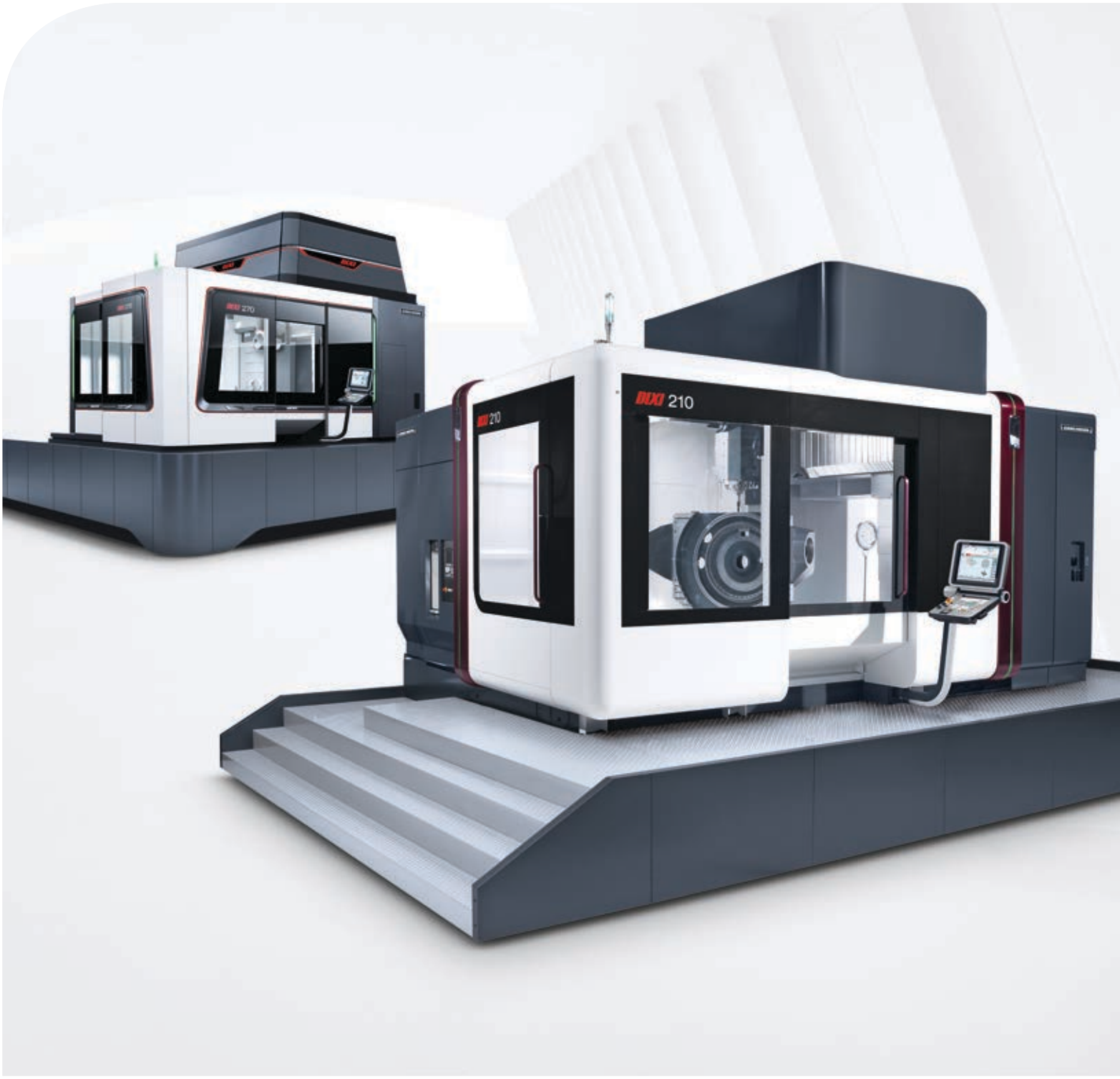
www.dmgmori.com

DMG MORI

Highly precise universal milling machines for 5-sided / 5-axis machining

DIXI 210 / *DIXI* 270



DIXI 210 / *DIXI* 270

Swiss Precision – highly accurate and unique.

The high-precision *DIXI* 210 and *DIXI* 270 machines are in a class of their own with volumetric accuracy of up to 35 µm. The gantry design provides 3-point support with GGG60 cast components for maximum rigidity and stability. You get ultimate dynamic finishing precision as well as unmatched power milling performance.

Aerospace

Helicopter gear

+ Material: Magnesium
+ Large work piece volumes with minimum wall thickness and weight
+ Machining of negative angles
+ Machining is only possible with an optional fire extinguishing system
+ Typical profile and positional tolerances in the range 10–20 µm

Aerospace

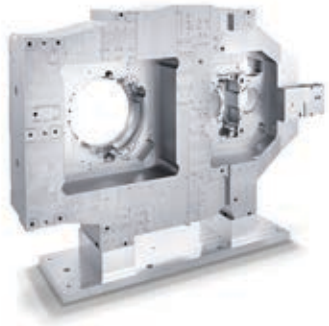
Helicopter gear housing

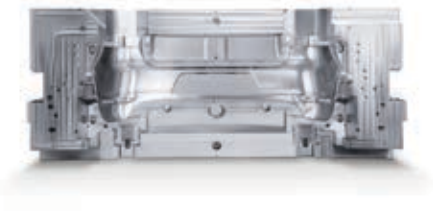
+ Material: Aluminium
+ The height of the component requires maximum accuracy in all work phases; positional tolerances in the range of 20 µm
+ Machining of negative angles
+ Complete machining in two setups

Aerospace

Transmission housing for turbine units

+ Material: Aluminium
+ The thin wall construction requires an absolutely stress free setup
+ The component length and positional tolerances require high positioning accuracy and temperature stability
+ Tolerances: holes better than H5, Location: 12–15 µm





