WFL MILLTURN TECHNOLOGIES

M80 | M80X | M85

M80-G | M80X-G | M85-G

M80, M80-G | M80X, M80X-G | M85, M85-G

[DE] [EN] [FR] [IT] [ES] [BR] [RU] [CN] [JP]

CLAMP ONCE – MACHINE COMPLETE

GROUP 1906 AUTANIA

One million possibilities

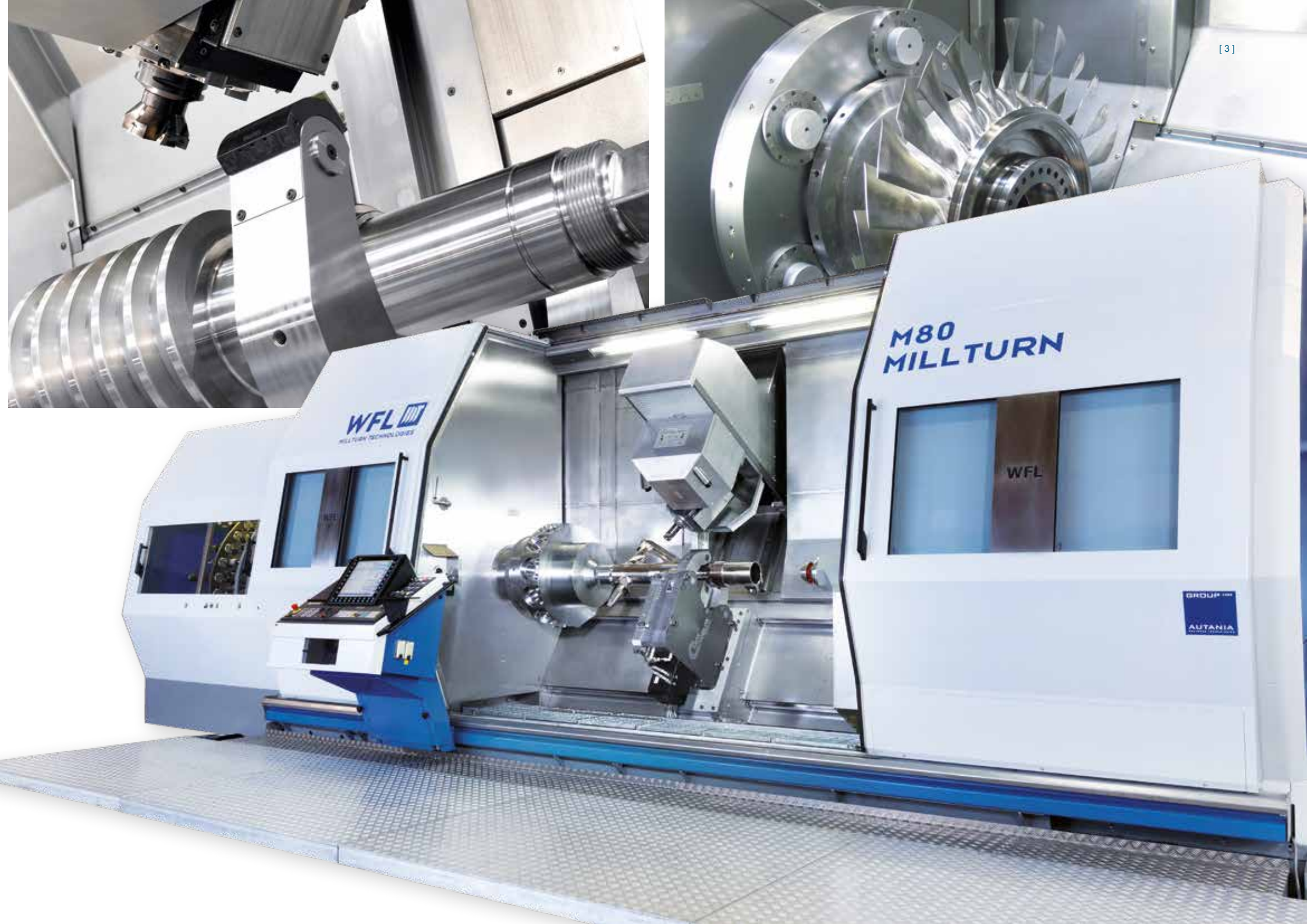
An essential feature of the M80 MILLTURN is the enormous variety of configurations possible out of the modular machine concept together with the best size for the individual machine configurations. The machine concept is based on minimized distances of tool and workpiece to the bed and widest possible guideway distances resulting in an optimum situation for rigidity and ideal geometries.

A cut above the rest

All center distances (except 1000 mm) are also available in a counter spindle version and for a further productivity enhancement an additional tool turret can be offered. Due to the innovative machine design the bottom guideways do not require any telescopic covers. Just straight stainless steel sheet metal makes perfect chip flow.

Rigid, precise and flexible

The new tool magazine is accessible from the front of the machine and is a compact, stable and truly maintenance-free unit. A highly dynamic tool changer with rack and pinion drive is equipped with linear axes thus avoiding any centrifugal forces caused by rotation so even tools with 35 kg in weight are handled safely and quickly.


M80
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WFL MILLTURN TECHNOLOGIES

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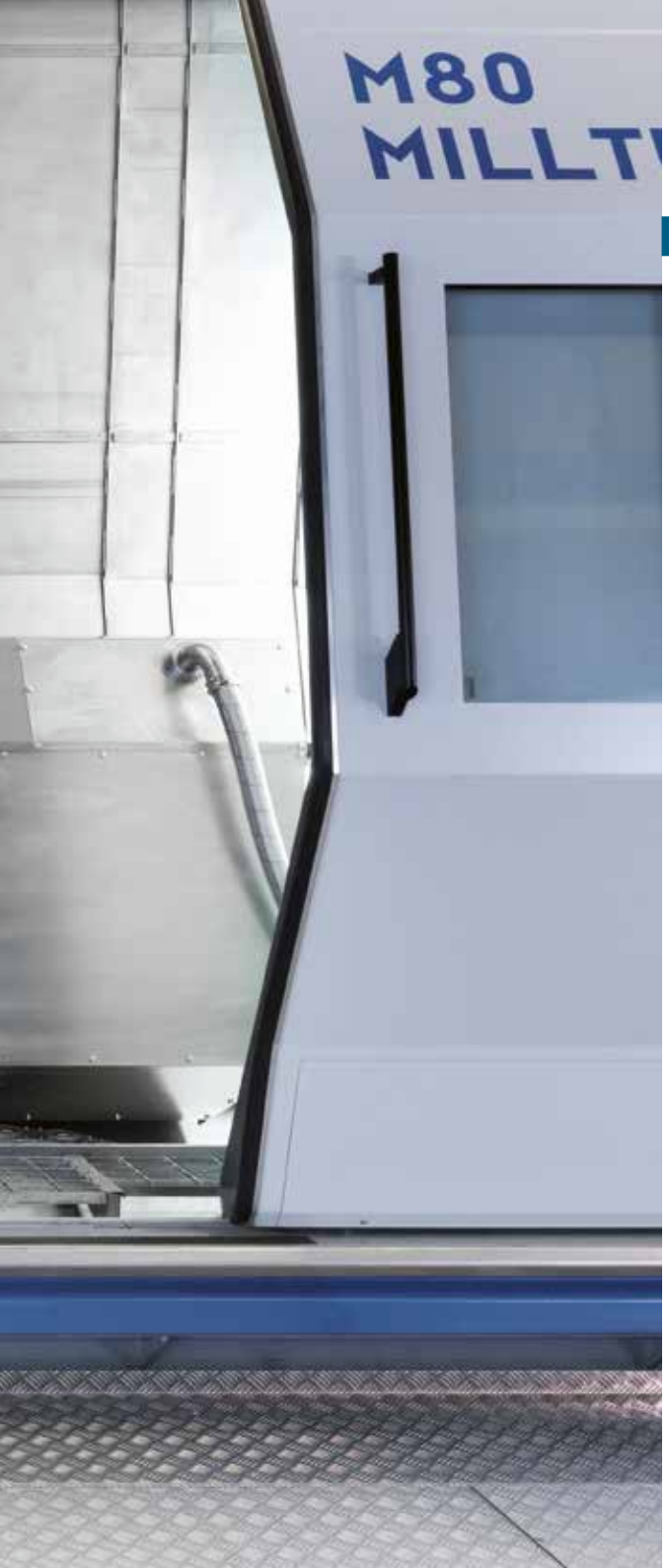


