000N      | 10,000N      | 10,000N      | 10,000N      |
| Rapid feed rate X- / Y- / Z-axis                 | 40 m/min              | 40 m/min              | 40 m/min     | 40 m/min     | 40 m/min     | 40 m/min     | 40 m/min     |
| Fixed table length                               | 1,400 mm              | 1,850 mm              | 2,600 mm     | 3,600 mm     | 5,100 mm     | 6,600 mm     | 8,600 mm     |
| Fixed table width                                | 550 mm                | 920 mm                | 550 mm       | 710 mm       | 710 mm       | 710 mm       | 710 mm       |
| T-Slots                                          | 2 x 18 H 12           | 4 x 18 H 12           | 2 x 18 H 12  | 4 x 18 H 12  | 4 x 18 H 12  | 4 x 18 H 12  | 4 x 18 H 12  |
| Reference slot                                   | 18 H 8                | 18 H 8                | 18 H 8       | 18 H 8       | 18 H 8       | 18 H 8       | 18 H 8       |
| NC-tilting rotary table                          | ± 110°                | ± 110°                | –            | –            | –            | –            | –            |
| Face plate diameter                              | 280 mm                | 280 mm                | –            | –            | –            | –            | –            |
| Dowel and bolt hole pattern                      | M 16 x Ø 15H7 x 50 mm | M 16 x Ø 15H7 x 50 mm | –            | –            | –            | –            | –            |
| Max. transport load                              | 320 kg                | 320 kg                | –            | –            | –            | –            | –            |
| Speed 4th/5th axis                               | 30/45 rpm             | 30/45 rpm             | –            | –            | –            | –            | –            |
| Direkt path measuring system on 4th and 5th axis | +/- 6"                | +/- 6"                | –            | –            | –            | –            | –            |
| Media connectors at the adapter face plate       | 6                     | 6                     | –            | –            | –            | –            | ,            |
| Chip conveyor, ejection height                   | 1,050 mm              | 1,050 mm              | 1,050 mm     | 1,050 mm     | 1,050 mm     | 1,050 mm     | 1,050 mm     |
| Coolant device, container capacity               | 900 l                 | 900 l                 | 900 l        | 900 l        | 1,400 l      | 1,400 l      | 1,400 l      |
| Total connection power approx.                   | 20 kVA                | 20 kVA                | 20 kVA       | 20 kVA       | 20 kVA       | 20 kVA       | 20 kVA       |
| Machine weight approx.                           | 7.0 t                 | 8.5 t                 | 9.5 t        | 13.5 t       | 18.5 t       | 23.5 t       | 28.5 t       |
| Air connection                                   | 6 bar                 | 6 bar                 | 6 bar        | 6 bar        | 6 bar        | 6 bar        | 6 bar        |