Machine Construction

Machine Bed

+ Material: Grey cast iron
+ High-precision finishing on 5 sides
+ Squareness and parallelism in the 10 µm range

Tool and Mould Making

Mould for wafer plates

+ Material: Aluminium
+ High-precision part for manufacturing plates
+ Coaxial values in the 10 µm range
+ Form and position tolerance in the 10–20 µm range
+ The large dimensions of the component requires the highest temperature stability for the processes

Automotive

Mould for car bumper

+ Material: Steel
+ Rough machining followed by high-precision finishing
+ Internal bores that are difficult to reach require optimum accessibility to the workpiece
+ Shape and positional tolerances in the 30 µm range

DIXI 210 / *DIXI* 270

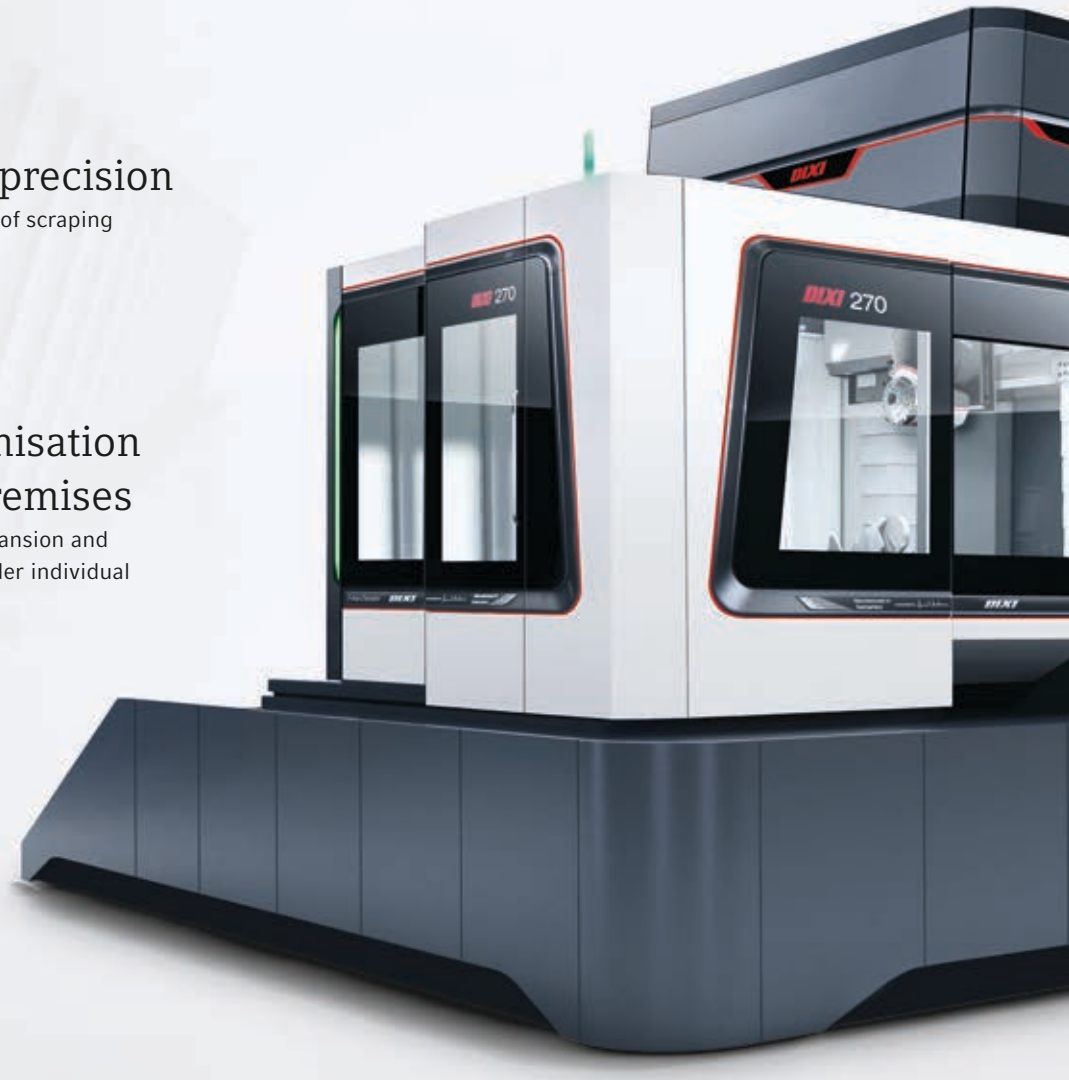
Maximum precision – unique.

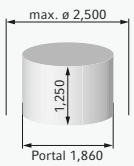
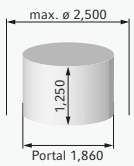
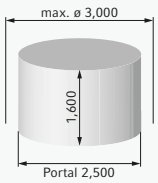
+ Maximum precision

thanks to 500 hours of scraping the guideways

+ Individual optimisation on the user's premises

compensation of thermal expansion and volumetric compensation under individual on-site conditions



		***DIXI* 210 Table version**	***DIXI* 210 Pallet version**	***DIXI* 270 Table version**
Table size	mm	ø 1,700	1,600 × 1,400	ø 2,200
Load tolerance	kg	8,000	5,000	12,000
Max. work piece dimensions	mm			

* optional, ** Travel without exchangeable milling heads

+ Unbeatable dynamics

up to 6 m/s² and 60 m/min

+ Temperature control

of all relevant heat-generating machine components

+ +80 % volumetric accuracy up to < 35 µm

as compared to 5-axes machines of other manufacturers that are > 100 / 200 µm

+ Travel ranges X / Y / Z

DIXI 210: 1,800 / 2,100 / 1,250 mm
DIXI 270: 2,700 / 2,700 / 1,600 mm

+ High-performance motor spindle
(1,000 Nm – 78 kW)