Features

150 bar coolant pressure

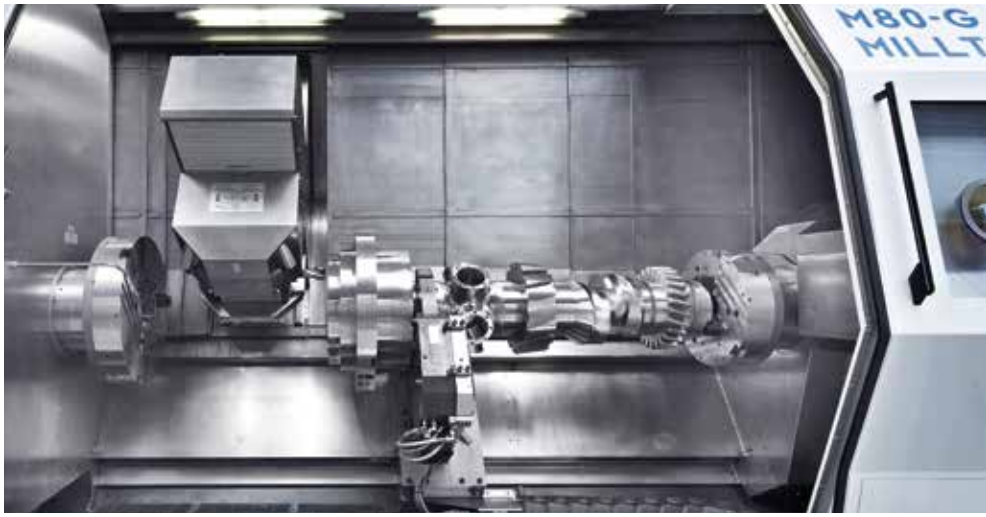
Tool change in any Z-axis position

Heavy drilling and boring

M80-G MILLTURN | M80X-G MILLTURN | M85-G MILLTURN

Features

Gear hobbing



Workpiece transfer

Active B-axis

The standard tool interface

In order to respond to the demands of the broad technological spectrum, MILLTURN turning-boring-milling centres use only modular tool interfaces with the highest levels of long-term precision and the maximum rigidity (HSK, Capto, KM, etc.). The high pull-in forces of the standard tool interface provide for particularly reliable machining. WFL offers a broad range of add-ons to ensure highly-productive deep hole drilling processes and to enable a variety of special technologies to be used.

High coolant pressure

- High coolant pressure for optimised chip breakage
- Coolant pressure below 150 bar – High Pressure Coolant (HPC)
- Coolant pressure between 150 and 350 bar – Ultra High Pressure Coolant (UHPC)
- Significant increases in cutting parameters, tool life and process safety
- Reduced machining costs
- No additional interfaces required for up to 200 bar (coolant supplied directly through the milling spindle)

Coolant solutions for deep hole drilling

- High coolant supply rates to ensure the best possible removal of chips from the hole – this makes the MILLTURN a fully-fledged deep hole drilling machine
- Coolant supply rates of up to 800 l/min
- External interfaces with manual or automatic docking
- Additional manual interfaces possible for automatic docking
- Individual configuration of the coolant pumps and filters

Special tool heads

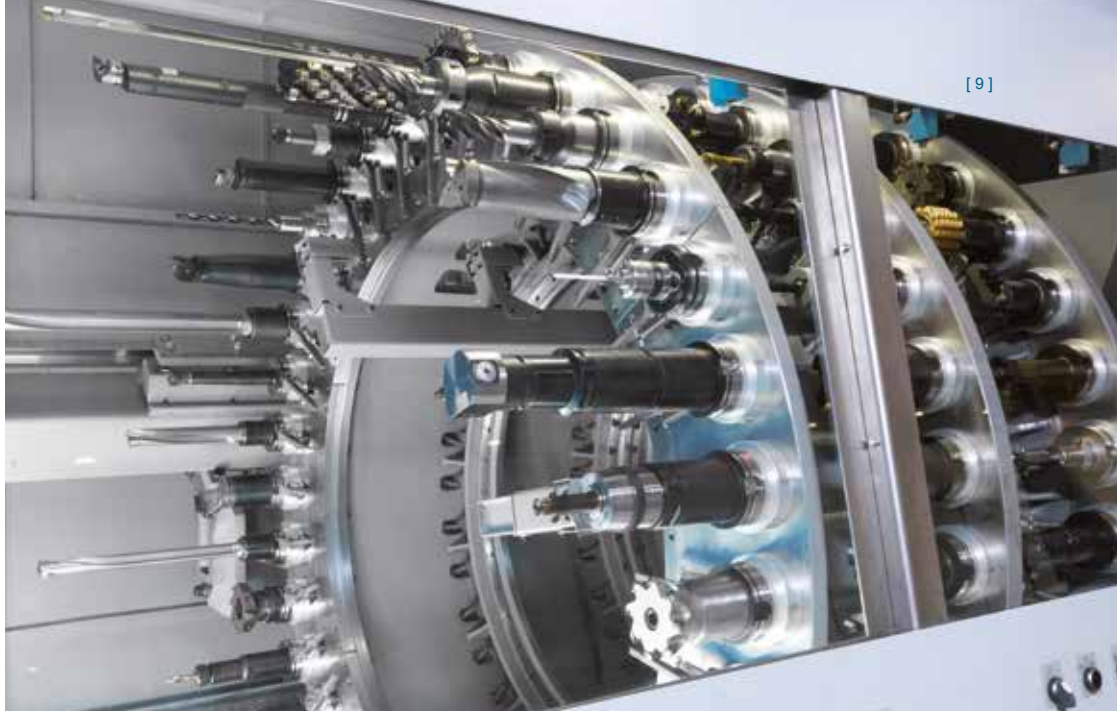
- Special tool heads for special manufacturing requirements (difficult to access workpiece geometries, special processes and special coolant solutions)
- The special tool heads are handled by means of the automatic tool changer
- Optional torque support prevents undesirable turning of the special tool head and ensures a rigid connection to the swivel housing

Ultra-High Pressure Coolant (UHPC)

Ejector drilling

Angular head with torque support

The tool magazine



A sufficient number of tool stations

The comprehensive range of machining possibilities requires a large number of tools. Up to 108 tool stations (depending on the tool system) housed in a particularly reliable disc magazine guarantee a sufficient quantity. In addition to the disc magazine, a chain magazine is also available as an option, providing a capacity of up to 200* tool stations. The tool changer travels in a lengthwise direction by means of a wear-free rack and pinion drive. The quick and robust tool changer with double gripper ensures that the tool changing process remains reliable in the long term.

Maximum user-friendliness

In order to reduce travel movements to a minimum, thereby also reducing non-productive idle time during tool changes, particularly in the case of long shaft components, the tool change position can be freely programmed anywhere along the travel path. The magazine can be equipped from the front side of the machine, even during machining, demonstrating the highest possible level of user-friendliness. Convenient software functions support the forward-looking and cross-task assembly of the magazine and guarantee that the tools will be able to be used until the end of the tool life.