| Options                                         | MILL 800           | MILL 1250          | MILL 2000          | MILL 3000           | MILL 4500          | MILL 6000          | MILL 8000          |
|-------------------------------------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|
| <b>High Speed Version</b>                       |                    |                    |                    |                     |                    |                    |                    |
| Infinitely variable speed range up to           | 12,000 rpm         | 12,000 rpm         | 12,000 rpm         | 12,000 rpm          | 12,000 rpm         | 12,000 rpm         | 12,000 rpm         |
| Chip-to-chip-time approx.                       | 3.2 s              | 3.2 s              | 3.2 s              | 3.2 s               | 3.2 s              | 3.2 s              | 3.2 s              |
| Rapid feed rate X / Y- / Z-axis                 | 60 m/min           | 60 m/min           | 60 m/min           | 60 m/min            | 60 m/min           | 60 m/min           | 60 m/min           |
| <b>High Speed Plus Version</b>                  |                    |                    |                    |                     |                    |                    |                    |
| Infinitely variable speed range up to           | 20,000 rpm         | 20,000 rpm         | 20,000 rpm         | 20,000 rpm          | 20,000 rpm         | 20,000 rpm         | 20,000 rpm         |
| Chip-to-chip-time approx.                       | 2.9 s              | 2.9 s              | 2.9 s              | 2.9 s               | 2.9 s              | 2.9 s              | 2.9 s              |
| Rapid feed rate X / Y- / Z-axis                 | 60 m/min           | 60 m/min           | 60 m/min           | 60 m/min            | 60 m/min           | 60 m/min           | 60 m/min           |
| <b>More powerful spindle drive</b>              |                    |                    |                    |                     |                    |                    |                    |
| Infinitely variable speed range up to           | 12,000 rpm         | 12,000 rpm         | 12,000 rpm         | 12,000 rpm          | 12,000 rpm         | 12,000 rpm         | 12,000 rpm         |
| Spindle drive Siemens                           | 42.7 kW            | 42.7 kW            | 42.7 kW            | 42.7 kW             | 42.7 kW            | 42.7 kW            | 42.7 kW            |
| Max. torque Siemens                             | 180 Nm             | 180 Nm             | 180 Nm             | 180 Nm              | 180 Nm             | 180 Nm             | 180 Nm             |
| Drilling capacity in St 60 with inserted drill  | 45 mm              | 45 mm              | 45 mm              | 45 mm               | 45 mm              | 45 mm              | 45 mm              |
| Tapping                                         | M 33               | M 33               | M 33               | M 33                | M 33               | M 33               | M 33               |
| Milling capacity in St 60                       | 700 cm³/min        | 700 cm³/min        | 700 cm³/min        | 700 cm³/min         | 700 cm³/min        | 700 cm³/min        | 700 cm³/min        |
| <b>More Options</b>                             |                    |                    |                    |                     |                    |                    |                    |
| Tool storage capacity                           | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 1635 | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 |
| Travel Y-axis                                   | 630                | –                  | 630/840            | 840                 | 840                | 840                | 840                |
| Tool taper HSK-A 63                             | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Tool length 370 mm (HSK-A 63)                   | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| NC rotary table                                 | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| NC rotary table with basic fixture              | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| 2-axis NC rotary table                          | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| NC rotary table integrated in fixed table       | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Through the spindle coolant up to 70 bar        | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Chip conveyor with full flow cleaning           | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Probe                                           | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Direct path measuring system                    | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Stationary 3-D-probe system                     | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Centre guard with mechanically operated opening | –                  | –                  | •                  | •                   | •                  | •                  | •                  |
| Tool breakage monitoring/Tool life management   | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Probes for workpiece and tool measurement       | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Signal lamp                                     | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Handwheel                                       | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| CHIRON Laser Control                            | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Control: Siemens, Fanuc, Heidenhain             | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Central lubrication                             | •                  | •                  | •                  | •                   | •                  | •                  | •                  |
| Automatic doors                                 | •                  | •                  | •                  | •                   | •                  | •                  | •                  |