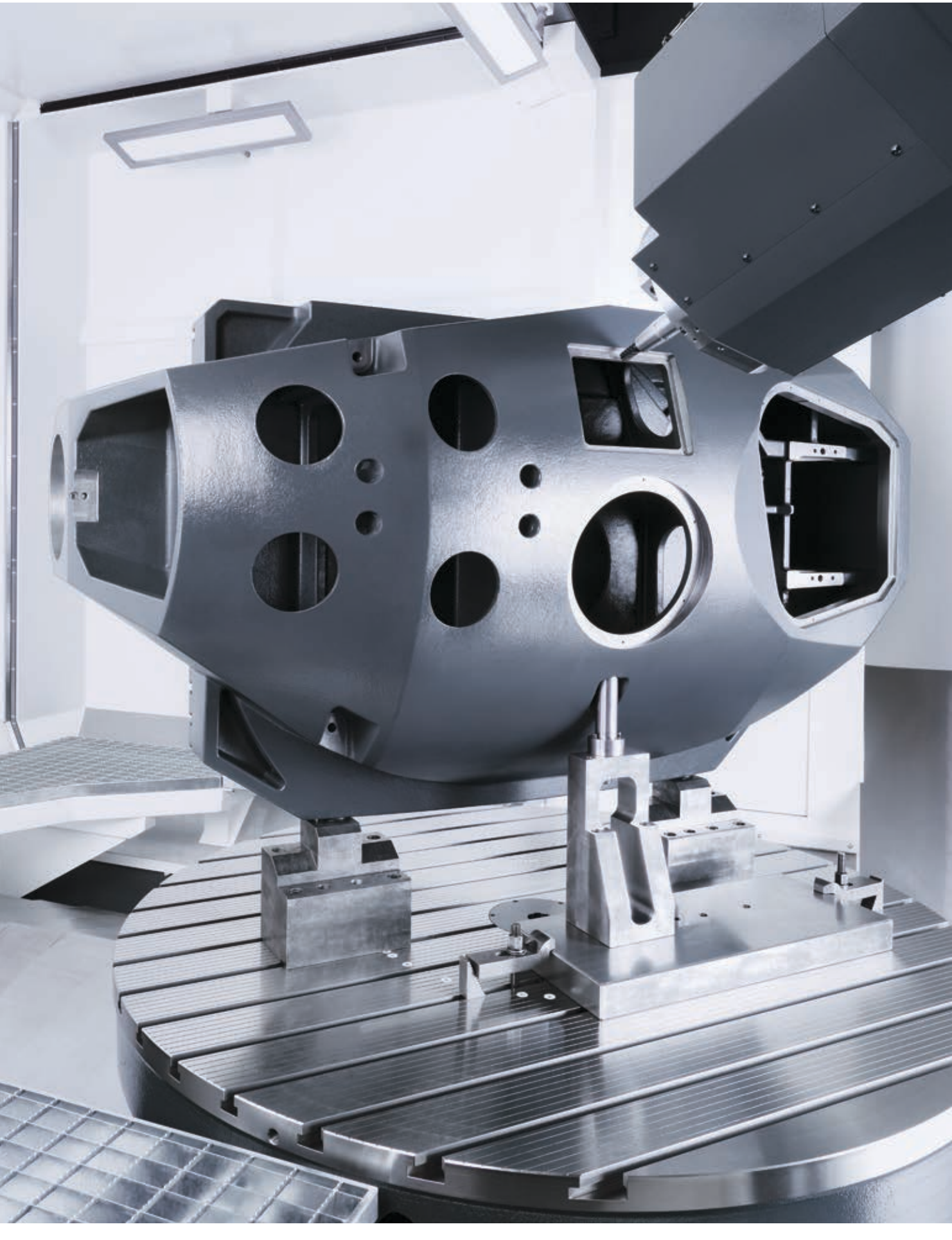
+ Positioning accuracy of up to 4 µm

+ Powerful gear spindle
(1,550 Nm – 6,300 rpm)

+ Maximum rigidity
for top milling performance (GGG60 cast components)

+ 3-point support
no additional costs because no foundation is needed thanks to the inherently rigid machine bed made of GGG60

+ Maximum workpiece weight up to 12,000 kg
with diameters up to 3,000 mm and heights up to 1,600 mm



DIXI 210 / *DIXI* 270

Maximum precision: +80 % increase in volumetric accuracy.

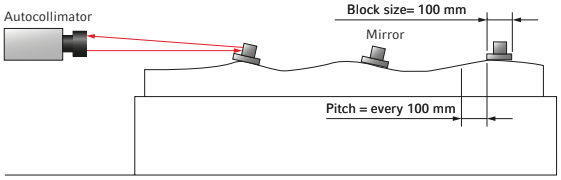
To achieve perfect machining results over the entire work area, high precision flatness, squareness and straightness of all axes is required. In order to achieve the required accuracy, the guideways of every *DIXI* 210 / *DIXI* 270 undergo over 500 hours of hand scraping. This results in typical volumetric accuracy of less than 35 / 60 µm and positioning accuracies of 4 / 6 µm for all linear axes and 4 arc seconds for all rotary axes of the *DIXI* 210 / *DIXI* 270 (ISO 230-2).

500 hours of hand scraping

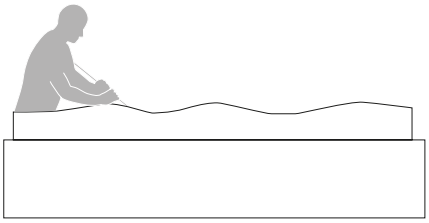
Scraping process: Up to 80 % increase in precision

The scraping process

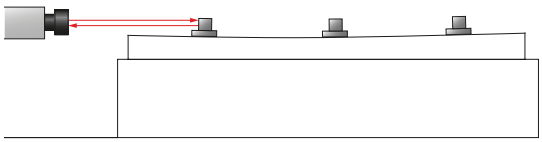
- Measurement of the straightness of the surface to be scraped with an autocollimator.