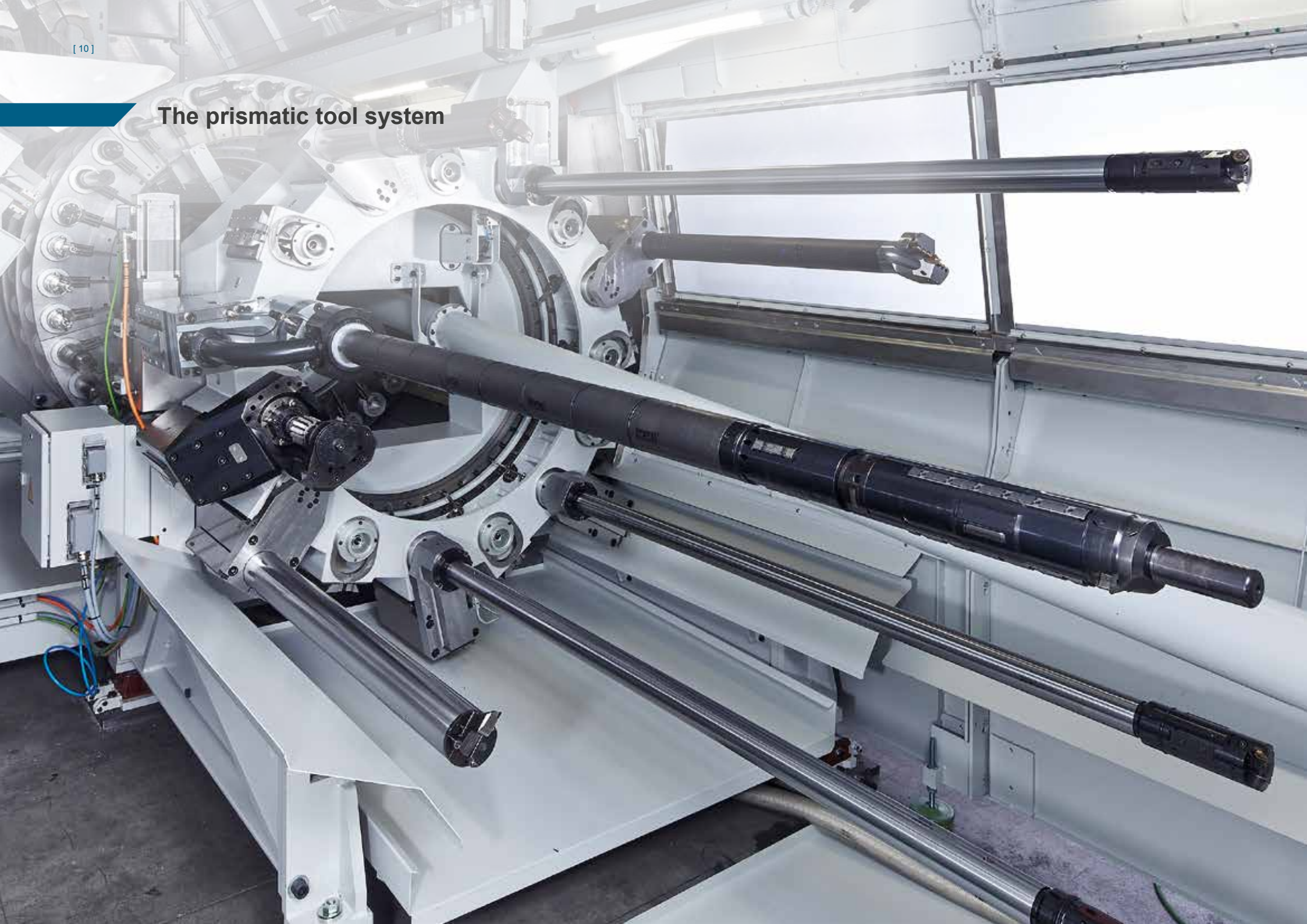
* Higher values available upon request

Loading aid for heavy tools

Maintenance-free disc magazine

Optional chain magazine

The prismatic tool system



WFL system boring bar

Pick-up magazine

Prismatic tool

A second tool interface takes care of those tools that exceed the maximum dimensions of the standard tool interface. Thanks to the particularly stable prismatic accommodation, boring bars, solid drills, angular heads and facing heads can be securely fixed onto the milling unit. The use of the special WFL system boring bar opens up the possibility of automatically changing the cutting heads too. For the automatic handling of heavy ID machining tools, two different magazine types are available.

Pick-up magazine

Up to 3 tools with a maximum length of 1780 mm and a weight of 200 kg can be automatically stored in this separate magazine above the headstock.

Heavy boring bar magazine

An additional magazine and the corresponding tool stations accommodates up to 15 heavy tools measuring 2500 mm and weighing 180 kg maximum in addition to the standard tools. In this case, automatic handling of the tools is ensured by a supplementary tool changer.

U-axis

Manufacturing of pockets (seat pocket)

Internal machining with damped boring bar

CNC special contour boring bar (radial feed out using the U-axis)

Deep hole drilling with automatic coolant docking

Internal milling with angular head

CNC facing head for complex spindle operations

The use of driven tools with additional NC drive such as facing heads (D´Andrea) or special boring bars for seat pocket machining (e.g. Cogsdill, ITS) requires an additional NC axis. WFL offers such an axis (U-axis) as an option. Even after the integration of this U-axis, the option of angular machining remains.

This option can offer enormous cost reduction potentials, especially for the aerospace industry as well as for manufacturers in the oil and gas industry. In order to ensure the necessary stability, only the prismatic tool interface is used to accommodate tools on the U-axis. Automatic tool change is carried out either via the pick-up magazine or the prismatic tool changer.

Big bar slide

Tool change on boring bar

Tool control

As an alternative to the prismatic tool system supported by either a pick-up station or a heavy boring bar changer, a separate boring bar slide is available for very deep and heavy ID operations. This slide can be coupled with the slide carrying the milling unit or may be independent and operated via a separate NC drive.

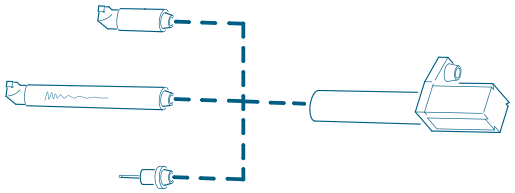
This equipment allows the use of a boring bar with a diameter of 220 mm* and a variable length of up to 2000 mm*. In addition, the boring bar is extendable on its own separate slide. It is equipped with an automatic system tool accommodation and tools can be loaded via the standard tool changer.

Without interrupting the machining process these tools can be taken out of the magazine, controlled and fitted with new inserts.

* larger on request

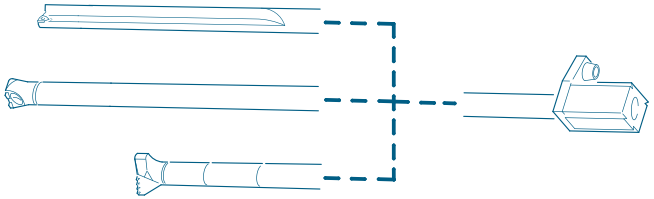
Prismatic tools

WFL system boring bar
automatic head change

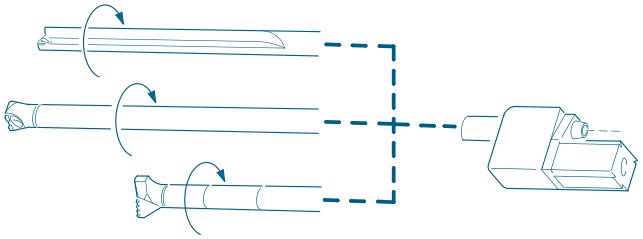


Boring bar
single-piece, vibration damped

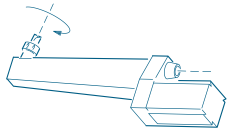
Deep hole drilling tool
for centric bore



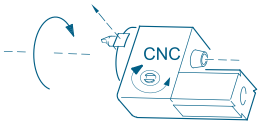
Deep hole drilling tool
rotating, with coolant supply



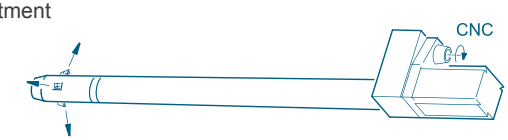
Internal machining tool
driven



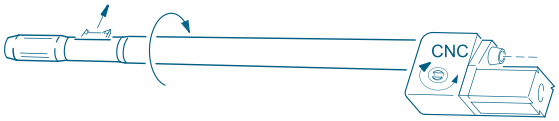
CNC facing head
rotating, with radius adjustment
B-axis: -45° / +90°



CNC special contour boring bar
rotating, with radius adjustment
B-axis: -45° / +90°



CNC special contour boring bar
rotating, with radius adjustment
(seat pocket machining)



Ergonomic industrial design

Simple tool setting-up

- Optimal accessibility from the front
- Setting-up during machining
- Large magazine windows that slide smoothly in a horizontal direction
- Optional loading aid for heavy prismatic tools

Optimal view of the workpiece

- Large safety windows provide the best possible overview of the working area
- Optional spin windows
- Innovative and energy-saving lighting concept with LED lamps

Machine operation made easy

- Adjustable operator panel
- Tiltable 19-inch display
- Ability of the operator panel to travel along the full length of the working range as far as the tool magazine

Modular machine concept for customer-specific manufacturing solutions

1. Machine bed

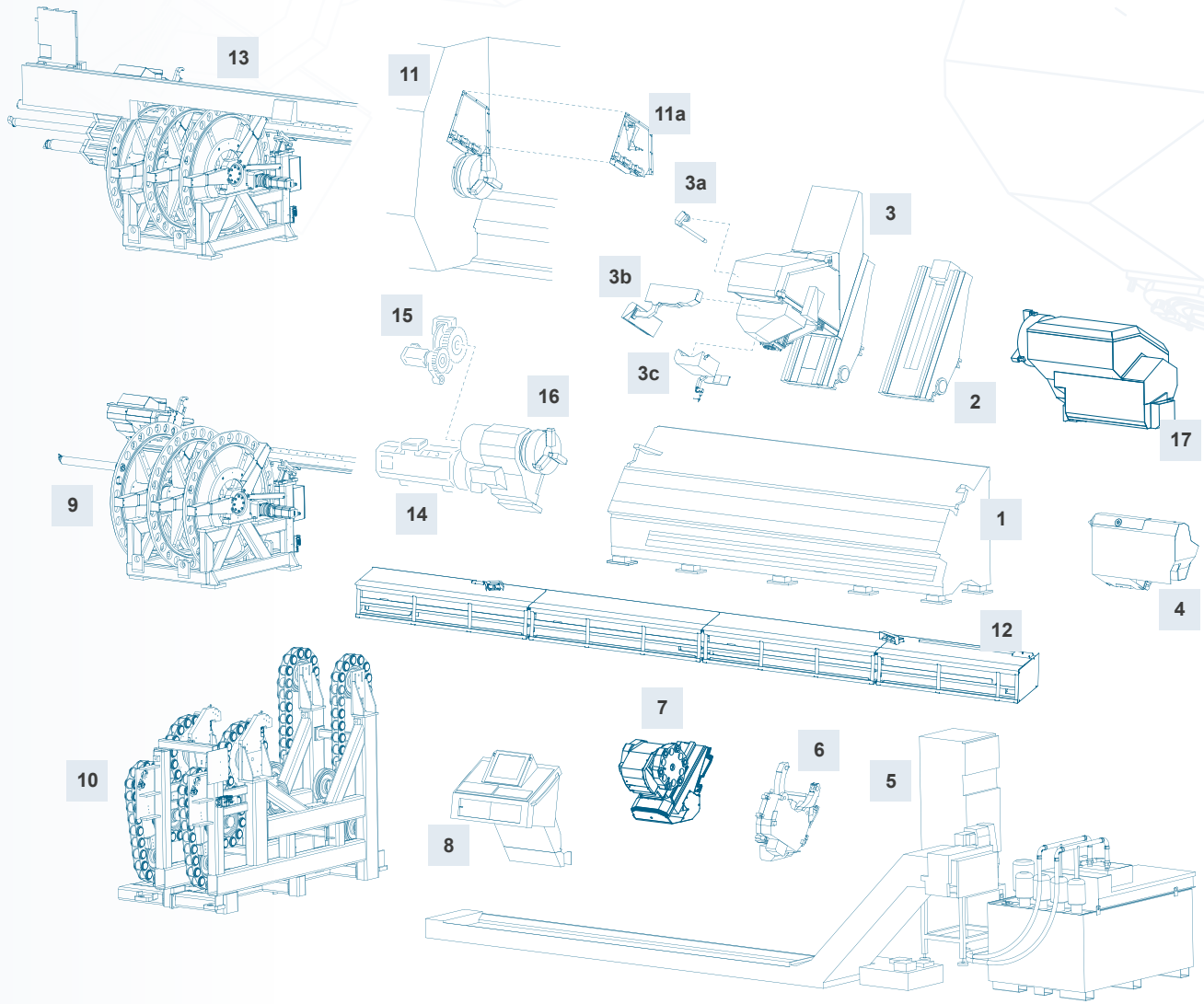
- 60° slant bed with large-scale guide ways
- Heavily ribbed cast body, designed to provide optimal torsional rigidity
- Optimal damping properties
- Minimal influx thanks to optimised chip flow
- Compact design of the bottom slides