# Machines with NC swivel head

| Technical Data                                 | MILL 800     | MILL 1250      | MILL 2000    | MILL 3000    | MILL 4500    | MILL 6000    | MILL 8000    |
|------------------------------------------------|--------------|----------------|--------------|--------------|--------------|--------------|--------------|
| Drilling capacity in st 60 with inserted drill | 42 mm        | 42 mm          | 42 mm        | 42 mm        | 42 mm        | 42 mm        | 42 mm        |
| Tapping                                        | M 30         | M 30           | M 30         | M 30         | M 30         | M 30         | M 30         |
| Milling capacity in St 60                      | 600 cm³/min  | 600 cm³/min    | 600 cm³/min  | 600 cm³/min  | 600 cm³/min  | 600 cm³/min  | 600 cm³/min  |
| Tool storage capacity                          | 24           | 24             | 24           | 24           | 24           | 24           | 24           |
| Tool taper DIN 69893                           | HSK-A 63     | HSK-A 63       | HSK-A 63     | HSK-A 63     | HSK-A 63     | HSK-A 63     | HSK-A 63     |
| Max. tool diameter                             | 75 mm        | 75 mm          | 75 mm        | 75 mm        | 75 mm        | 75 mm        | 75 mm        |
| If adjacent places are free                    | 160 mm       | 160 mm         | 160 mm       | 160 mm       | 160 mm       | 160 mm       | 160 mm       |
| Max. tool length                               | 320 mm       | 320 mm         | 320 mm       | 320 mm       | 320 mm       | 320 mm       | 320 mm       |
| Max. tool weight                               | 8 kg         | 8 kg           | 8 kg         | 8 kg         | 8 kg         | 8 kg         | 8 kg         |
| Tool change time approx.                       | 1.5 s        | 1.5 s          | 1.5 s        | 1.5 s        | 1.5 s        | 1.5 s        | 1.5 s        |
| Chip-to-chip-time approx.                      | 3.5 s        | 3.5 s          | 3.5 s        | 3.5 s        | 3.5 s        | 3.5 s        | 3.5 s        |
| Infinitely variable speed range up to          | 12,000 rpm   | 12,000 rpm     | 12,000 rpm   | 12,000 rpm   | 12,000 rpm   | 12,000 rpm   | 12,000 rpm   |
| Spindle drive (Siemens / Fanuc)                | 34 kW        | 34 kW          | 34 kW        | 34 kW        | 34 kW        | 34 kW        | 34 kW        |
| Max. torque                                    | 140 Nm       | 140 Nm         | 140 Nm       | 140 Nm       | 140 Nm       | 140 Nm       | 140 Nm       |
| Diameter front spindle bearing                 | 70 mm        | 70 mm          | 70 mm        | 70 mm        | 70 mm        | 70 mm        | 70 mm        |
| Tool clamping                                  | 18,000 N     | 18,000 N       | 18,000 N     | 18,000 N     | 18,000 N     | 18,000 N     | 18,000 N     |
| Distance spindle to column                     | 240 - 720 mm | 240 - 1,060 mm | 240 - 720 mm | 240 - 850 mm | 240 - 850 mm | 240 - 850 mm | 240 - 850 mm |
| Distance spindle nose to table surface, vert.  | 90 - 720 mm  | 90 - 720 mm    | 90 - 720 mm  | 90 - 720 mm  | 90 - 720 mm  | 90 - 720 mm  | 90 - 720 mm  |
| Distance spindle nose to table surface, horiz. | 190 - 905 mm | 190 - 905 mm   | 190 - 905 mm | 190 - 905 mm | 190 - 905 mm | 190 - 905 mm | 190 - 905 mm |
| SWIVEL HEAD with gear drive                    |              |                |              |              |              |              |              |
| NC positioning axis                            | ±100°        | ±100°          | ±100°        | ±100°        | ±100°        | ±100°        | ±100°        |
| Resolution                                     | 0,001°       | 0,001°         | 0,001°       | 0,001°       | 0,001°       | 0,001°       | 0,001°       |
