

Universal milling machines for five-sided / five-axis machining

DMU 80 P / FD duoBLOCK®  
DMC 80 U / FD duoBLOCK®

# DMU / DMC duoBLOCK®



World premiere

4<sup>th</sup> Generation  
duoBLOCK®



4<sup>th</sup> Generation duoBLOCK®

## The new benchmark in five-axis machining.

The five-axis machines in the highly stable duoBLOCK® design with 30 % more precision, performance and efficiency allow for the highest machining performance and maximum precision with high dynamics. From hard-to-cut materials such as those found in the aerospace sector, to the highest requirements for surface quality such as in tool and mould making, the 4<sup>th</sup> generation duoBLOCK® machines provide the best machining conditions.

02



Automotive

Steering knuckles for the Formula 1 cars  
of Infinity Red Bull Racing



**DMG MORI**

TEAM SUPPLIER

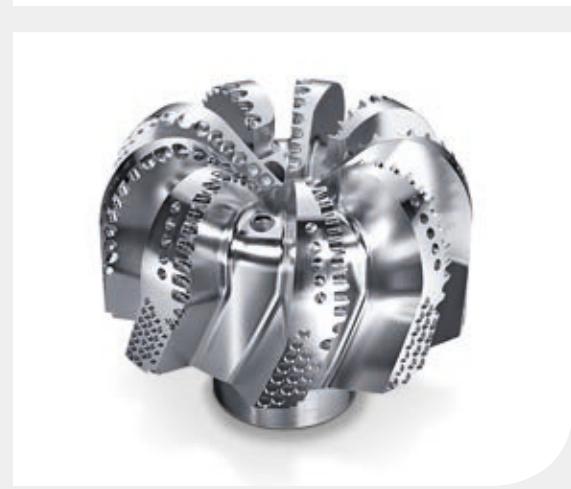
## Aerospace

Chassis components



## Machine construction

Mould carrier for PET bottles



## Tool and mould making

Tube mould

## Energy technology

Drill head for the oil and gas drilling sector

03



4<sup>th</sup> Generation duoBLOCK® – added value for you

# Unique!

With the new duoBLOCK®, every component becomes a masterpiece. Comprehensive cooling and the optimised stiffness of the new redesigned duoBLOCK® concept are the basis for the highest possible levels of precision and machining performance.

The stiffness of the highly stable and highly precise duoBLOCK® concept has been improved by 30 %. The new innovative wheel magazine provides the highest flexibility with up to 363 tools and minimal space requirements.

04

**DMU 80 P / FD duoBLOCK®**  
**Unique**



**Please note:** The results of machining and performance trials given in this catalogue are examples. The results may vary slightly due to the site conditions and cutting conditions.

## Precision

- + 30 % greater precision
- + Full cooling of the axis drives with the precision package
- + Comprehensive cooling measures
- + Significantly improved temperature response
- + SGS: Spindle Growth Sensor

## Performance

- + 30 % more overall stiffness
- + powerMASTER 1000 motor spindle rated at 1,000 Nm and 77 kW
- + Table with 76 % greater stiffness
- + Ball screw of 50 mm diameter
- + 55 mm wide linear guides on the Y-axis

## Efficiency

- + 30 % lower energy consumption
- + Lower space requirements, extremely compact wheel magazine with shortest set-up time
- + High machine availability

4<sup>th</sup> Generation  
duoBLOCK®

Precision  
Performance  
Efficiency  
CELOS



05

| CELOS

#### CELOS

- + Optimal ease of maintenance and the best ergonomics thanks to unrestricted accessibility
- + B-axis: improved interfering, higher stiffness
- + CELOS by DMG MORI enables consistent administration, documentation and visualisation of order, process and machine data
- + CELOS can be extended with apps and is also compatible with your company's existing infrastructures and programmes

Excellence  
redefined!

DMU / DMC 80 P / U / FD duoBLOCK®

## The masterpiece. Always precise!

Comprehensive cooling measures achieve the highest long-term accuracy and precision. In connection with the precision package, the entire feed drive is cooled and the machine bed is tempered, resulting in up to 30 % higher component precision.