2. Compound slide

- Cast body with optimal damping properties
- Best possible torsional and bending strength

3. Turning-boring-milling unit

- Linear direct measuring system in the X- and Y-axes
- Interpolable B-axis and B-axis clamping
- Indexable milling spindle
- Standard tool interface
- Optional prismatic tool interface
- Coolant supplied directly through the milling spindle (up to 200 bar)
- Optional external coolant supply for high supply rates – manual and automatic docking variants **(3a)**
- Optional U-axis for feed out tools **(3b)**
- Optional integrated measuring probe **(3c)**



4. Tailstock
- Positioning and feed force by easy software cycle
- Adjustable tip height
- Automatically positionable (with its own NC drive)
- Also available with optional neck

5. Chip conveyor and coolant cleaning system
- Travels to the right
- With coolant tank and filter system

6. Steady rest
- Self-centring steady rests
- Individual clamping device and support solutions
- Automatically positionable (with its own NC drive)

7. Disc turret
- 2 x 12-position (6 tools per disc, also driven)
- Disc turret available in axial design

8. Operator panel
- Control elements for the Siemens Sinumerik 840D sl control system
- Integrated printer

9. Disc magazine
- For up to 108 tools with a standard tool interface
- Setting-up parallel to machining time
- Max. tool length: 900 mm
- Max. tool weight: 20 kg
- Automatic tool change

10. Chain magazine (optional)
- For high tool requirements
- For up to 200 tools with a standard tool interface
- Setting-up parallel to machining time
- Automatic tool change

11. Pick-up magazine (optional)
- For up to 3 prismatic tools
- Design variants for long tools with standard tool interfaces
- Max. tool length: 1780 mm
- Max. tool weight: 200 kg
- Automatic tool change
- Optional integrated tool control using a measuring probe in the form of a probe or a laser **(11a)**

12. Energy supply platform
- Platform height 200 mm, 400 mm, 600 mm
- Optional installation in the assembly pit
- Energy chains outside the working area

13. Prismatic tool magazine (optional)
- Expansion of the standard disc magazine
- For up to 15 prismatic tools
- Max. tool length: 2500 mm
- Max. tool weight: 180 kg
- Automatic tool change

14. Main spindle
- AC drive with 2-speed gearbox
- Motor and headstock thermally separated
- Robust cast housing with stable spindle bearing

15. C-axis with retaining brake
- Can be swivelled hydraulically
- Clearance-free AC drive with Harmonic Drive
- Separate retaining brake for machining while the main spindle is static (optional damping function)

16. Chuck
- Partially-hollow or hollow centre clamping
- Automatic power chuck
- Rapid changing of clamping jaws
- Tool-specific special clamping devices

17. Counter spindle (M80-G, M80X-G, M85-G only)
- With tailstock and synchronous spindle function
- 2-speed gearbox
- Digital AC drive

Software solutions by WFL

The latest in control technology

Not only does the Sinumerik 840D sl, which is perfectly-suited to machining tasks, have the highest processing power, alongside its especially user-friendly programming it is also perfectly compatible with all current CAD/CAM systems. NC programs, technological data, measuring protocols, tool data and machine and process parameters can be transferred to a host computer, for example, using an Ethernet connection. This means that the MILLTURN is fully prepared for connection to networked production and to meet future requirements.

Safety is a central concern

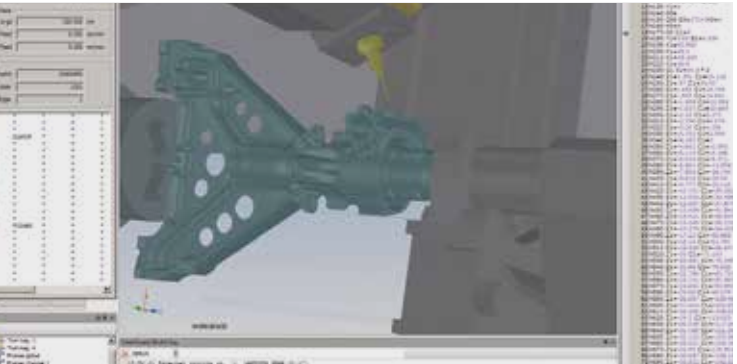
The sophisticated MILLTURN safety concept works on an exclusively electronic basis. The advantages of this are that the system reacts extremely quickly in comparison to conventional concepts, the cabinet configuration is more simple and it provides the option of precise fault diagnosis on site and via a network connection.

Good parts from the very first workpiece

High-precision measuring probes, linear direct measuring systems and clearance-free anti-friction guideways transform the MILLTURN into a 3D measuring machine. WFL provides the user with comprehensive modular measuring software and proven expertise for intelligent measuring strategies, which serve to exclude as many error-causing variables as possible, right from the very start.

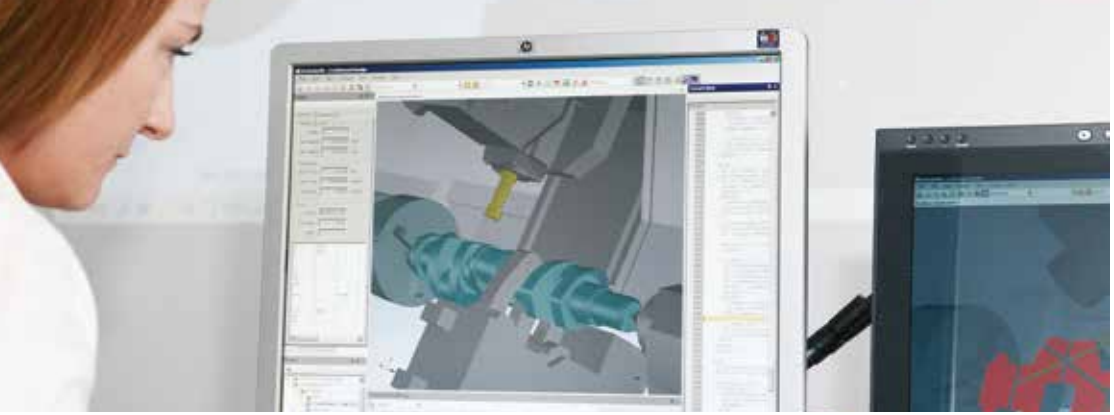
- Creation of complex user-specific measuring processes
- Determination of workpiece features or any forging allowances prior to machining
- Automatic recording and compensation for tool wear
- Software-controlled temperature compensation in order to eliminate machining errors caused by the thermal expansion of the workpiece
- Saving or printing of measuring protocols

Simulation



Reality

Technology cycles



CrashGuard Studio

CrashGuard

Professional CAM solutions from WFL

… for the programmer:

CrashGuard Studio: Offline 3D simulation with material removal to enable verification of NC programs
Millturn PRO: Programming editor in CrashGuard Studio with interactive graphics

… for the machine operator:

CrashGuard: Real time collision prevention software within the CNC machine control system

Safe machining with up to 12 monitoring channels...

During machining, the sophisticated process monitoring visualises and monitors the flow of forces on all of the axes and spindles. This renders the cutting process fully transparent and makes it easy to identify potential for optimisation.