| Repeatability                                  | ±10"         | ±10"           | ±10"         | ±10"         | ±10"         | ±10"         | ±10"         |
| Drive torque                                   | 280 Nm       | 280 Nm         | 280 Nm       | 280 Nm       | 280 Nm       | 280 Nm       | 280 Nm       |
| Holding moment clamping                        | 1,400 Nm     | 1,400 Nm       | 1,400 Nm     | 1,400 Nm     | 1,400 Nm     | 1,400 Nm     | 1,400 Nm     |
| SWIVEL HEAD with torque drive                  |              |                |              |              |              |              |              |
| NC positioning axis                            | ±110°        | ±110°          | ±110°        | ±110°        | ±110°        | ±110°        | ±110°        |
| Resolution                                     | 0,001°       | 0,001°         | 0,001°       | 0,001°       | 0,001°       | 0,001°       | 0,001°       |
| Repeatability (direct path measuring system)   | ±5"          | ±5"            | ±5"          | ±5"          | ±5"          | ±5"          | ±5"          |
| Drive torque                                   | 240 Nm       | 240 Nm         | 240 Nm       | 240 Nm       | 240 Nm       | 240 Nm       | 240 Nm       |
| Holding moment clamping                        | 2,350 Nm     | 2,350 Nm       | 2,350 Nm     | 2,350 Nm     | 2,350 Nm     | 2,350 Nm     | 2,350 Nm     |
| Travel X-axis                                  | 800 mm       | 1,250 mm       | 2,000 mm     | 3,000 mm     | 4,500 mm     | 6,000 mm     | 8,000 mm     |
| Shuttle operation X-axis max.                  | –            | –              | 2 x 765 mm   | 2 x 1,265 mm | 2 x 2,015 mm | 2 x 2,765 mm | 2 x 3,765 mm |
| Travel Y-axis                                  | 480 mm       | 820 mm         | 480 mm       | 610 mm       | 610 mm       | 610 mm       | 610 mm       |
| Feed force X- / Y-axis                         | 5,000N       | 5,000N         | 5,000N       | 5,000N       | 5,000N       | 5,000N       | 5,000N       |
| Travel Z-axis vertical/horizontal              | 630/715 mm   | 630/715 mm     | 630/715 mm   | 630/715 mm   | 630/715 mm   | 630/715 mm   | 630/715 mm   |
| Feed force Z-axis                              | 10,000N      | 10,000N        | 10,000N      | 10,000N      | 10,000N      | 10,000N      | 10,000N      |
| Rapid feed rate X- / Y- / Z-axis               | 40 m/min     | 40 m/min       | 40 m/min     | 40 m/min     | 40 m/min     | 40 m/min     | 40 m/min     |
| Fixed table length                             | 1,400 mm     | 1,850 mm       | 2,600 mm     | 3,600 mm     | 5,100 mm     | 6,600 mm     | 8,600 mm     |
| Fixed table width                              | 550 mm       | 920 mm         | 550 mm       | 710 mm       | 710 mm       | 710 mm       | 710 mm       |
| T-Slots                                        | 2 x 18 H12   | 2 x 18 H12     | 2 x 18 H12   | 2 x 18 H12   | 2 x 18 H12   | 2 x 18 H12   | 2 x 18 H12   |
| Reference slot                                 | 18 H8        | 18 H8          | 18 H8        | 18 H8        | 18 H8        | 18 H8        | 18 H8        |
| Coolant device, container capacity             | 900 l        | 900 l          | 900 l        | 900 l        | 1,400 l      | 1,400 l      | 1,400 l      |
| Total connection power approx.                 | 20 kVA       | 20 kVA         | 20 kVA       | 20 kVA       | 20 kVA       | 20 kVA       | 20 kVA       |
| Machine weight approx.                         | 7.0 t        | 8.5 t          | 9.5 t        | 13.5 t       | 18.5 t       | 23.5 t       | 23.5 t       |
| Air connection                                 | 6 bar        | 6 bar          | 6 bar        | 6 bar        | 6 bar        | 6 bar        | 6 bar        |