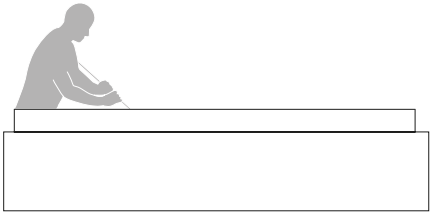
- First scraping process after measuring has been carried out (figurative representation).



- Measurement of the straightness of the scraped surface with an autocollimator to control the desired geometrical shape.

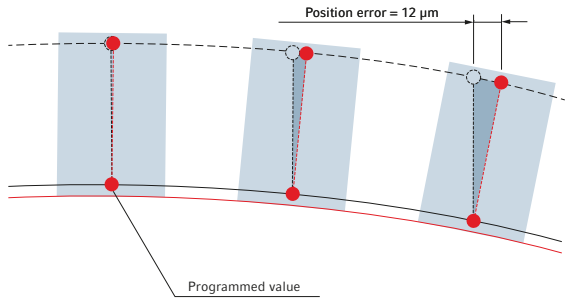


- Repetition of this measuring and scraping process until the required flatness is achieved.



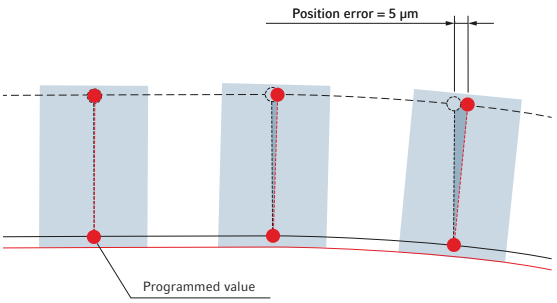
Error tolerance: Accuracy / straightness ≤ 4 / 6µm

Before scraping



Small geometric errors on the guideways at a reference height H1 induce angular errors, which increase through the workspace.

After scraping



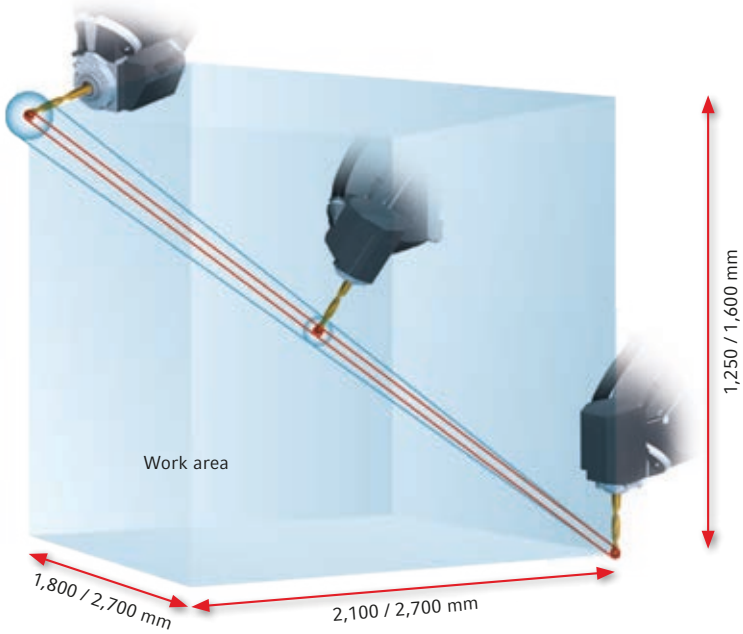
The angular errors can be reduced and the accuracy maintained across the whole height spectrum. Similarly, the effect of scraping applied to all other relevant contact surfaces yields an equivalent effect. One then speaks of volumetric accuracy or positioning accuracy throughout the whole working envelope.

DIXI 210 / *DIXI* 270

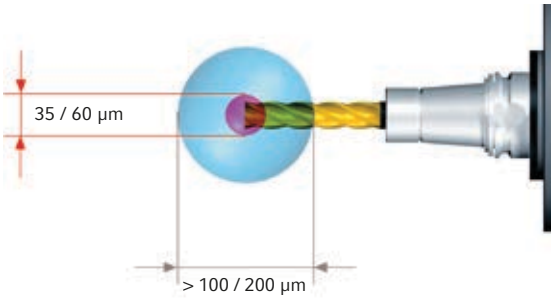
Highest volumetric accuracy.

Measuring instruments are mounted on the table while the Y-axis is moving. The positioning accuracy and repeatability are then measured at a reference height H1. Small geometric inaccuracies along the Y-axis, represented by roll, yaw and pitch, have a significant negative impact on positioning accuracy as the working height increases. With the traditional, highly accurate and expensive scraping process, these inaccuracies can be reduced to a minimum. The result is a tremendous increase in the accuracy of tool tip positioning in the whole workspace. This is how the volumetric accuracy is achieved.