- Tool breakage and collision monitoring
- Teach-In procedure to enable cutting forces to be saved and used for calibration in the event that the same task is repeated
- Machining aborts in the event that the process parameters exceed the freely-definable tolerance limits

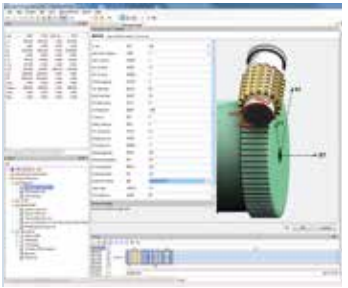
Process monitoring

Tool management

Tool correction

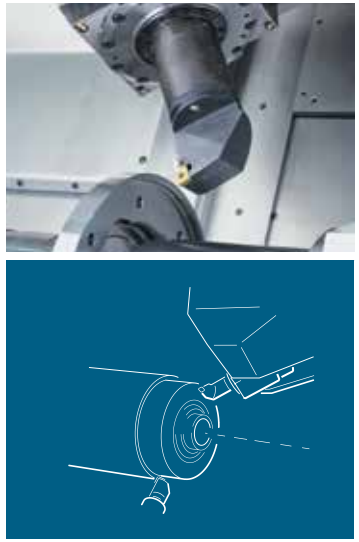
Temperature compensation

Millturn PRO programming editor

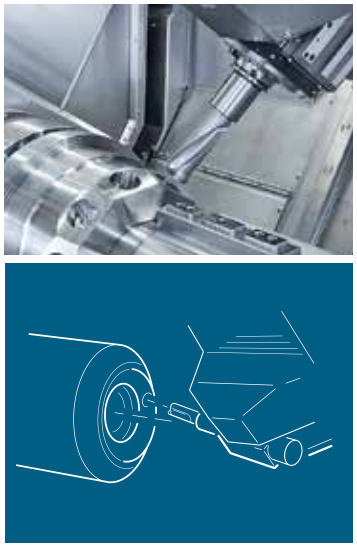


Technologies by WFL

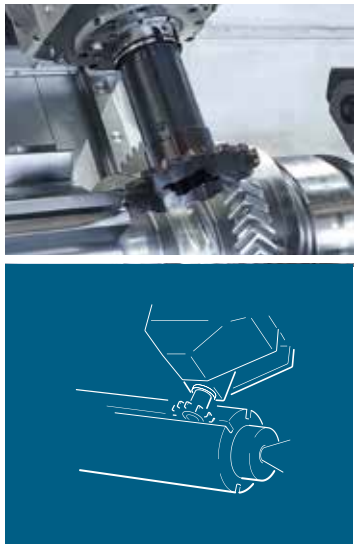
- Turning



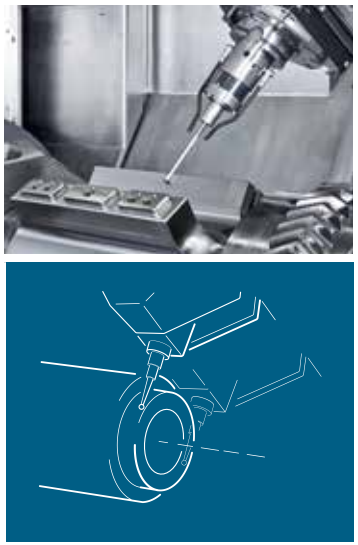
- Drilling



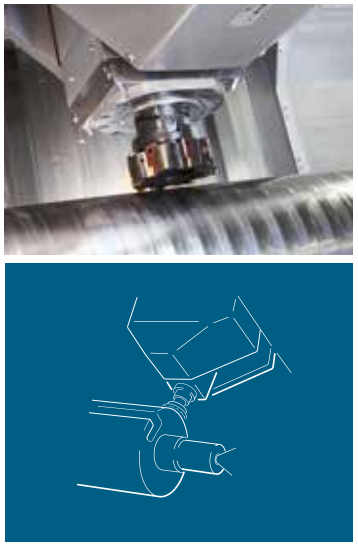
- Milling



- In-process measuring

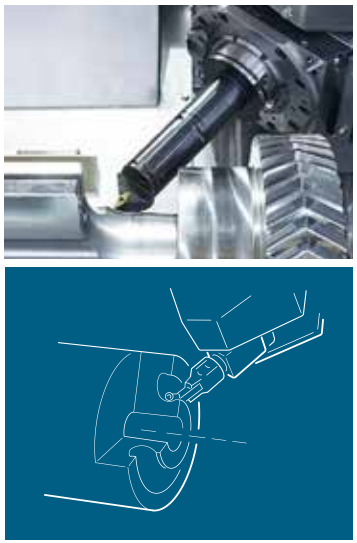


- Turn-milling

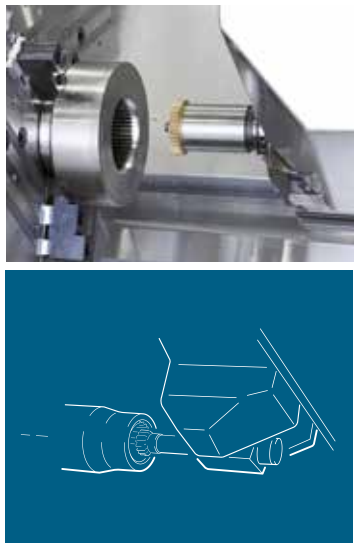


- 5-axis milling

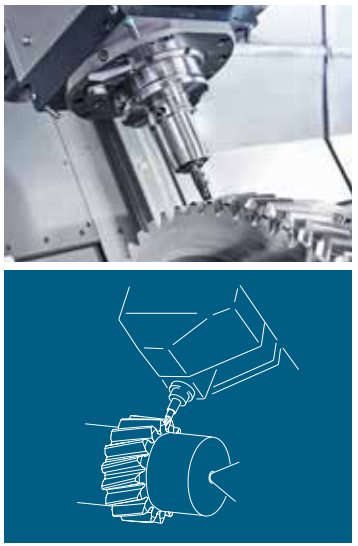
- B-axis turning



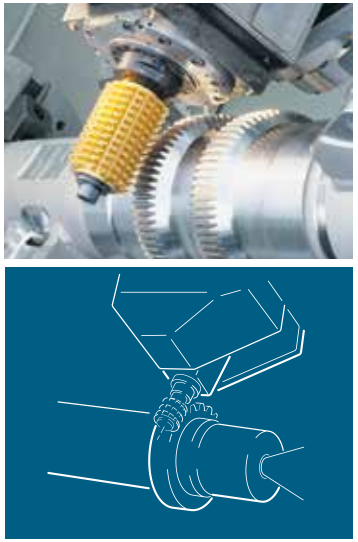
- Shaping of gear teeth (Flanx-Spline)



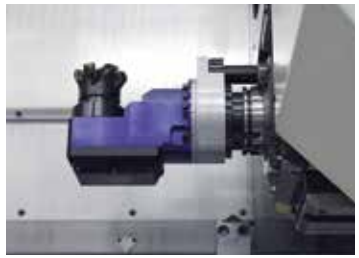
- Milling of gear teeth (Flanx-LM)

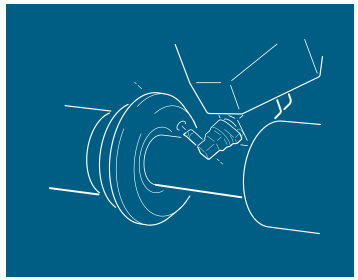


- Hobbing of gear teeth (Flanx-Hob)