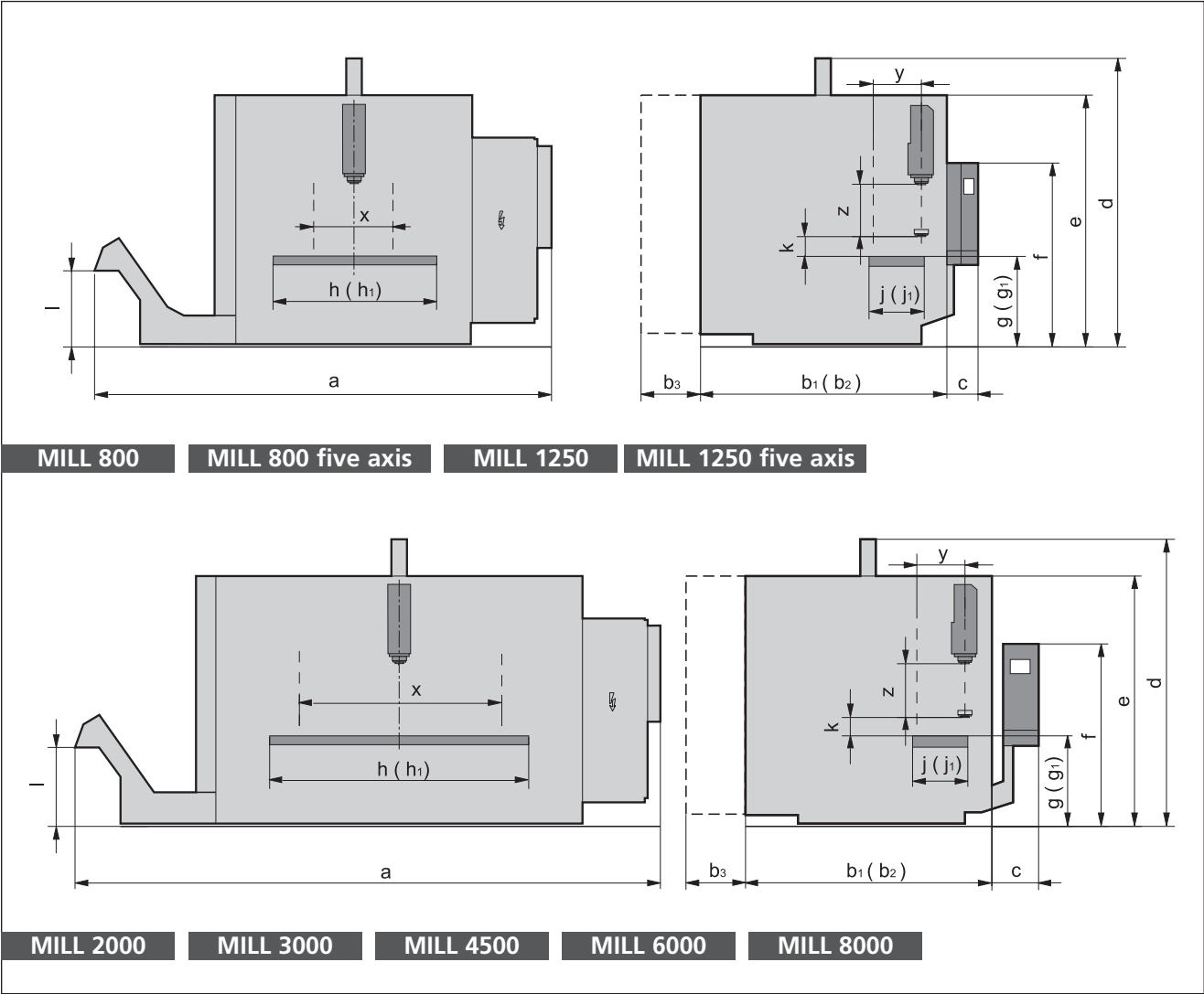
| Options                                             | MILL 800             | MILL 1250          | MILL 2000            | MILL 3000          | MILL 4500          | MILL 6000          | MILL 8000          |
|-----------------------------------------------------|----------------------|--------------------|----------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Technology package "Milling from bars"</b>       |                      |                    |                      |                    |                    |                    |                    |
| NC rotary table, max. speed                         | 45 rpm               | –                  | –                    | –                  | –                  | –                  | –                  |
| Autom. collect clamping for collet chucks up to     | Ø 100 mm             | –                  | –                    | –                  | –                  | –                  | –                  |
| NC slide for bar feed, max. stroke                  | 1,100 mm             | –                  | –                    | –                  | –                  | –                  | –                  |
| NC turning device with clamping stock for machining | 6 <sup>th</sup> side | –                  | –                    | –                  | –                  | –                  | –                  |
| <b>Technology package "Turning from bars"</b>       |                      |                    |                      |                    |                    |                    |                    |
| Turning spindle with collet chuck take-up           | 14.1 kW              | –                  | 14.1 kW              | –                  | –                  | –                  | –                  |
| Infinitely variable speed range up to               | 4,500/3,000 rpm      | –                  | 4,500/3,000 rpm      | –                  | –                  | –                  | –                  |
| Max. torque                                         | 90 Nm                | –                  | 90 Nm                | –                  | –                  | –                  | –                  |
| Bar passage, max.                                   | Ø 65 / 100 mm        | –                  | Ø 65 / 100 mm        | –                  | –                  | –                  | –                  |
| NC slide for bar feed, max. stroke                  | 1,100 mm             | –                  | 1,100 mm             | –                  | –                  | –                  | –                  |
| NC turning device with clamping stock for machining | 6 <sup>th</sup> side | –                  | –                    | –                  | –                  | –                  | –                  |
| Opposed spindle for machining                       | –                    | –                  | 6 <sup>th</sup> side | –                  | –                  | –                  | –                  |
| <b>High Speed Plus Version</b>                      |                      |                    |                      |                    |                    |                    |                    |
| Infinitely variable speed range up to               | 20,000 rpm           | 20,000 rpm         | 20,000 rpm           | 20,000 rpm         | 20,000 rpm         | 20,000 rpm         | 20,000 rpm         |
| Chip-to-chip-time approx.                           | 2.9 s                | 2.9 s              | 2.9 s                | 2.9 s              | 2.9 s              | 2.9 s              | 2.9 s              |
| Rapid feed rate X- / Y- / Z-axis                    | 60 m/min             | 60 m/min           | 60 m/min             | 60 m/min           | 60 m/min           | 60 m/min           | 60 m/min           |
| <b>More Options</b>                                 |                      |                    |                      |                    |                    |                    |                    |
| Tool storage capacity                               | 40 / 60 / 92 / 163   | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163   | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 | 40 / 60 / 92 / 163 |
| Tool length 370 mm                                  | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Travel Y-axis                                       | 610                  | –                  | 610                  | 820                | 820                | 820                | 820                |
| NC rotary table                                     | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| NC rotary table integrated in fixed table           | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| NC rotary table with basic fixture                  | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Through the spindle coolant up to 70 bar            | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Chip conveyor with full flow cleaning               | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| CHIRON Laser Control                                | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Probe                                               | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Direct path measuring system                        | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Stationary 3-D-probe system                         | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Centre guard with mechanically operated opening     | –                    | –                  | •                    | •                  | •                  | •                  | •                  |
| Probes for workpiece and tool measurement           | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Tool breakage monitoring/Tool life management       | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Signal lamp                                         | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Handwheel                                           | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Control: Siemens, Fanuc, Heidenhain                 | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Suctioning unit                                     | •                    | –                  | •                    | –                  | –                  | –                  | –                  |
| NC linear unit with NC turning device               | •                    | –                  | •                    | –                  | –                  | –                  | –                  |
| Central lubrication                                 | •                    | •                  | •                    | •                  | •                  | •                  | •                  |
| Automatic doors                                     | •                    | •                  | •                    | •                  | •                  | •                  | •                  |