Volumetric accuracy *DIXI* 210 / *DIXI* 270

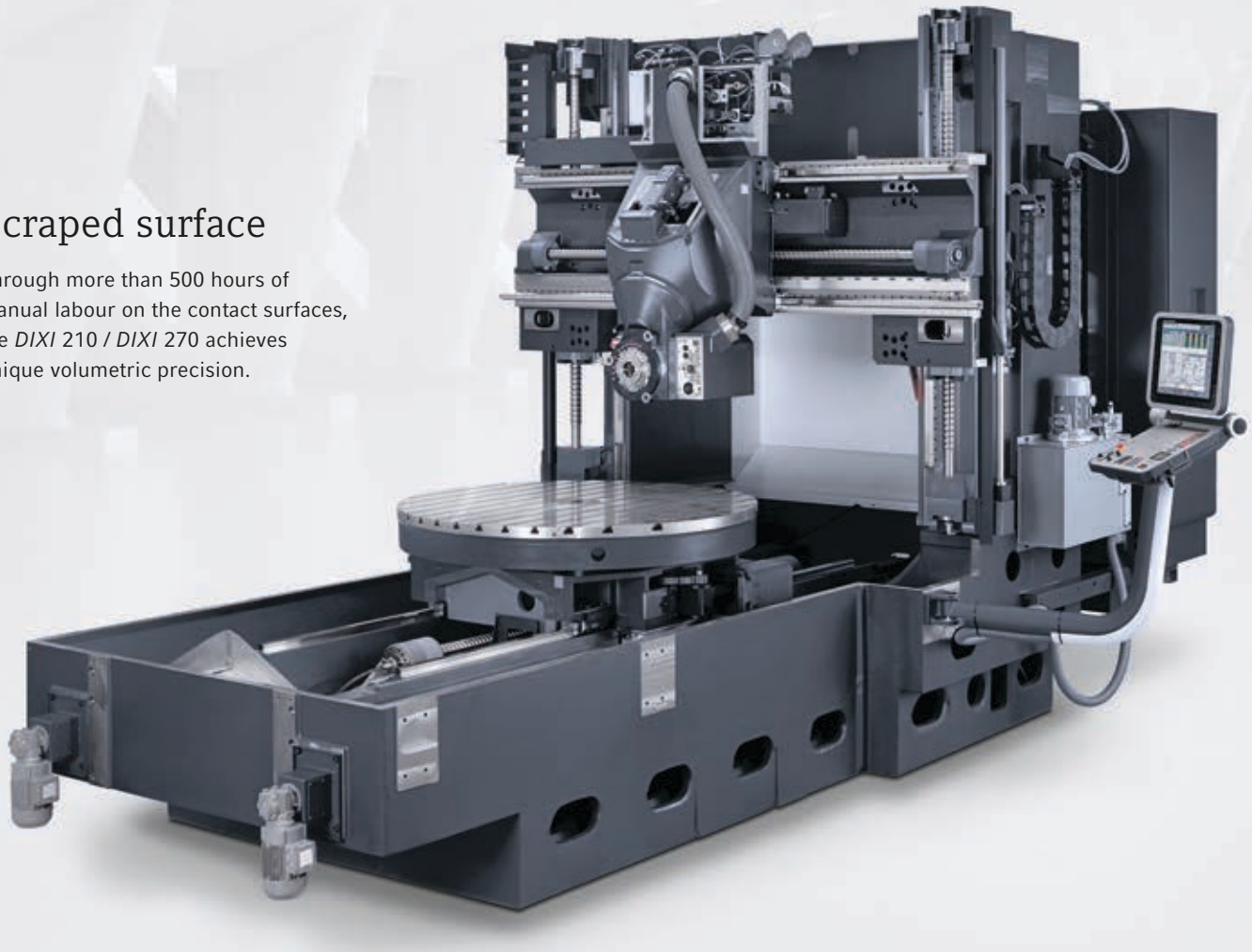


Positioning accuracy over the whole machining envelope that is valid regardless of the spindle position.



5-axis machines of other manufacturers

1: Multiple measurement of the guideways using an autocollimator **2:** Scraped surface



Scraped surface

Through more than 500 hours of manual labour on the contact surfaces, the *DIXI* 210 / *DIXI* 270 achieves unique volumetric precision.

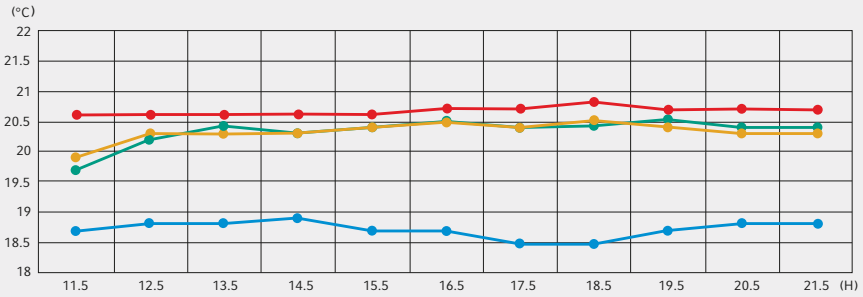
Long-term precision guaranteed for decades

Machine Construction:
High-precision milling of a machine component with form and positional tolerances in the 10 µm range

Thermal control to ensure maximum long-term precision.

The temperature of heat-generating machine elements is controlled using a large cooling unit that has a maximum flow rate, effectively preventing heat transfer to the machine structure.