### Standard cooling measures

#### Headstock

Headstock housing

Motor spindle

B-axis motor

06

#### NC rotary table

C-axis motor

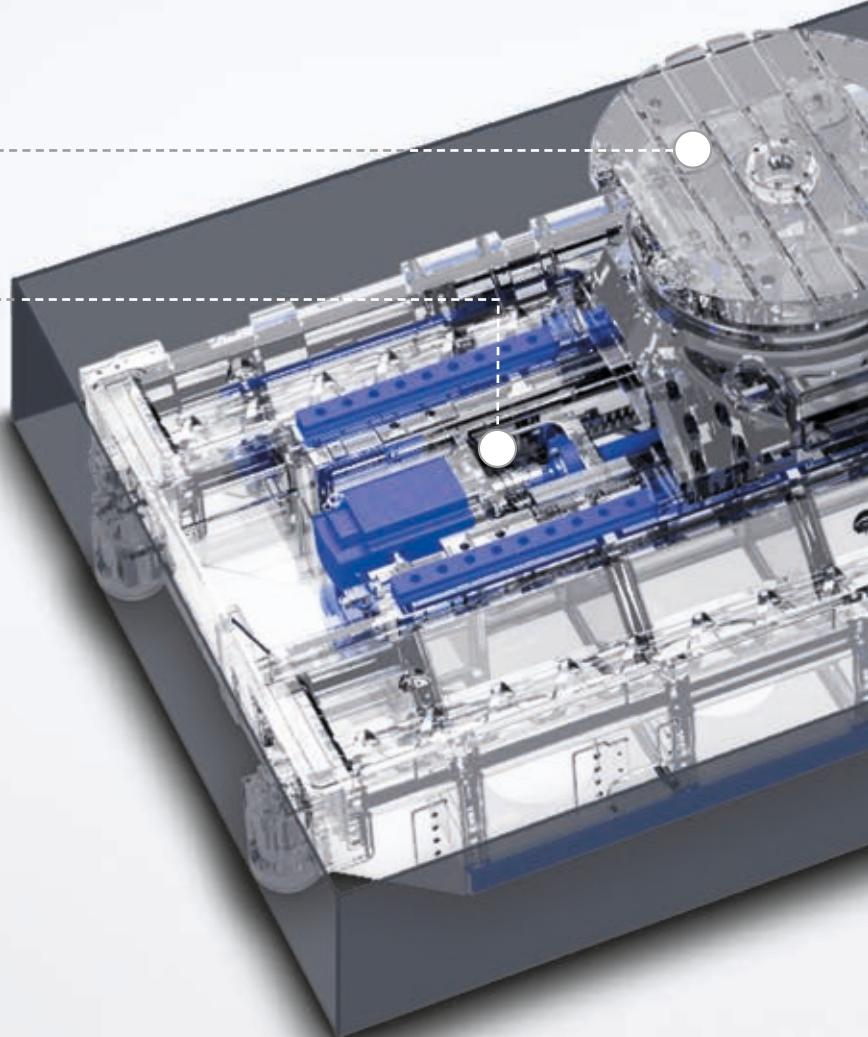
#### Basic construction

Y- / Z-axis motor

X- / Y- / Z-feed axes:

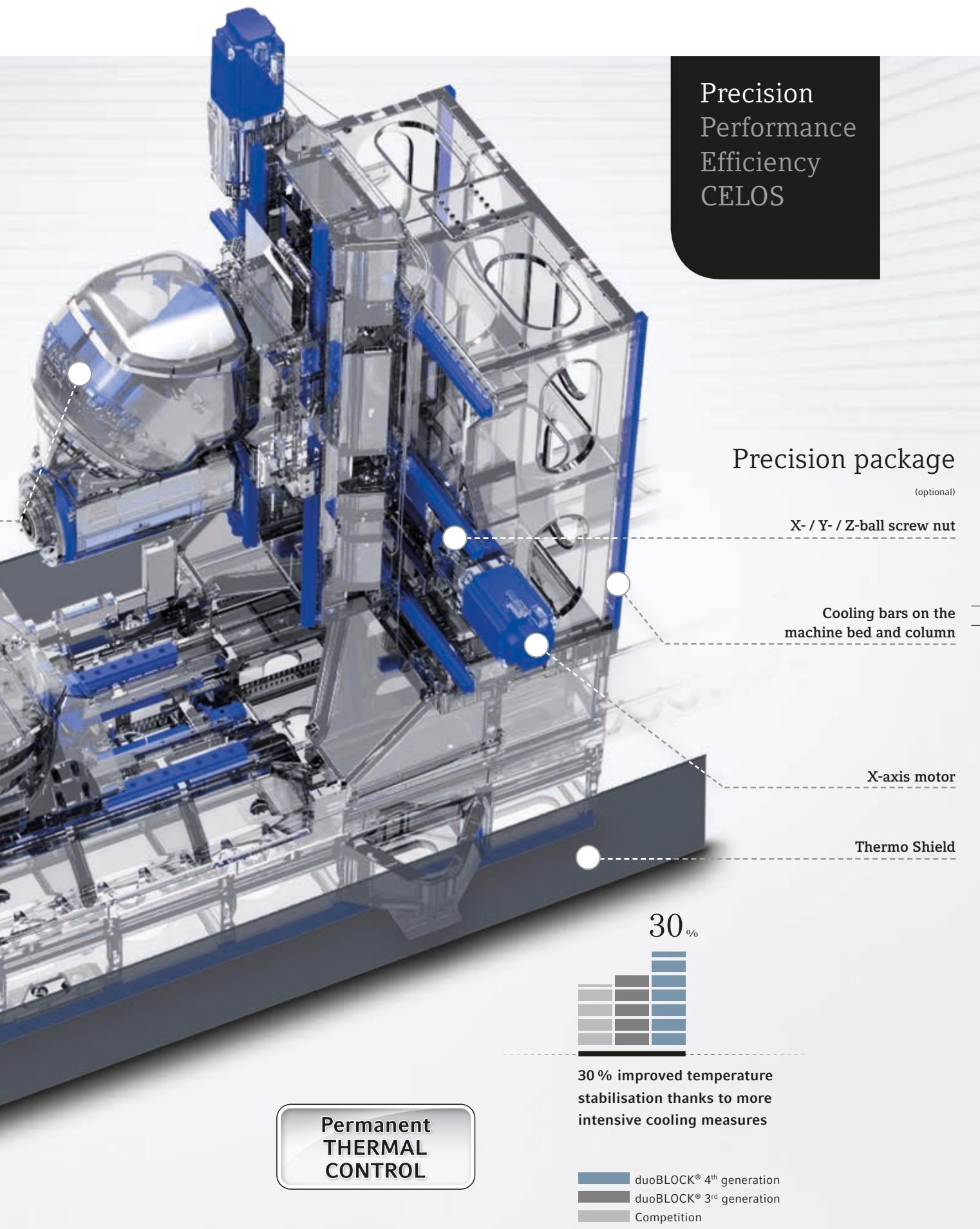
Ball screw bearing

X- / Y- / Z-linear guides



The first  
fully cooled  
feed drive

Precision  
Performance  
Efficiency  
CELOS



DMU / DMC 80 P / U / FD duoBLOCK®

## The greatest stiffness for maximised machining performance!

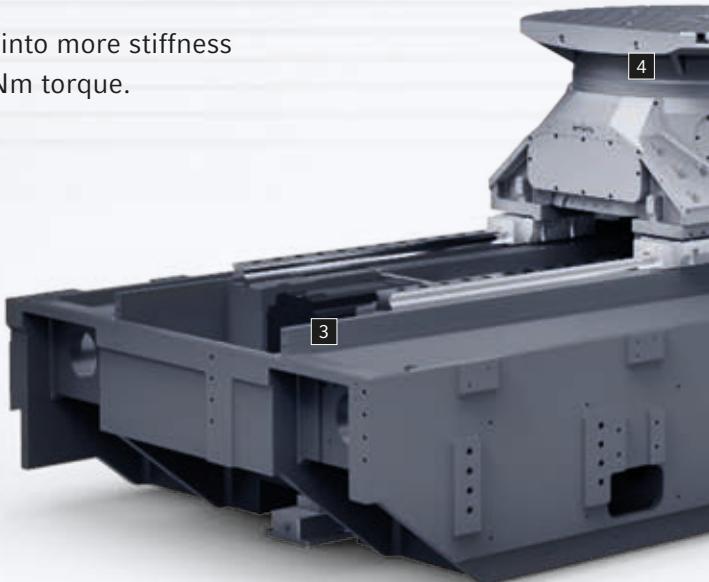
Precision  
Performance  
Efficiency  
CELOS

The overall stiffness of the highly stable and highly precise duoBLOCK® concept was improved by over 30 %. The structure of the basic concept was optimised further using FEM calculations and the components were strengthened.