# Dimensions

| MILL Series                                         | MILL 800   | MILL 1250 | MILL 2000      | MILL 3000  | MILL 4500  | MILL 6000  | MILL 8000  |
|-----------------------------------------------------|------------|-----------|----------------|------------|------------|------------|------------|
| a Total length                                      | 5,354 mm   | 6,033 mm  | 6,654 mm       | 8,788 mm   | 10,785 mm  | 12,835 mm  | 15,771 mm  |
| b1 Cabin width min., (24 tools, Y = 500)            | 2,735 mm   | 3,415 mm  | 2,735 mm       | 2,995 mm   | 2,995 mm   | 2,995 mm   | 2,995 mm   |
| b2 Cabin width max., (60 tools, Y = 840)            | 4,435 mm   | 4,855 mm  | 4,855 mm       | 4,855 mm   | 4,855 mm   | 4,855 mm   | 4,855 mm   |
| b3 Width background tool magazine (92 or 163 tools) | 800 mm     | 800 mm    | 800 mm         | 800 mm     | 800 mm     | 800 mm     | 800 mm     |
| c Control panel width                               | 330 mm     | 330 mm    | 467 mm         | 467 mm     | 467 mm     | 467 mm     | 467 mm     |
| d Total height max.                                 | 2,990 mm   | 3,110 mm  | 3,110 mm       | 3,170 mm   | 3,170 mm   | 3,170 mm   | 3,170 mm   |
| e Cabin height max.                                 | 2,545 mm   | 2,545 mm  | 2,545 mm       | 2,545 mm   | 2,545 mm   | 2,545 mm   | 2,545 mm   |
| f Control panel height max.                         | 1,875 mm   | 1,875 mm  | 1,875 mm       | 1,875 mm   | 1,875 mm   | 1,875 mm   | 1,875 mm   |
| g Height of fixed table                             | 905 mm     | 945 mm    | 905 mm         | 945 mm     | 945 mm     | 945 mm     | 945 mm     |
| h Length of fixed table                             | 1,400 mm   | 1,850 mm  | 2,600 mm       | 3,600 mm   | 5,100 mm   | 6,600 mm   | 8,600 mm   |
| j Width of fixed table                              | 550/710 mm | 920 mm    | 550/710/920 mm | 710/920 mm | 710/920 mm | 710/920 mm | 710/920 mm |
| k Distance spindle nose to table surface            | 90 mm      | 90 mm     | 90 mm          | 90 mm      | 90 mm      | 90 mm      | 90 mm      |
| l Height of discharge funnel                        | 1,050 mm   | 1,050 mm  | 1,050 mm       | 1,050 mm   | 1,050 mm   | 1,050 mm   | 1,050 mm   |
| x Travel X-axis                                     | 800 mm     | 1,250 mm  | 2,000 mm       | 3,000 mm   | 4,500 mm   | 6,000 mm   | 8,000 mm   |
| y Travel Y-axis                                     | 500/630 mm | 840 mm    | 500/630/840 mm | 630/840 mm | 630/840 mm | 630/840 mm | 630/840 mm |
| z Travel Z-axis                                     | 550 mm     | 550 mm    | 550 mm         | 550 mm     | 550 mm     | 550 mm     | 550 mm     |