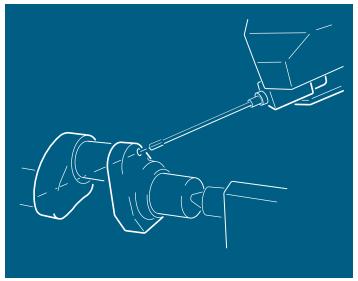


- Special tool heads

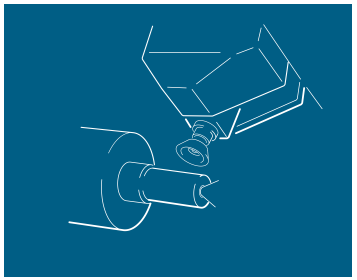




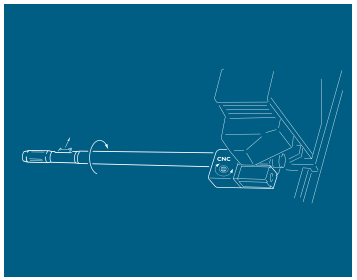
- Deep hole drilling



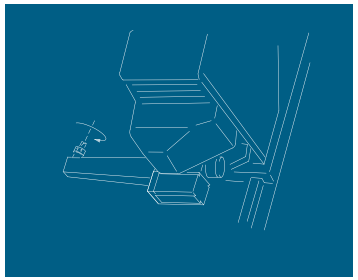
- Grinding and fine machining



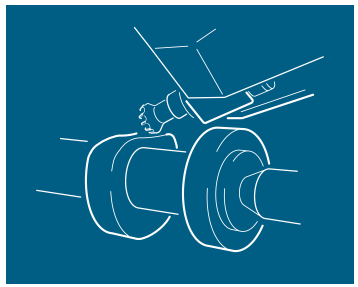
- CNC special contour boring bar



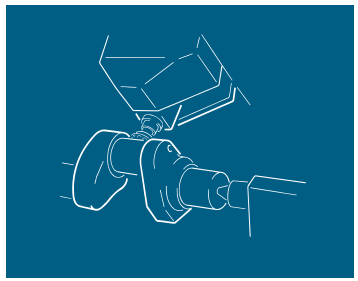
- Internal machining tool



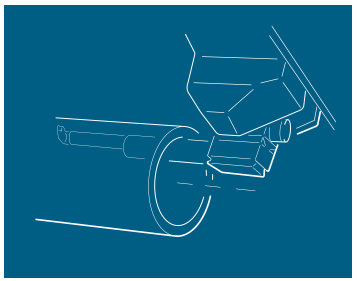
- Cam milling



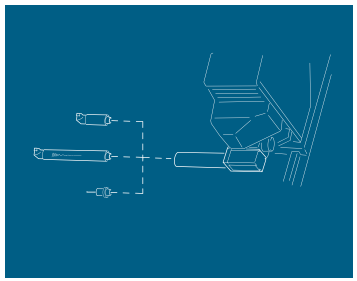
- Milling of crankshaft pins



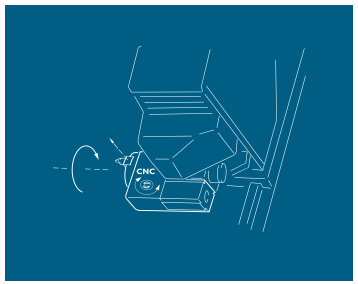
- Drilling and internal turning



- WFL system boring bar

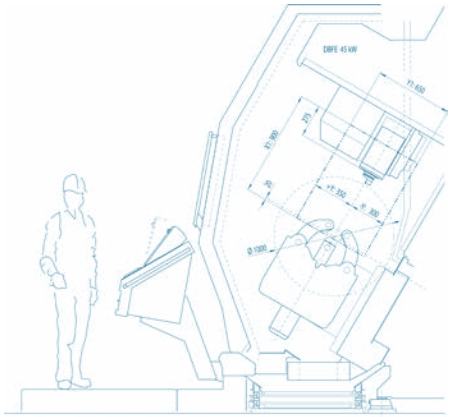


- CNC facing head

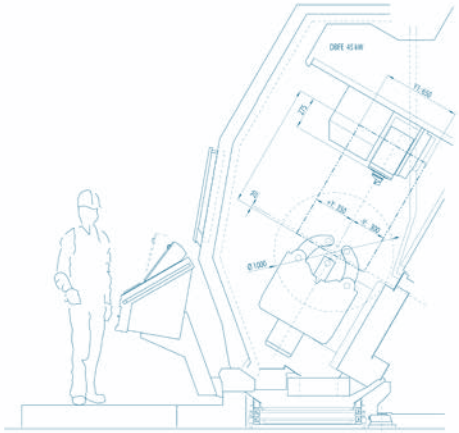


Machine cross section

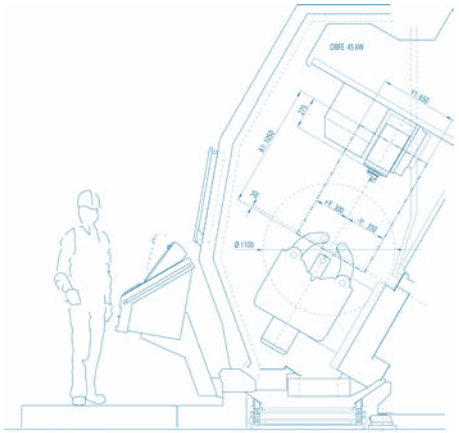
M80 MILLTURN | M80-G MILLTURN



M80X MILLTURN | M80X-G MILLTURN

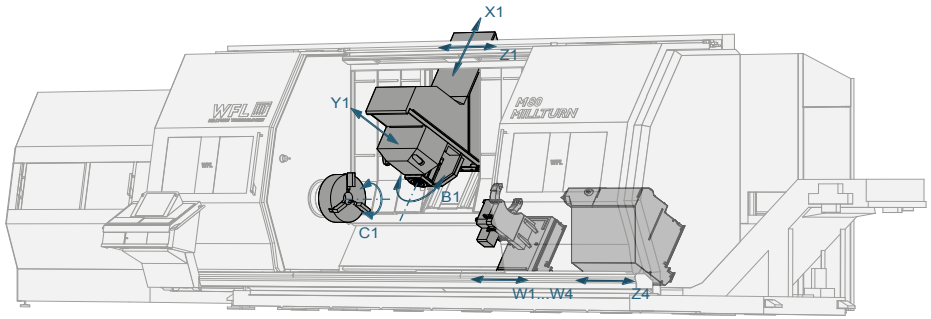


M85 MILLTURN | M85-G MILLTURN

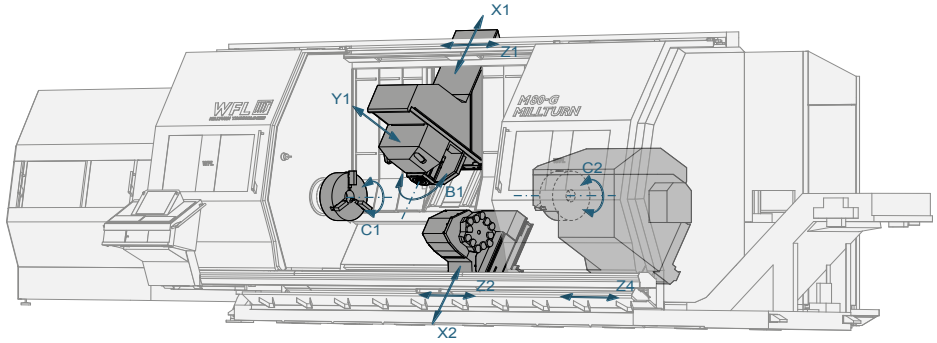


	M80 M80-G	M80X M80X-G	M85 M85-G
Swing over steady rest slide [mm]	1000	1000	**1100**
Travel X-axis [mm]	900 (-20/+880)	**1050** **(-20/+1030)**	**1050** **(-20/+1030)**
Travel Y-axis [mm]	650 (-300/+350)	650 (-300/+350)	650 **(-350/+300)**

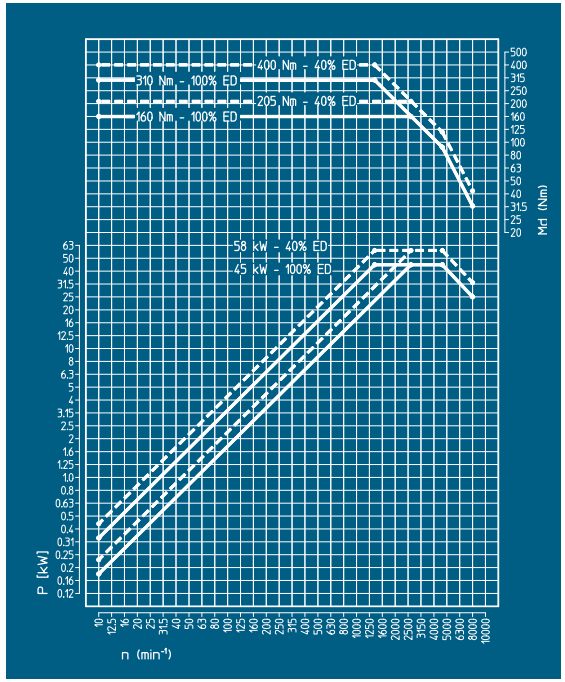
Axis scheme



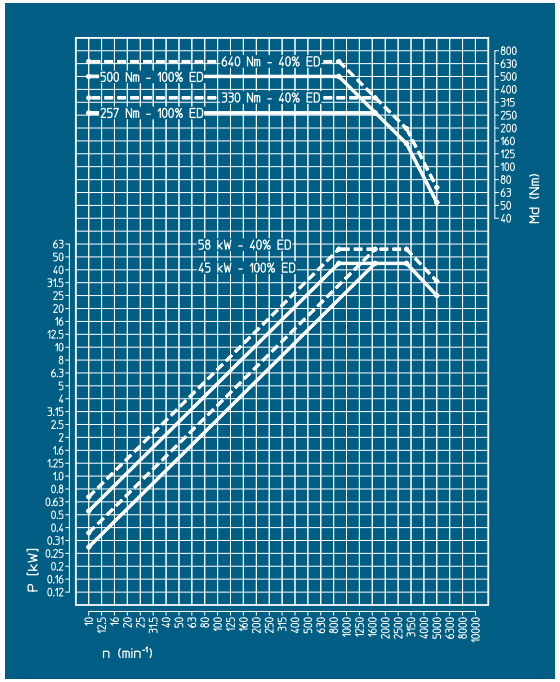
M80 MILLTURN | M80X MILLTURN | M85MILLTURN