With the powerMASTER 1000, this is converted into more stiffness and maximised machining performance with 1,000 Nm torque.

08

The royal class!



Increased structural  
stiffness up to:

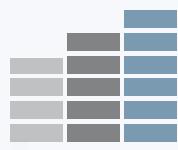
76 %



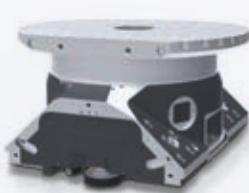
12 %



20 %



- duoBLOCK® 4<sup>th</sup> generation
- duoBLOCK® 3<sup>rd</sup> generation
- Competition



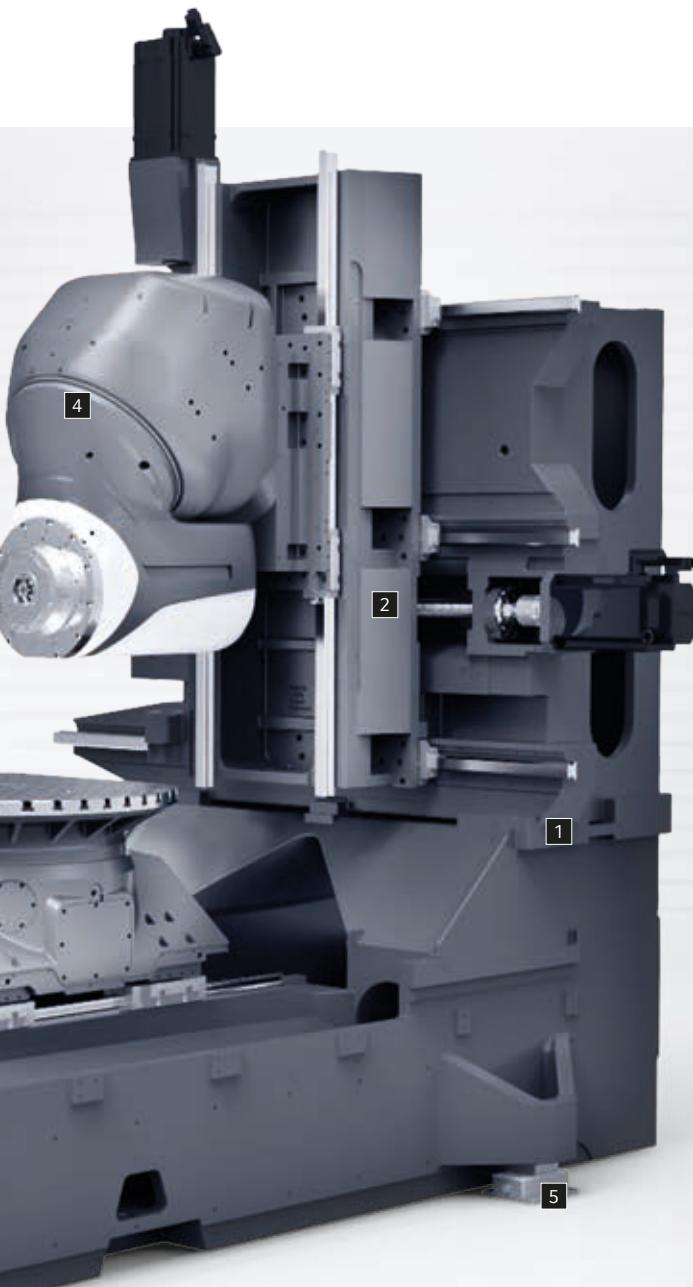
NC ROTARY TABLE



MACHINE STRUCTURE



B-AXIS

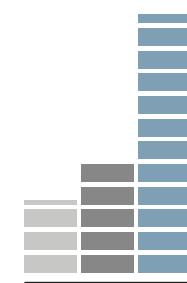


## powerMASTER 1000

**130 % increase in torque**

duoBLOCK® 4<sup>th</sup> generation  
 duoBLOCK® 3<sup>rd</sup> generation  
 Competition

130 %



09



powerMASTER 1000

### Optimised component structure

12 % higher stiffness thanks to an elevated column with a wider support

### Size 50 ball screw on all axes

Large drive systems and internally cooled ball screw as standard

### Size 55 linear guides on the Y-axis

Wide linear guides for a maximum table load of 1,500 kg

### Larger YRT bearing on the B- and C-axis

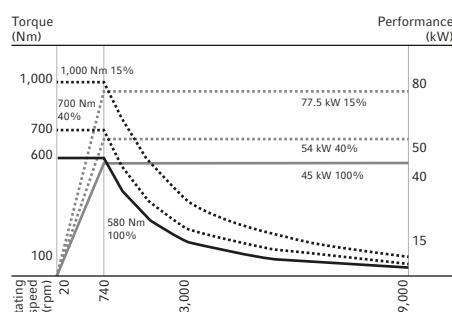
Improved stiffness thanks to the larger bearing diameter

### Optimised three-point support

100 mm wider supporting area

### powerMASTER SK50 / HSK-A100\* motor spindle

9,000 rpm / 77.5\*\* kW / 1,000\*\* Nm



\* optional, \*\* 15 % DC (2 min)