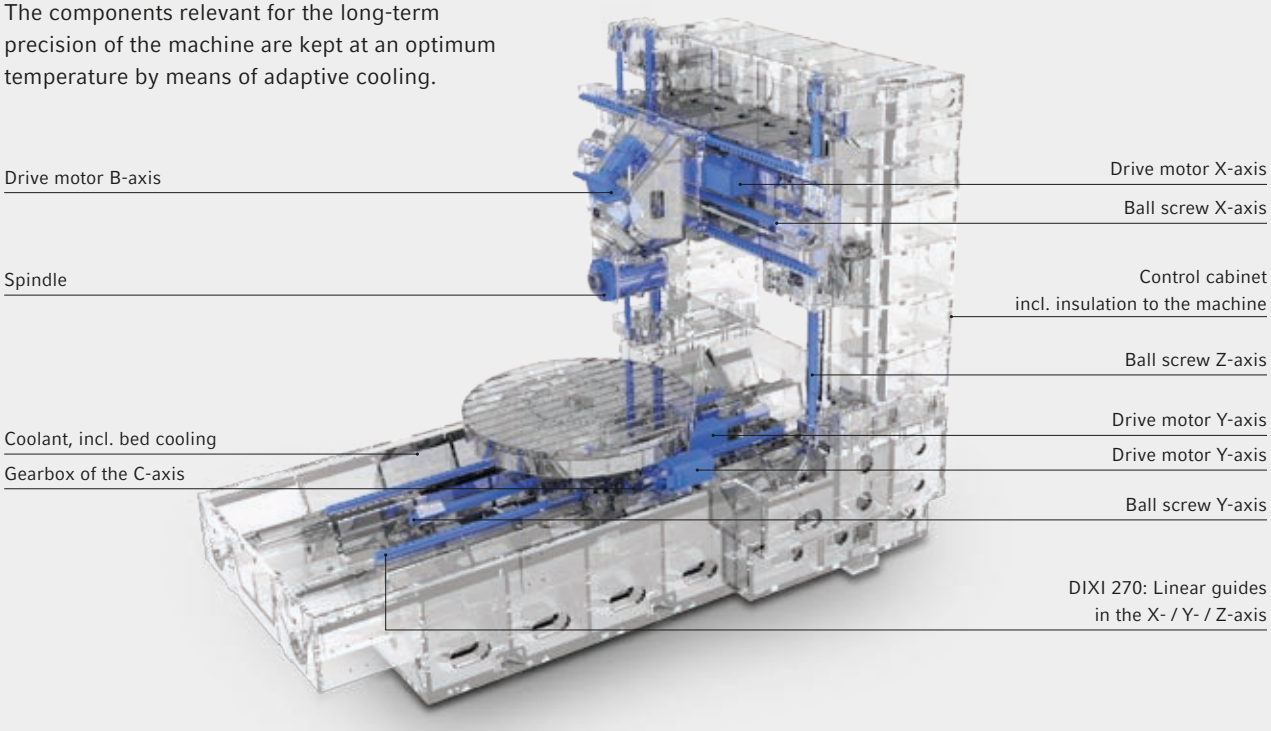
Temperature curves of the cooling unit



Heat transfer to the machine is prevented by the constant flow of coolant to the heat generating elements.

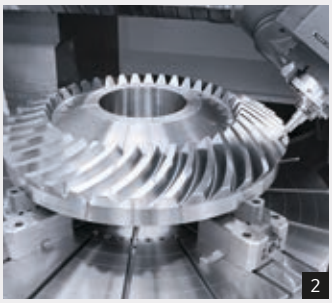
Temperature control points

The components relevant for the long-term precision of the machine are kept at an optimum temperature by means of adaptive cooling.



1: Highest precision in 5-axis machining due to volumetric accuracy of < 35 / 60 µm **2:** 5-axis machining of a gear of quality 3 (DIN) – component ø 1,600 mm **3:** NC-controlled A-axis – for simultaneous 5-axis milling of negative angles up to –30° **4:** NC-controlled swivelling milling head as a B-axis for simultaneous 5-axis milling with maximum stability due to machining at the axis pivot point


1


2

3


4

5-sided machining and 5-axis simultaneous machining

+ NC-rotary table in the standard version
+ Patented B-axis, NC-controlled swivelling milling head with maximum stability and accuracy due to machining at the axis pivot point
+ 5X torqueMASTER®, NC-controlled B-axis with gear spindle for 5-axis simultaneous machining with 1,550 Nm (6,300 rpm, 44 kW)
+ Swivelling milling head as an NC-controlled A-axis for machining negative angles up to –30°

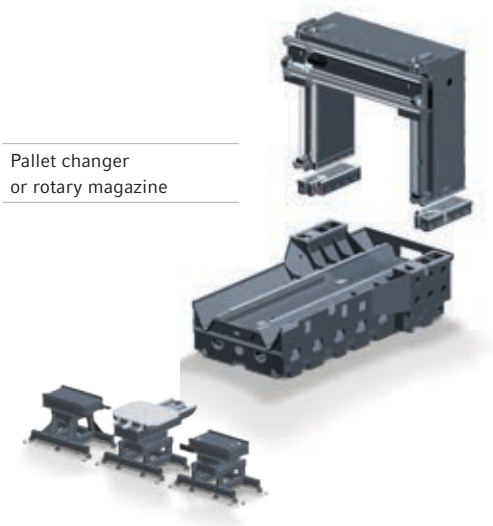
DIXI modular concept – the right components for every application.

State-of-the-art spindle technology		
Speed / tool holder / performance / torque (40 % DC)	***DIXI* 210**	***DIXI* 270**
Motor spindle 10,000 rpm // SK50 / HSK-A100 / 44 kW / 288 Nm	•	–
Motor spindle 12,000 rpm // SK50 / HSK-A100 / 44 kW / 288 Nm	○	•
Motor spindle 12,000 rpm // HSK-A100 / 52 kW / 430 Nm	○	○
Motor spindle 18,000 rpm // SK40 / HSK-A63 / 35 kW / 119 Nm	○	○
Gear spindle 6,300 rpm // SK50 / HSK-A100 / 44 kW / 1,550 Nm	○	○
Aerospace motor spindle 15,000 rpm // HSK-A100 / 100 kW / 179 Nm	○	–
Motor spindle 9,000 rpm // HSK-A100 / 78 kW / 1,000 Nm (15 % DC / 2 min)	–	○

• Standard, ○ optional

Modular concept of the 210 and 270 series

Gantry, cross-beam, X-slide



Pallet changer or rotary magazine

Milling heads

A-axis

B-axis

B-axis with gear

Tables Direct Drive

NC rotary table

FD table

Tool magazines

Wheel magazine (*DIXI* 270) with up to 183 tools

Shelf magazine (*DIXI* 210) up to 240 tools

Chain magazine (*DIXI* 210) up to 180 tools

DIXI 210 / *DIXI* 270

Optimum user comfort – DMG MORI ERGO*line*® Control with 19" screen.

An outstanding highlight of the new machine design is the DMG MORI ERGO*line*® Control with its 19" screen. The larger screen allows for the integration of additional SOFTkeys® and more detailed status information. Both the screen and control panel can be adjusted to fit the individual ergonomic requirements of the operator. This also applies to the optionally adjustable seat and mouse pad. The SMART*key*® allows personalised authorisations with the relevant access rights.