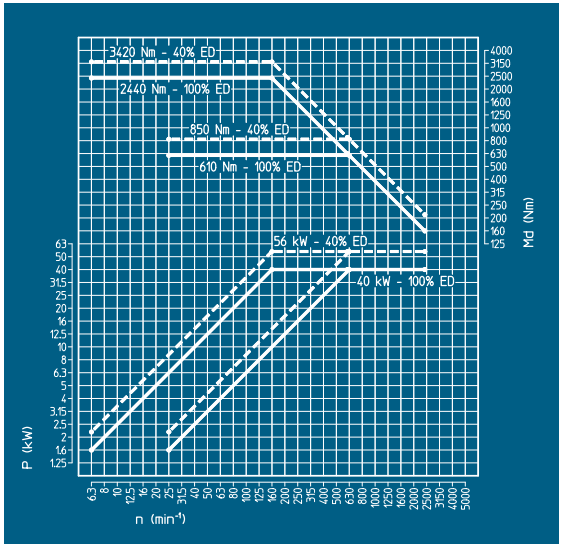
M80-G MILLTURN | M80X-G MILLTURN | M85-G MILLTURN



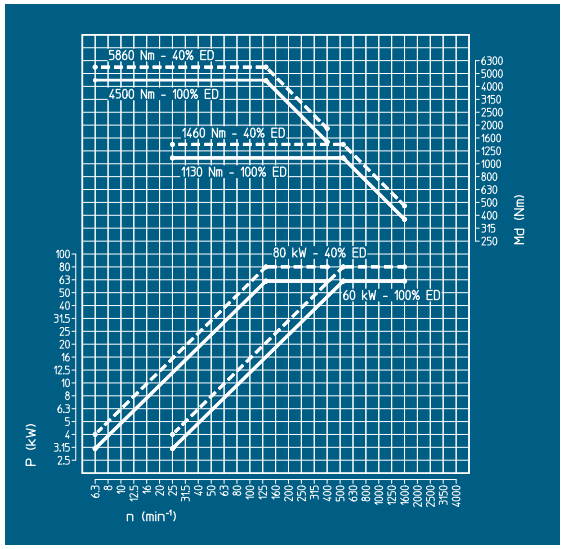
Milling spindle 58 kW (45 kW) - 8000 min^{-1}



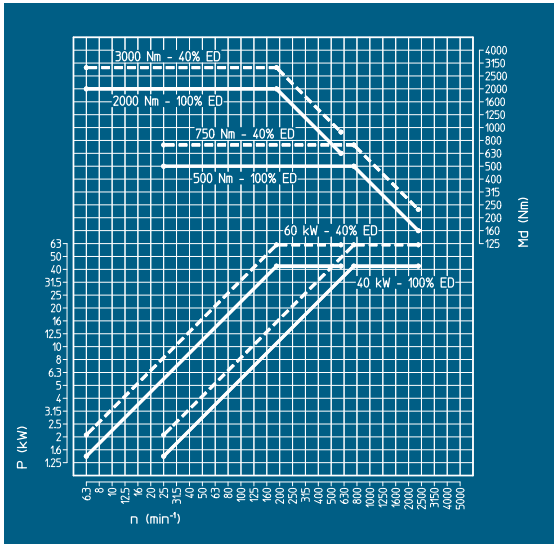
Milling spindle 58 kW (45 kW) - 5000 min^{-1}



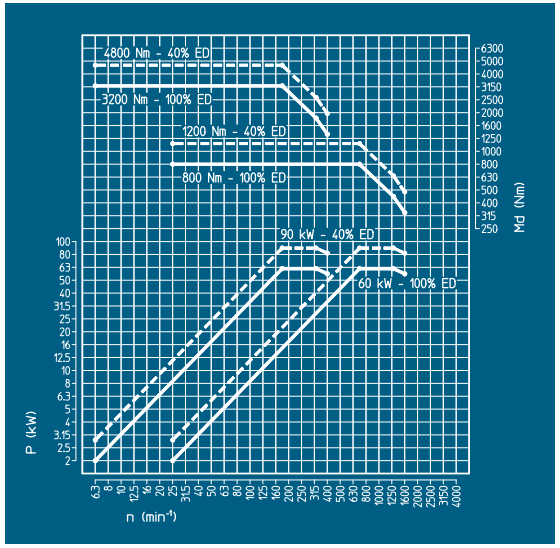
Main spindle left 56 kW (40 kW) - 2400 min^{-1}



Main spindle left 80 kW (60 kW) - 1600 min^{-1}

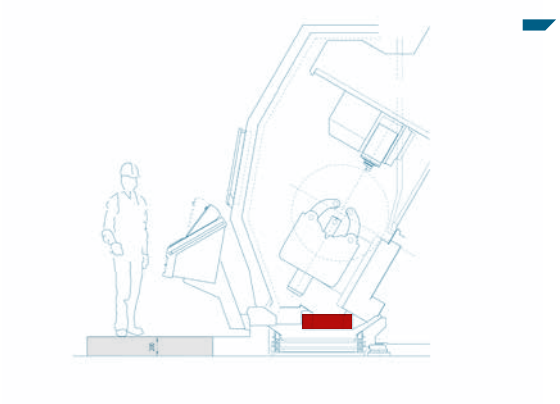


Main spindle right 60 kW (40 kW) - 2400 min^{-1}



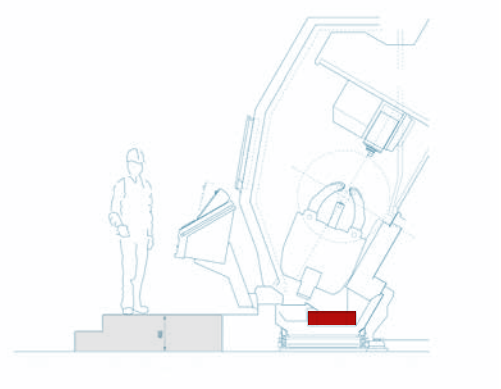
Main spindle right 90 kW (60 kW) - 1600 min^{-1}

Types of operator platforms



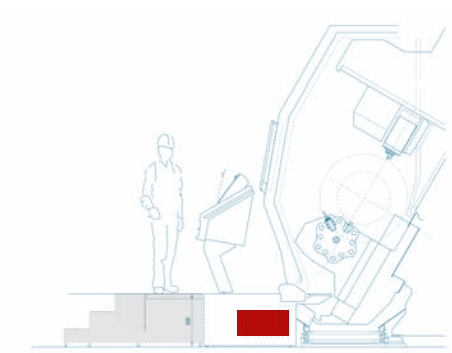
Platform height 200 mm

- Energy chains in the working area
- E.g. with up to two steady rest slides in the tailstock version



Platform height 400 mm

- Lowered energy chains in the working area
- Enlarged steady rest area
- E.g. with one steady rest slide in the counter spindle version



Platform height 600 mm

- Optional installation in the assembly pit
- Energy chains outside the working area
- E.g. with more than two steady rest slides in the version with lower turret or the tailstock version with more than two steady rest slides

Platform Position of the energy chains

M80 MILLTURN

WORKING RANGE		
Centre distance	mm	1000 / 2000 / 3000 / 4500 / 6000
Turning length incl. standard chuck approx.	mm	1070 / 2070 / 3070 / 4570 / 6070
Turning diameter max.	mm	1000 / 1000 / 1000 / 1000 / 980
TURNING SPINDLE LEFT // RIGHT		**L**
Spindle head DIN 55026	Size	A15
Spindle bore	mm	165 *
Spindle diameter in front bearing	mm	240
MAIN DRIVE LEFT // RIGHT		**L**
Power max. 40% (100%) duty cycle	kW	56 (40) / 80 (60)
Spindle speed max.	min^{-1}	2400 / 1600
Torque max. 40% (100%) duty cycle	Nm	3420 (2440) / 5860 (4500)
C - AXIS LEFT // RIGHT		**L**
Spindle speed max.	min-1	0-20
Torque max.	Nm	4000
Torque with disc brake engaged	Nm	7500
Smallest programmable increment	Degrees	0,0001
TURNING - BORING - MILLING UNIT - UPPER TOOL CARRIER		
Power max. ED 40% (100%) duty cycle	kW	58 (45)
Spindle speed max.	min^{-1}	5000 / 8000
Torque max. 40% (100%) duty cycle	Nm	640 (500) / 400 (310)
Milling spindle diameter at front bearing	mm	130
Travel Z-axis	mm	1300 / 2300 / 3300 / 4800 / 6300
Travel X-axis	mm	900 (-20 ... +880)
Travel Y-axis	mm	650 (-300 ... +350)
Travel Y-axis (option)**	mm	650 (-250 ... +400)
Feed force Z-axis, 100 % duty cycle	kN	20
Feed force X-axis, 100 % duty cycle	kN	20
Feed force Y-axis, 100 % duty cycle	kN	27
Rapid traverse Z / X / Y	m/min	30 / 30 / 20
Swivelling range B-axis	Degrees	220 (-110 ... +110)
B-axis additional indexing	Degrees	2,5
Swivelling torque B-axis max.	Nm	1600
Torque at indexed B-axis max.	Nm	15000
Smallest programmable increment B-axis	Degrees	0,0001
Tool system	Type	HSK-A100 / C8