Precision  
Performance  
Efficiency  
CELOS

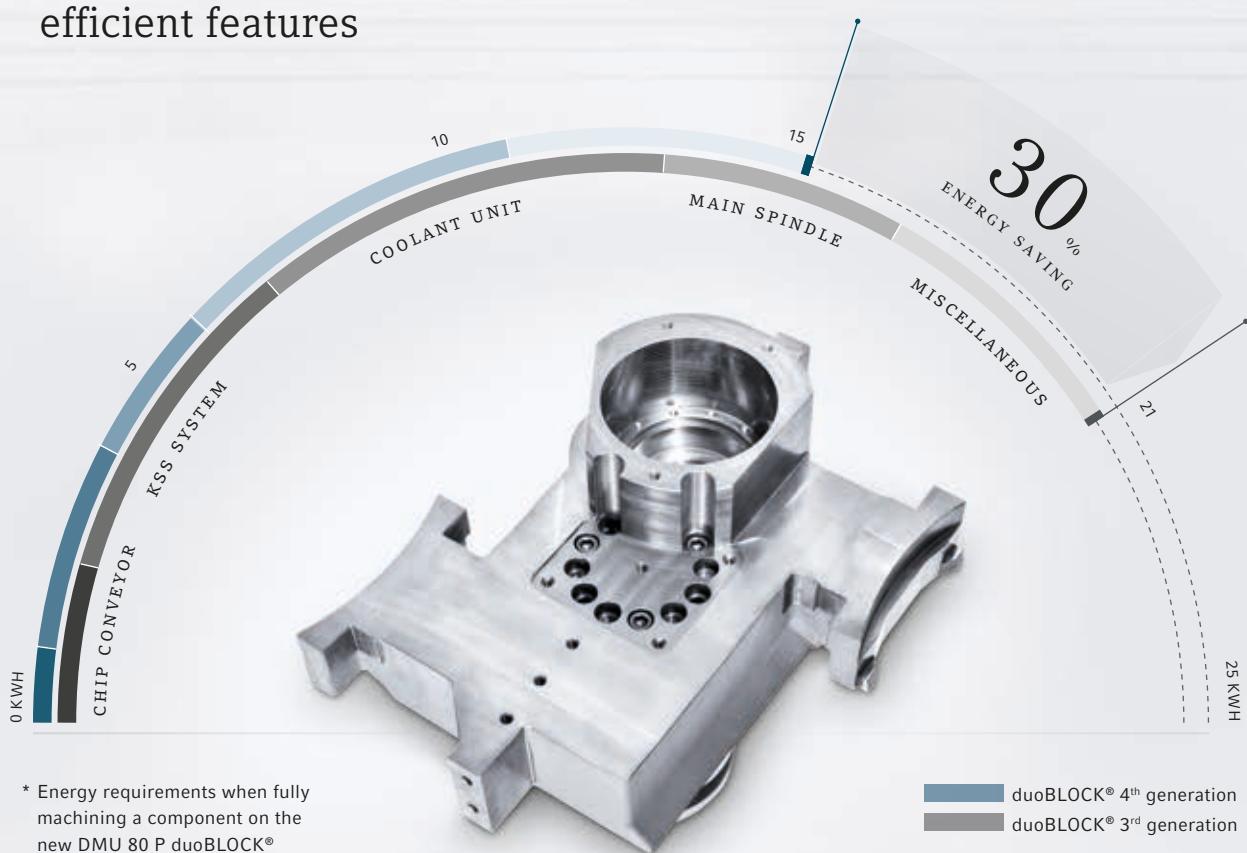
DMU / DMC 80 P / U / FD duoBLOCK®

## Manufacture more efficiently!

The new DMU / DMC 80 P / U / FD duoBLOCK® reduces energy consumption by up to 30 % thanks to its intelligent requirements-based features, and thanks to its maximised availability provides the best conditions for efficient production. The new, most compact tool magazine on the market significantly reduces the tool setting area, and the optimal accessibility provides maximised ease of maintenance.

10

### Save energy with efficient features



## The best ease of maintenance

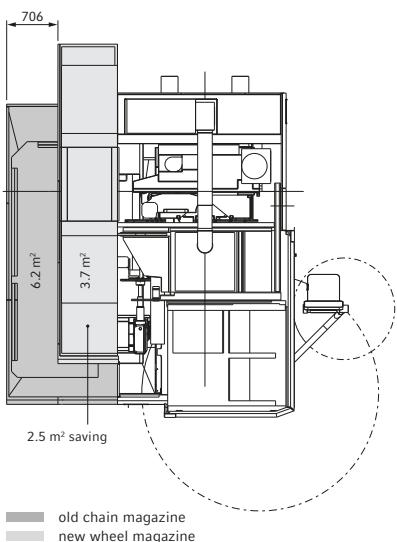
With its large viewing panels, the Fluidbox provides optimised accessibility for unrivalled ease of maintenance.



## Compact magazine

The new wheel magazine is the most compact on the market, reducing the set-up area by 41 % compared to its predecessors.

**Example:** Magazine for 123 tools with SK50 tool holder



DMU / DMC 80 P / U / FD duoBLOCK®

## Obvious!

The duoBLOCK® has always been the benchmark for optimised accessibility and large working volumes that are open on three sides. The large operating doors allow quick and ergonomic set-up and adjustment. Additionally, the unrestricted crane loading from above to over the centre of the table is visibly simple.