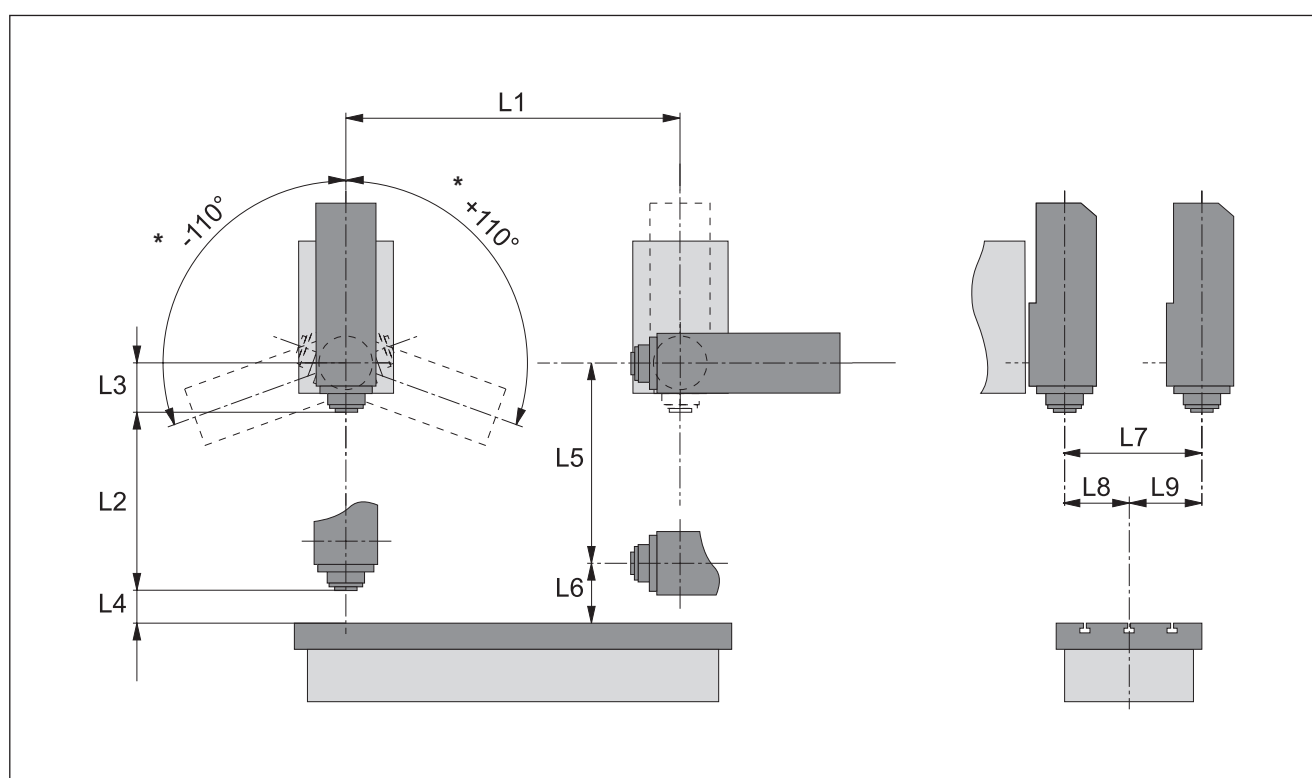
## Fixe Axis Version

|                          |        |          |
|--------------------------|--------|----------|
| g1 Height of fixed table | 795 mm | 825 mm   |
| h1 Bridge size           | 950 mm | 1,390 mm |
| j1 Faceplate diameter    | 280 mm | 630 mm   |