M80-G MILLTURN	M80X MILLTURN	M80X-G MILLTURN
- / 2000 / 3000 / 4500 / 6000	1000 / 2000 / 3000 / 4500 / 6000	- / 2000 / 3000 / 4500 / 6000
-	1070 / 2070 / 3070 / 4570 / 6070	-
- / 1000 / 1000 / 1000 / 980	- / 1000 / 1000 / 1000 / 980	- / 1000 / 1000 / 1000 / 980
L // R	**L**	**L // R**
A15 // A15	A15	A15 // A15
165 // 165 *	165 *	165 // 165 *
240 // 240	240	240 // 240
L // R	**L**	**L // R**
56 (40) / 80 (60) // 60 (40) / 90 (60)	56 (40) / 80 (60)	56 (40) / 80 (60) // 60 (40) / 90 (60)
2400 / 1600 // 2400 / 1600	2400 / 1600	2400 / 1600 // 2400 / 1600
3420 (2440) / 5860 (4500) // 3000 (2000) /4800 (3200)	3420 (2440) / 5860 (4500)	3420 (2440) / 5860 (4500) // 3000 (2000) /4800 (3200)
L // R	**L**	**L // R**
0-20 / 0-20	0-20	0-20 / 0-20
4000 // 4000	4000	4000 // 4000
7500 // 7500	7500	7500 // 7500
0,0001 // 0,0001	0,0001	0,0001 // 0,0001
58 (45)	58 (45)	58 (45)
5000 / 8000	5000 / 8000	5000 / 8000
640 (500) / 400 (310)	640 (500) / 400 (310)	640 (500) / 400 (310)
130	130	130
2300 / 3300 / 4800 / 6300	2300 / 3300 / 4800 / 6300	2300 / 3300 / 4800 / 6300
900 (-20 ... +880)	1050 (-20 … +1030)	1050 (-20 … +1030)
650 (-300 ... +350)	650 (-300 ... +350)	650 (-300 ... +350)
650 (-250 ... +400)	-	-
20	20	20
20	20	20
27	27	27
30 / 30 / 20	30 / 30 / 20	30 / 30 / 20
220 (-110 ... +110)	220 (-110 ... +110)	220 (-110 ... +110)
2,5	2,5	2,5
1600	1600	1600
15000	15000	15000
0,0001	0,0001	0,0001
HSK-A100 / C8	HSK-A100 / C8	HSK-A100 / C8

		M80 MILLTURN	M80-G MILLTURN	M80X MILLTURN	M80X-G MILLTURN
TAILSTOCK - MECHATRONIC / ADJUSTMENT VIA NC SERVO DRIVE (Z)					
Feed force adjustable (min 15% max. 100%)	kN	6 - 40	-	6 - 40	-
Live center	MT	6	-	6	-
STEADY REST					
Clamping diameter max.	mm	770*	770*	770*	770*
Swing over steady rest slide	mm	1000***	-		
DISC MAGAZINE					
Number of tool stations (place-encoded)	Number	36 / 72 / 108 / *	36 / 72 / 108 / *	36 / 72 / 108 / *	36 / 72 / 108 / *
Tool diameter, adjacent, max.	mm	125	125	125	125
Tool diameter, non-adjacent, max.	mm	250	250	250	250
Tool length max.	mm	900	900	900	900
Max. tool weight	kg	35	35	35	35
PRINCIPAL DIMENSIONS OF THE BASE MACHINE					
Length x width x height (with max. magazine)	m	11 / 12 / 13 /14,5 / 16 x 5,0 x 4,0	- / 12 / 13 /14,5 / 16 x 5,0 x 4,0	11 / 12 / 13 /14,5 / 16 x 5,0 x 4,25	- / 12 / 13 /14,5 / 16 x 5,0 x 4,25
Number of sliding doors	Piece	1 / 2 / 2 / 3 / 4	- / 2 / 2 / 3 / 4	1 / 2 / 2 / 3 / 4	- / 2 / 2 / 3 / 4
Height of the turning spindle/turning centre above the ground	mm	1480	1480	1480	1480
Total weight of the machine approx.	kg	38 000.....60 000	46 000.....62 000	38 500.....61 000	46 500.....63 000
CONTROL		Sinumerik 840D sl			
Display on the operator panel	Type	LCD colour display / 19“			
PAINTING		RAL 5023 distant blue, texture / 7035 light grey, texture / 7037 dusty grey, texture			

* Other values available upon request

** turning diameter reduced to 900mm (880mm with a center distance of 6000mm)

*** Applies to platform height 200mm

		M85 MILLTURN	M85-G MILLTURN
WORKING RANGE			
Centre distance	mm	1000 / 2000 / 3000 / 4500 / 6000	- / 2000 / 3000 / 4500 / 6000
Turning length incl. standard chuck approx.	mm	1070 / 2070 / 3070 / 4570 / 6070	-
Turning diameter max.	mm	1100 / 1100 / 1100 / 1080	1100 / 1100 / 1100 / 1080
TURNING SPINDLE LEFT // RIGHT		**L**	**L // R**
Spindle head DIN 55026	Size	A15	A15 // A15
Spindle bore	mm	165 *	165 // 165 *
Spindle diameter in front bearing	mm	240	240 // 240
MAIN DRIVE LEFT // RIGHT		**L**	**L // R**
Power max. 40% (100%) duty cycle	kW	56 (40) / 80 (60)	56 (40) / 80 (60) // 60 (40) / 90 (60)
Spindle speed max.	min^{-1}	2400 / 1600	2400 / 1600 // 2400 / 1600
Torque max. 40% (100%) duty cycle	Nm	3420 (2440) / 5860 (4500)	3420 (2440) / 5860 (4500) // 3000 (2000) /4800 (3200)
C - AXIS LEFT // RIGHT		**L**	**L // R**
Spindle speed max.	min^{-1}	0-20	0-20 / 0-20
Torque max.	Nm	4000	4000 // 4000
Torque with disc brake engaged	Nm	7500	7500 // 7500
Smallest programmable increment	Degrees	0,0001	0,0001 // 0,0001
TURNING - BORING - MILLING UNIT - UPPER TOOL CARRIER			
Power max. ED 40% (100%) duty cycle	kW	58 (45)	58 (45)
Spindle speed max.	min^{-1}	5000 / 8000	5000 / 8000
Torque max. 40% (100%) duty cycle	Nm	640 (500) / 400 (310)	640 (500) / 400 (310)
Milling spindle diameter at front bearing	mm	130	130
Travel Z-axis	mm	2300 / 3300 / 4800 / 6300	2300 / 3300 / 4800 / 6300
Travel X-axis	mm	1050 (-20 ... +1030)	1050 (-20 ... +1030)
Travel Y-axis	mm	650 (-350 ... +300)	650 (-350 ... +300)
Travel Y-axis (option)**	mm	-	-
Feed force Z-axis, 100 % duty cycle	kN	20	20
Feed force X-axis, 100 % duty cycle	kN	20	20
Feed force Y-axis, 100 % duty cycle	kN	27	27
Rapid traverse Z / X / Y	m/min	30 / 30 / 20	30 / 30 / 20
Swivelling range B-axis	Degrees	220 (-110 ... +110)	220 (-110 ... +110)
B-axis additional indexing	Degrees	2,5	2,5
Swivelling torque B-axis max.	Nm	1600	1600
Torque at indexed B-axis max.	Nm	15000	15000
Smallest programmable increment B-axis	Degrees	0,0001	0,0001
Tool system	Type	HSK-A100 / C8	HSK-A100 / C8

		M85 MILLTURN	M85-G MILLTURN
TAILSTOCK - MECHATRONIC / ADJUSTMENT VIA NC SERVO DRIVE (Z)			
Feed force adjustable (min 15% max. 100%)	kN	6 - 40	-
Live center	MT	6	-
STEADY REST			
Clamping diameter max.	mm	770*	770*
Swing over steady rest slide	mm	-	-
DISC MAGAZINE			
Number of tool stations (place-encoded)	Number	36 / 72 / 108 / *	36 / 72 / 108 / *
Tool diameter, adjacent, max.	mm	125	125
Tool diameter, non-adjacent, max.	mm	250	250
Tool length max.	mm	900	900
Max. tool weight	kg	35	35
PRINCIPAL DIMENSIONS OF THE BASE MACHINE			
Length x width x height (with max. magazine)	m	11 / 12 / 13 /14,5 / 16 x 5,0 x 4,25	- / 12 / 13 /14,5 / 16 x 5,0 x 4,25
Number of sliding doors	Piece	1 / 2 / 2 / 3 / 4	- / 2 / 2 / 3 / 4
Height of the turning spindle/turning centre above the ground ***	mm	1505	1505
Total weight of the machine approx.	kg	38 500.....61 000	46 500.....63 000
CONTROL		Sinumerik 840D sl	
Display on the operator panel	Type	LCD-Farbdisplay / 19"	
PAINTING		RAL 5023 Fernblau, Struktur / 7035 Lichtgrau, Struktur / 7037 Staubgrau, Struktur	

* Other values available upon request

** turning diameter reduced to 900mm (880mm with a center distance of 6000mm)

*** Applies to platform height 200mm

Subject to technical changes.

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