1: SMART*key*® – the electronic access control for personalised authorisation of the operator
2: SOFT*key*® – hotkeys that can be assigned freely for frequently-used screen sequences

DMG MORI ERGO*line*® Control

Benefits for production

+ Hard disk with more than 10 GB of storage memory
+ Ethernet connection and USB interface in the standard version
+ Pallet management
+ TPC (Table Precision Control) for calculation and compensation of the turning centre's NC rotary table
+ 99 zero points
+ Parametric programming
+ Extensive machining cycles such as drilling and milling cycles, thread tapping with / without a floating tap holder, reaming, boring, hole patterns, milling of slots, square and circular pockets, etc.
+ Graphical simulation of the machining sequence

Additional functions in the standard version

+ SMART*key*® with transponder: personalised authorisation of the operator with the relevant access rights to the control of the machine
+ SOFT*key*®: hotkeys that can be assigned freely for frequently accessed screen contents or frequently-used operational sequences

Ergonomics

+ Large 19" screen (1,280 × 1,024 pixels)
+ Angle of the screen and keyboard continuously adjustable (screen from 5–30°, keyboard 15–70°); expanded functions with the optional mouse pad, plan holder

Siemens 840D solutionline

+ Simple interactive programming thanks to identical "Look & Feel" for turning and milling
+ New SINUMERIK Operate user interface
+ Quick view simulation for complex part programs
+ Efficient tool management
+ Extensive 5-axis functionality with a large range of options for compensation and intervention
+ High-performance graphical support with setup and measuring functions
+ Advanced Surface – option for optimum surface quality*, ideal expansion for tool and mould making
+ Direct spline machining from CAD data*

DMG Control Highlights

+ Control identical AV programming with DMG Powertools
+ Integration of angle milling heads in standardised 5-axis machining
+ Tool measurement with Blum laser for use with angle milling heads*
+ HSC – high-speed, efficient milling with contour accuracy
+ SDS – Spindle Diagnostic System*
+ 3D quickSET®*
+ ATC (Application Tuning Cycle)*
+ Electronic balancing on the milling-turning machines
+ Exclusive measuring cycles for in-process measurement of diameters, grooves and ribs*

* optional

DIXI 210

Technical data

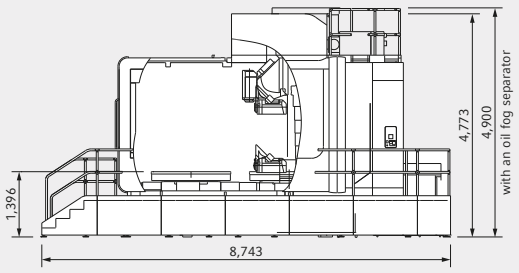
		Table version	Pallet version
Work area			
X- / Y- / Z-axis	mm	1,800 / 2,100 / 1,250	1,800 / 2,100 / 1,250
Distance between spindle – table surface			
Milling head horizontal	mm	130–1,380	130–1,380
Milling head vertical	mm	230–1,480	230–1,480
Distance between spindle – table centre			
Milling head horizontal	mm	–750 bis 1,350	–750 bis 1,350
Milling head vertical	mm	–850 bis 1,250	–850 bis 1,250
Tables			
NC rotary table			
Speed	rpm	12	12
Table size / pallet size	mm	ø 1,700	1,600 × 1,400
Max. table load	kg	8,000	5,000
Mill / turn table			
Milling speed	rpm	20	20
Turning speed	rpm	250	250
Table size / pallet size	mm	ø 1,850	ø 1,850
Max. table load	kg	5,000	4,000
5-axis options			
NC-controlled swivelling milling head (B-axis)		•	•
Swivel range (0 = vert. / 180 = horiz.)	Degrees	–30 / +180	–30 / +180
Rapid traverse and feed	rpm	30	30
NC-controlled swivelling milling head (A-axis)		•	•
Swivel range (0 = vert. / –90 = horiz.)	Degrees	–120 / +10	–120 / +10
Rapid traverse and feed	rpm	25	25
5X torqueMASTER® – NC-controlled B-axis with gear spindle		○ (not with FD)	○ (not with FD)
Swivel range (0 = vert. / 180 = horiz.)	Degrees	–10 / +180	–10 / +180
Rapid traverse and feed	rpm	23	23
Tools			
Tool holder (FD only with HSK-A)		SK40 (HSK-A63) / SK50 (HSK-A100)	SK40 (HSK-A63) / SK50 (HSK-A100)
Tool diameter (occupied adjacent pockets)	mm	110	110
Tool diameter (free adjacent pockets)	mm	250	250
Boring bar diameter	mm	250 × 400	250 × 400
Tool length	mm	650	650
Weight	kg	15 / 30	15 / 30
Chip-to-chip time (HSK)	sec.	10	10
Magazine expansion stages		60 / 120 / 180	60 / 120 / 180 / 240
Further magazine models and tool measurements on request.			
Main drive			
Integrated motor spindle SK50	rpm	10,000	10,000
Power (40 / 100 % DC)	kW	44 / 32	44 / 32
Torque (40 / 100 % DC)	Nm	288 / 187	288 / 187
Linear axes (X / Y / Z)	m/min	60 / 40 / 40	60 / 40 / 40
Machine weight	kg	41,000	45,000
Control			
DMG MORI ERGO*line*® Control with 19" screen, 3D-control			Siemens 840D solutionline

• Standard, ○ optional

Floor plans

DIXI 210 (table version)