**Highlights**

- Innovation

Control technology

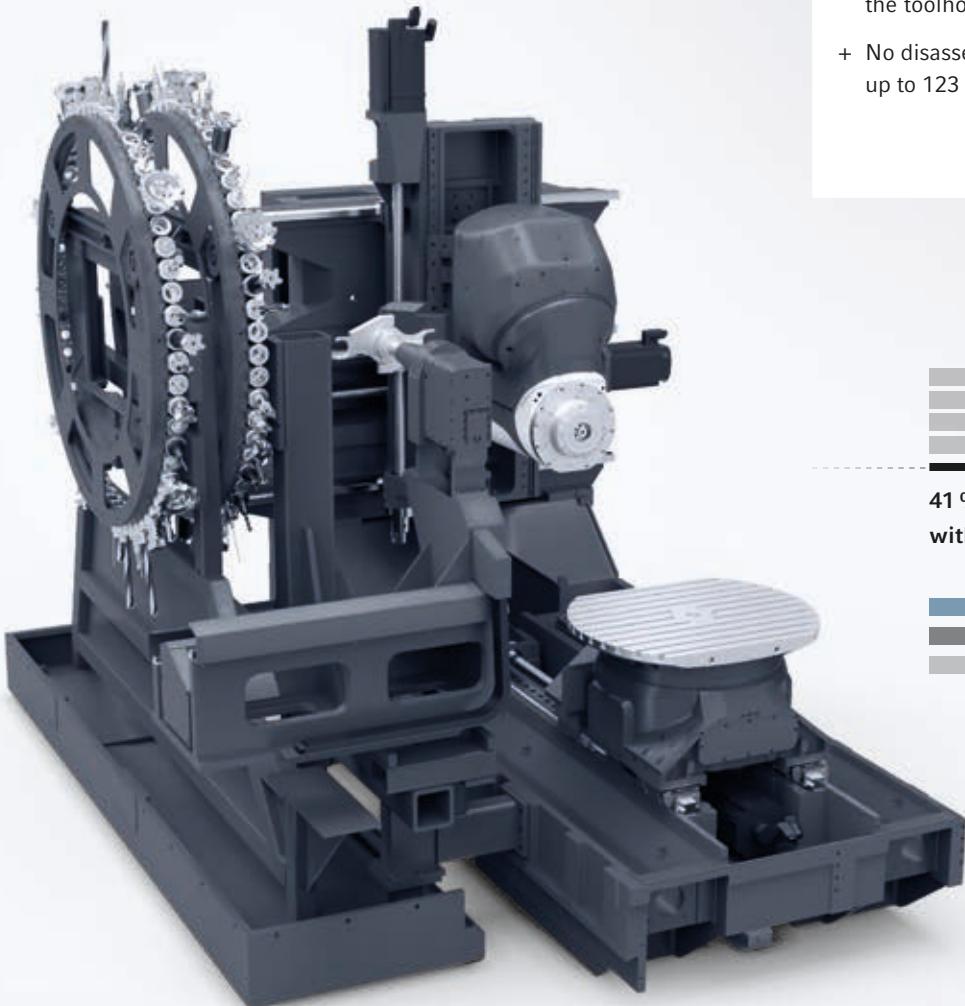
Overview

Technical data

**DMU / DMC 80 P / U / FD duoBLOCK®**

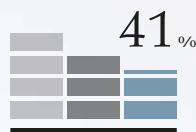
## Innovative down to the smallest detail!

The new innovative wheel magazine provides the highest flexibility and productivity due to the fact that it can be retooled during machining and during idle times and due to its compactness, with a 41 % smaller set-up area. With the shortest tool call-up times of up to 5.6 seconds with 363 tools, the preselected tool can be switched into the spindle within 0.5 second, even during short machining processes.



### **Highlights**

- + Set-up during machining and idle times (two wheels or more)
- + The most compact magazine on the market (41 % lower machine width with the 123 pocket magazine)
- + Up to 363 tool pockets: call-up time of up to 5.6 seconds
- + Patented design
- + Extremely short tool-changing time of just 0.5 second (0.8 second with the HSK-A100)
- + Safe tool retention thanks to the toolholder
- + No disassembly for transportation with up to 123 (SK50) / 183 (SK40) tools



**41 % increased set-up area with the 123 magazine**

- duoBLOCK® 4<sup>th</sup> generation
- duoBLOCK® 3<sup>rd</sup> generation
- Competition

DMU / DMC 80 P / U / FD duoBLOCK®



Precision  
Performance  
Efficiency  
CELOS

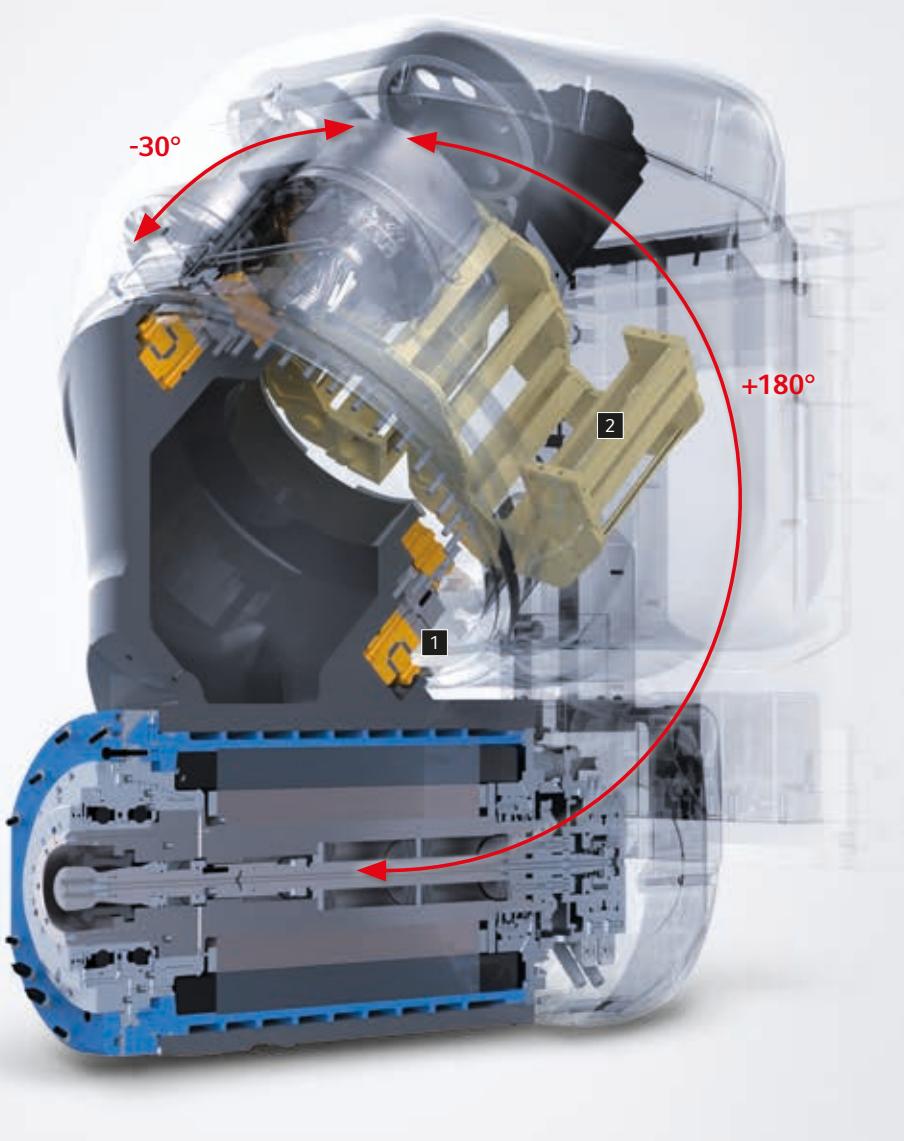
## New B-axis!