# Working Area NC Swivel Head

|                                                         | MILL 800   | MILL 1250 | MILL 2000      | MILL 3000  | MILL 4500  | MILL 6000  | MILL 8000  |
|---------------------------------------------------------|------------|-----------|----------------|------------|------------|------------|------------|
| L <sub>1</sub> Travel X-axis                            | 800 mm     | 1,250 mm  | 2,000 mm       | 3,000 mm   | 4,500 mm   | 6,000 mm   | 8,000 mm   |
| L <sub>2</sub> Travel Z-axis, vertical                  | 630 mm     | 630 mm    | 630 mm         | 630 mm     | 630 mm     | 630 mm     | 630 mm     |
| L <sub>3</sub> Distance spindle nose to swivel head     | 185 mm     | 185 mm    | 185 mm         | 185 mm     | 185 mm     | 185 mm     | 185 mm     |
| L <sub>4</sub> Distance spindle nose to table surface   | 90 mm      | 90 mm     | 90 mm          | 90 mm      | 90 mm      | 90 mm      | 90 mm      |
| L <sub>5</sub> Travel Z-axis, horizontal                | 715 mm     | 715 mm    | 715 mm         | 715 mm     | 715 mm     | 715 mm     | 715 mm     |
| L <sub>6</sub> Distance spindle axis to table surface   | 190 mm     | 190 mm    | 190 mm         | 190 mm     | 190 mm     | 190 mm     | 190 mm     |
| L <sub>7</sub> Travel Y-axis                            | 480/610 mm | 820 mm    | 480/610/820 mm | 610/820 mm | 610/820 mm | 610/820 mm | 610/820 mm |
| L <sub>8</sub> Distance reference point to table centre | 230/295 mm | 400 mm    | 230/295/400 mm | 295/400 mm | 295/400 mm | 295/400 mm | 295/400 mm |
| L <sub>9</sub> Distance table centre to travel          | 250/315 mm | 420 mm    | 250/315/420 mm | 315/420 mm | 315/420 mm | 315/420 mm | 315/420 mm |



\* Swivel head with gear drive:  $\pm 100^\circ$

Swivel head with torque drive:  $\pm 110^\circ$

## Mill Options

|                                                 |
|-------------------------------------------------|
| High speed version                              |
| Technology package "Milling from bars"          |
| Technology package "Turning from bars"          |
| Travel Y-axis up to 840 mm                      |
| Tool storage capacity 24 / 40 / 60 / 92 / 163   |
| Tool taper HSK-A 63                             |
| Tool length up to 370 mm                        |
| Through the spindle coolant up to 70 bar        |
| Chip conveyor with full flow cleaning           |
| Coolant treatment                               |
| NC-swivel head                                  |
| NC rotary table                                 |
| NC rotary table with basic fixture              |
| NC rotary table integrated in fixed table       |
| 2-axis NC rotary table                          |
| Probes for workpiece and tool measurement       |
| CHIRON Laser Control                            |
| Tool breakage monitoring / Tool life management |
| Stationary 3-D-probe system                     |
| Probe                                           |
| Direct path measuring system                    |
| Suctioning unit                                 |
| Machining with minimal lubrication              |
| Centre guard with mechanically operated opening |
| Automatic doors                                 |
| Handwheel                                       |
| Signal lamp                                     |
| Multi-spindle head adaptor                      |
| Control: Siemens, Fanuc, Heidenhain             |

### Basic series

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Fast, compact milling centres for high precision and diverse applications

#### 12 Series

Fast, compact single and multi-spindle precision machining centres

#### 15 Series

Fast, powerful, single and twin-spindle precision milling centres for profitable series production

#### 18 Series

Powerful, single and twin-spindle machining centres for high-speed machining and heavy cutting

#### MILL Series

Universal precision machining centres as well for combined milling and turning machining

#### BIG MILL Series

High-precision machining centres for heavy cutting and large workpieces

### Flexible production systems

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Robot-automated 6-side complete machining

#### MPC

Pallet automation

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