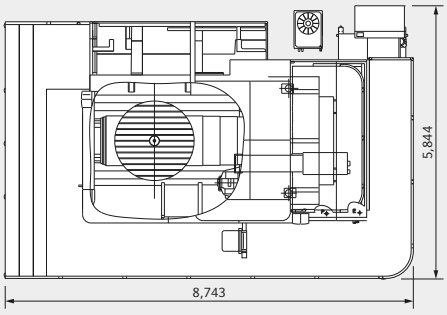
Side view



DIXI 210 (table version) with chain magazine featuring 60 pockets

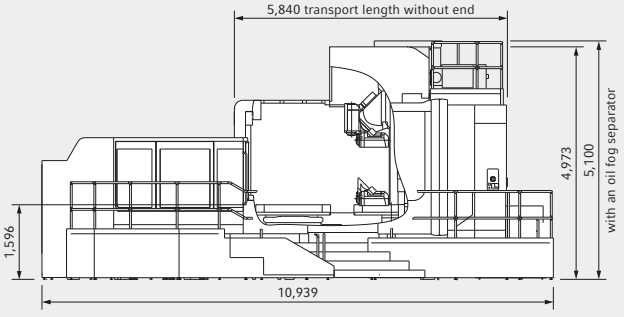
Top view

Footprint 51.1 m²



DIXI 210 (pallet version)

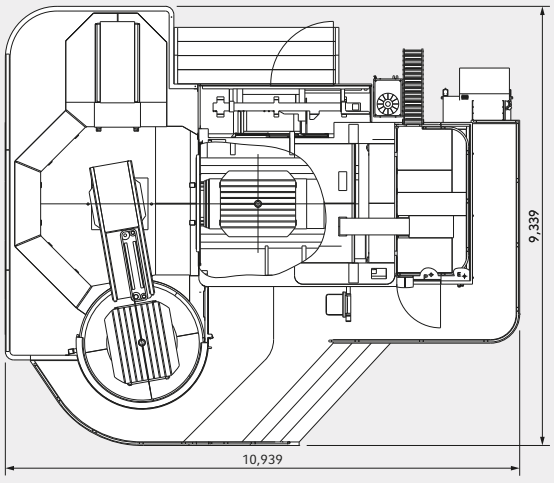
Side view



DIXI 210 (pallet version) with chain magazine featuring 60 pockets

Top view

Footprint 102.2 m²



DIXI 270

Technical data

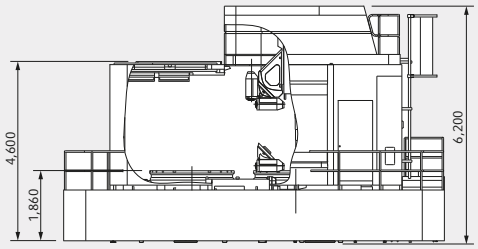
		Table version
Work area		
X- / Y- / Z-axis	mm	2,700 / 2,700 / 1,600
Distance between spindle – table surface		
Milling head horizontal	mm	130–1,730
Milling head vertical	mm	230–1,830
Distance between spindle – table centre		
Milling head horizontal	mm	–1,050 bis 1,650
Milling head vertical	mm	–1,150 bis 1,550
Tables		
NC rotary table		
Speed	rpm	9
Table size / pallet size	mm	ø 2,200
Max. table load	kg	12,000
5-axis options		
NC-controlled swivelling milling head (B-axis)		•
Swivel range (0 = vert. / 180 = horiz.)	Degrees	–70 / +180
Rapid traverse and feed	rpm	30
NC-controlled swivelling milling head (A-axis)		○
Swivel range (0 = vert. / –90 = horiz.)	Degrees	–120 / +10
Rapid traverse and feed	rpm	25
Tools		
Tool holder (FD only with HSK-A)		SK40 (HSK-A63) / SK50 (HSK-A100)
Tool diameter (occupied adjacent pockets)	mm	80 / 110
Tool diameter (free adjacent pockets)	mm	160 / 280
Boring bar diameter	mm	280 × 160 / 400 × 280
Tool length	mm	650
Weight	kg	15 / 30
Chip-to-chip time (HSK)	sec.	13
Magazine expansion stages		63 / 123 / 183
Further magazine models and tool measurements on request.		
Main drive		
Integrated motor spindle SK50	rpm	12,000
Power (40 / 100 % DC)	kW	44 / 32
Torque (40 / 100 % DC)	Nm	288 / 187
Linear axes (X / Y / Z)	m/min	60 / 30 / 40
Machine weight	kg	79,000
Control		
DMG MORI ERGO*line*® Control with 19" screen, 3D-control		Siemens 840D solutionline

• Standard, ○ optional

Floor plans

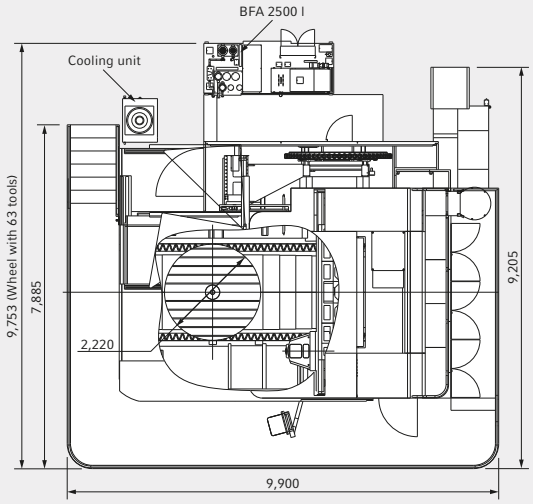
DIXI 270 (table version)

Side view



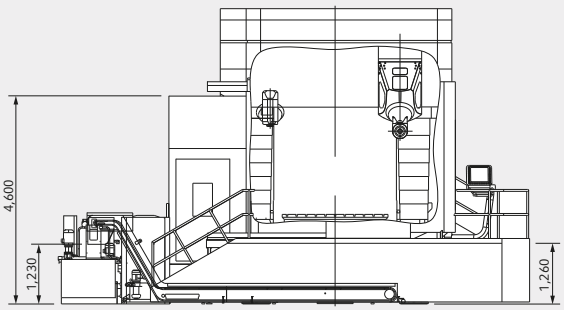
DIXI 270 (table version)

Top view



DIXI 270 (table version)

Front view



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MONTFORT WERBUNG

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