### 20 % more stiffness thanks to the large YRT bearing

a further improvement to the already highly stiff B-axis concept with a 45° swivel plane.

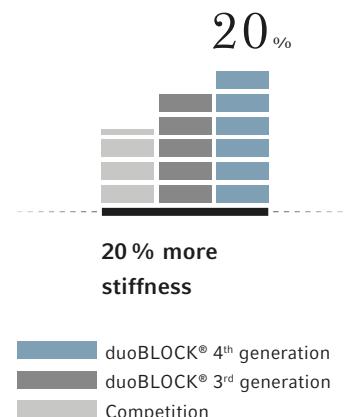
### Integrated cable carrier

improved interference contour, higher quality thanks to better sealed housing, longer life span thanks to mechanically guided cables.



13

Improved  
interfering contour,  
higher stiffness!



20 % more  
stiffness

duoBLOCK® 4<sup>th</sup> generation  
duoBLOCK® 3<sup>rd</sup> generation  
Competition

Applications and parts

## Highlights

- › CELOS

Control technology

Overview

Technical data

Precision  
Performance  
Efficiency  
CELOS

# CELOS

App menu: Central access  
to all available applications

**ERGoline® Control**  
with 21.5" multi-  
touch-screen and  
Siemens.

### **STANDARD**

Standard user interfaces for all new  
hightech machines from DMG MORI.

### **CONSISTENT**

Consistent administration, docu-  
mentation and visualisation of order,  
process and machine data.

### **COMPATIBLE**

Compatible with PPS and ERP systems.  
Can be networked with CAD / CAM  
products. Open to trendsetting CELOS  
APP extensions.



DMU / DMC 80 P / U / FD duoBLOCK®

## CELOS – From the idea to the finished product.

CELOS from DMG MORI enables consistent administration, documentation and visualisation of order, process and machine data-based CELOS can be extended with apps and is also compatible with your company's existing infrastructures and programs.

CELOS APPs facilitate quick and easy operation: three examples »

### JOB MANAGER

*Systematic planning, administration and preparation of work orders.*

- + Machine related creation and configuration of new work orders
- + Structured storage of all production related data and documents
- + Easy visualisation of orders, including NC program, equipment, etc.



### JOB ASSISTANT

*Defining and processing orders.*

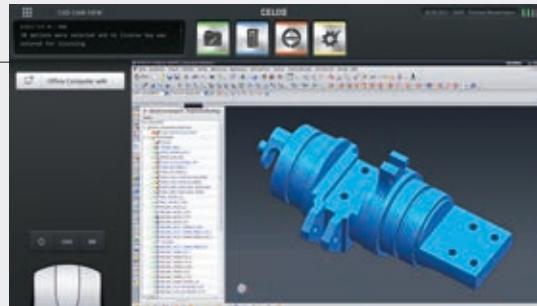
- + Menu guided set-up of the machine and processing of production orders in the dialogue
- + Reliable error prevention thanks to windows-based assistance instructions with a mandatory acknowledgement function



### CAD-CAM VIEW

*Visualise workpieces and improve program data.*

- + Direct remote access to external CAD / CAM workstations
- + Central master data as basis for component viewing
- + Immediate change options for machining steps, NC programs and CAM strategies, directly in the CNC control



## Exclusive, optionally available DMG MORI technology cycles



### MPC – Machine Protection Control

**Protecting machines with an emergency shut-off function**

Vibration sensors on the milling spindle

Emergency shut-off function with teach function

Process monitoring by means of a bar graph

Milling spindle bearing diagnostics



### SGS – Spindle Growth Sensor

**Improved precision by measuring spindle displacement**

Measurement of the axial displacement of the rotor compared to the stator in real time

The CNC control system compensates for the actual displacement



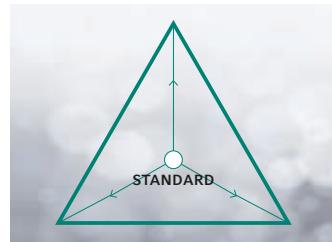
### Grinding

**Machining with the highest surface precision**

Grinding on a universal milling machine

For internal, external and face grinding

Truing cycles for truing the grinding wheel



### ATC – Application Tuning Cycle

**Process optimisation at the push of a button**

Process-oriented feed-drive tuning

Minimised machining time with maximised component quality, even taking into account the workpiece weight



### 3D quickSET®

**Quick and easy for the highest precision**

Toolkit for checking and correcting the kinematic precision of four- and five-axis machine configurations

All head variants and all table axes



### L measuring sensor package

**Enhanced measuring options with the L measuring sensor**

Measurement of pockets and grooves

Measurement in hard-to-reach areas

Measurement of individual points

Package with manual and automatic calibration



### Interpolation turning

**Machining of faces and recesses without a turn-mill table**

The machining process takes place in a circular movement around and inside the workpiece

The spindle is perpendicular to the direction of movement



### Multi-tool

**Save time by efficiently using tools**

Several „sister tools“ on one tool holder

Save tool-changing time and magazine pockets



## Operate 4.5 on Siemens 840D solutionline

- + Highly simplified interactive programming with identical "look and feel" for turning and milling
- + SINUMERIK Operate new user interface
- + ATC\*, 3D quickSET®\*
- + Powerful 32-bit multiprocessor system and controller, 1 GB RAM
- + Fast block processing time of approx. 0.6 ms
- + Look-ahead function for up to 150 NC blocks (capable of parameterisation)
- + Graphic simulation of the machining process with overhead view, triple-plane display and 3D display; synchronised display during the machining process
- + 3D machining, optional 3D tool correction via the surface normal vector
- + DECKEL MAHO Package MDynamics, optional optimisation of surface finish and speed for smoothing surface transitions

\* optional

## Heidenhain TNC 640

- + Unique, highly detailed 3D simulation display
- + New optimised TNC user interface
- + HSCI – Heidenhain Serial Controller Interface
- + Workshop or ISO programming
- + Rapid program generation with plain-text programming
- + Graphic programming
- + Collision monitoring (DCM)
- + ATC\*, 3D quickSET®\*
- + Powerful dual-core processor (Intel i7-3)
- + New optimised ADP movement guide for improved surfaces and quicker machining (block processing time of just 0.5 ms)
- + Dynamic look-ahead function with no line restrictions
- + Adaptive AFC feed controller as standard

\* optional

DMU / DMC 80 P / U / FD duoBLOCK®

## High-end CNCs for safe processes and maximum precision.

Besides Siemens 840D solutionline, the new duoBLOCK® generation is equipped with the new ERGOline® control panel with a 21.5" monitor and CELOS. The 19" ERGOline® panel is available for the Heidenhain TNC 640. Optionally, various exclusive software cycles such as ATC, MPC, 3D quickSET® and DMG Virtual Machine are available, which directly influence either workpiece quality or process optimisation.

DMU / DMC 80 P / U / FD duoBLOCK®

# 4<sup>th</sup> Generation duoBLOCK® – for 30 % more precision, performance and efficiency!

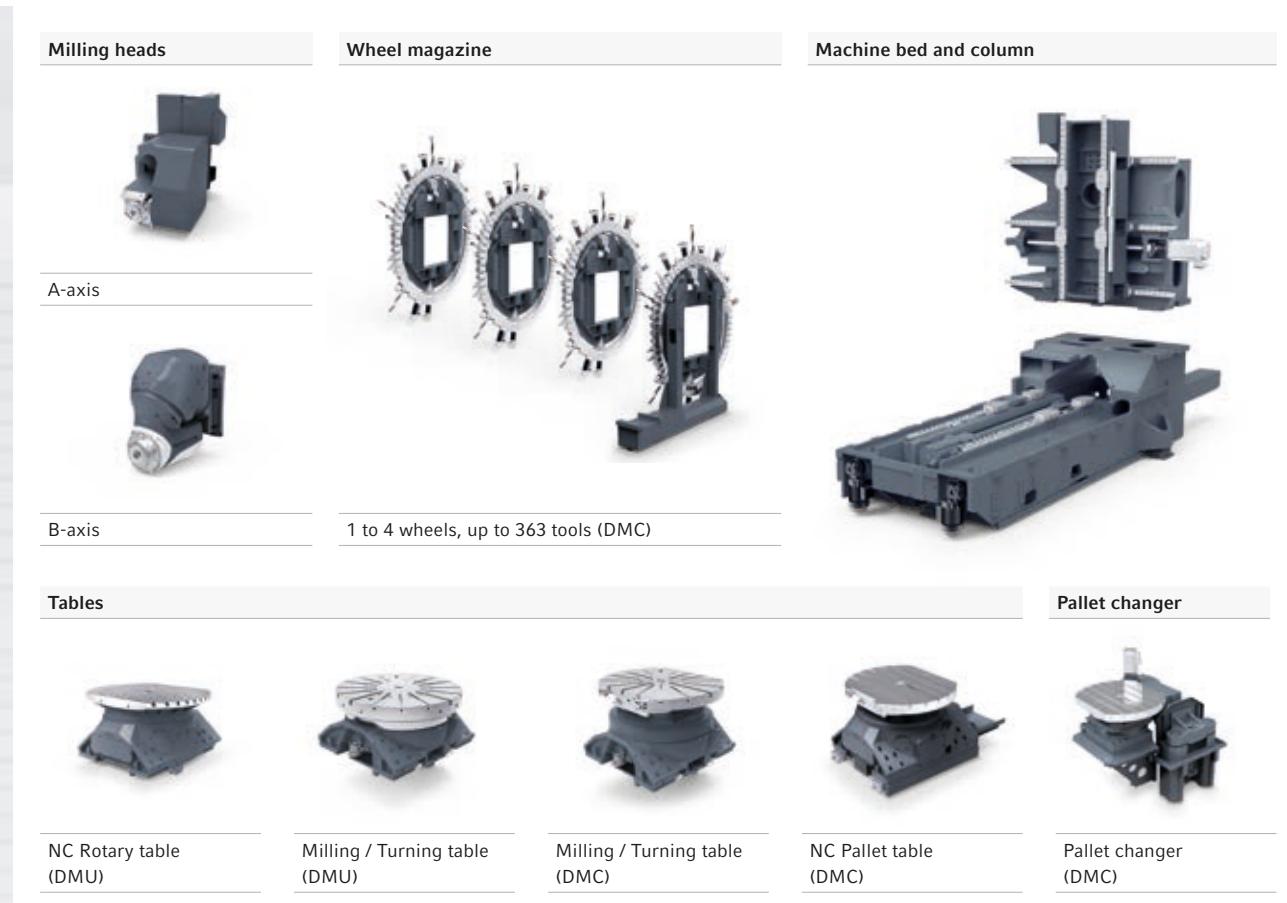
**Highlights:**

- + **Precision:** up to 30 % higher component precision with the fully water-cooled feed drive
- + **Performance:** up to 30 % higher stiffness for maximum cutting performance
- + **Efficiency:** up to 30 % lower energy consumption with intelligent accumulators
- + Highest flexibility and shortest machining times with the new B-axis with 20 % greater stiffness, swivel range of 210° and integrated cable carrier
- + Fast innovative wheel magazine with tool-changing time of 0.5 second and up to 363 tools within a small set-up area
- + Fast pallet changer for in-process set-up as standard
- + Milling and turning in one set-up with DirectDrive table and rotary speed up to 800 rpm



	DMU 80 P duoBLOCK®	DMU 80 FD duoBLOCK®
Travels X / Y / Z	mm	800 / 1,050 / 850
Table size	mm	Ø 900 × 700
Load weight	kg	1,500
Work piece measurements	mm	800 / 1,050 / 850
		Ø 800
		1,300
		1,450
		950
		1,500 kg
		1,450
		950
		1,300 kg

## The duoBLOCK® Series modular design with B-axis as standard equipment.



19



	DMC 80 U duoBLOCK®	DMC 80 FD duoBLOCK®
Travels X / Y / Z	mm	800 / 1,050 / 850
Table size	mm	ø 800 × 630
Load weight	kg	1,400
Work piece measurements	mm	800 / 1,050 / 850
		ø 800 × 630
		1,200
		900
		1,450
		1,400 kg
		900
		1,450
		1,200 kg

Applications and parts

Highlights

Control technology

Overview

**Technical data**

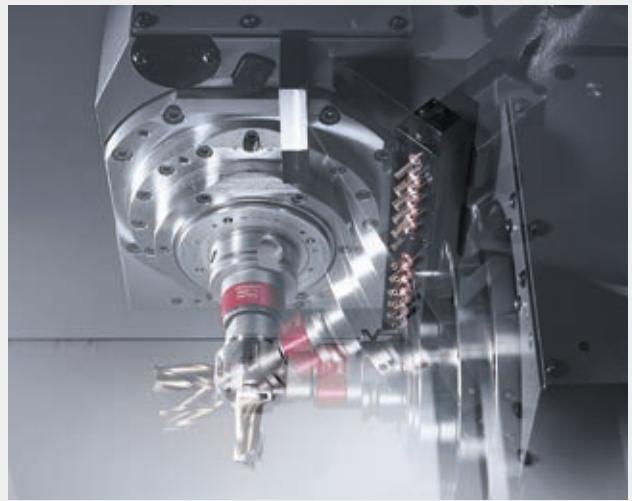
› Tool magazines

› Milling heads

DMU / DMC 80 P / U / FD duoBLOCK®

## Innovative milling heads and intelligent tool management.

20



### A-axis

SK40 / CAT 40 / HSK-A63

-

### A-axis

- + More flexible production of complex shapes thanks to negative angles up to  $-30^\circ$
- + Full use of the X-axis travel for every A-axis angle
- + Optimal interference contour when using angle heads
- + User-friendly axis kinematics thanks to the swivel plane positioned at  $90^\circ$

### B-axis

SK40 / CAT 40 / HSK-A63

SK50 / CAT 50 / HSK-A100

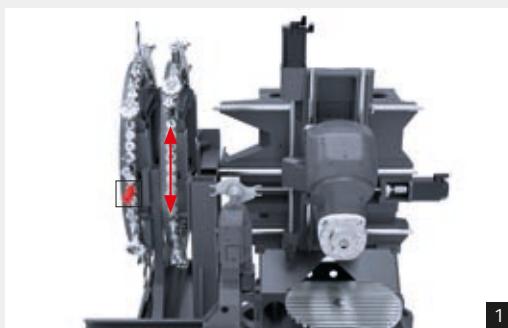
### B-axis

- + Full five-axis milling performance
- + The  $45^\circ$  swivel plane results in a minimal loss of working area
- + Very short overhang / distance from the tool to the guideways in the X-axis
- + Very stiff milling head with good damping and low moments of force thanks to the swivel plane positioned at  $45^\circ$
- + Outstanding milling behaviour regardless of the direction of the machining forces
- + No axis clamping necessary

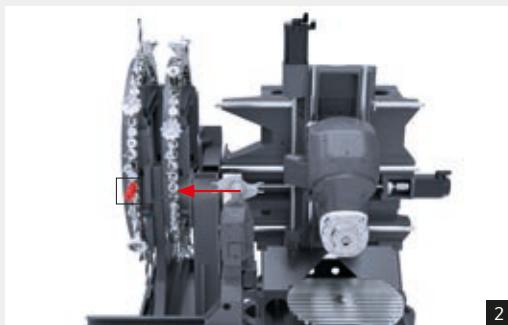
NEW!

	SK40 / HSK-A63				SK50 / HSK-A100			
Number of wheels	1	2	3	4	1	2	3	4
Number of tools	40	63	123	183	273	363	40	63
DMU 80 P / FD	•	◦	◦	—	—	—	◦	◦
DMC 80 U / FD	—	•	◦	◦	◦	◦	◦	◦

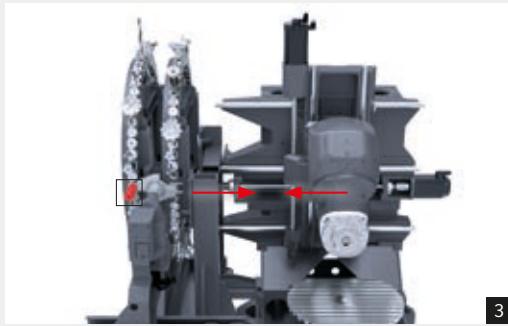
• standard, ◦ optional



1



2



3



4

## Principle of operation

- 1 The selected tool is on wheel 2
- 2 Free path (three empty pockets) for the shuttle on wheel 1 by turning the wheels
- 3 The shuttle (double gripper) travels to the selected tool; lift to release the tool from the holder, shuttle travels to spindle
- 4 Exchange / replacement of the tool and retraction of the double gripper

21

### Maximised tool measurements and tool magazine configurations

SK40 / CAT 40 / HSK-A63	DMU 80 P / FD
Tool holder	SK40 (HSK-A63)*
Magazine type / maximum	123
Measurements (adjacent pockets occupied)	mm
Measurements (adjacent pockets free)	mm
Drilling bar measurements	mm
Weight	kg
Maximum torque	Nm
Chip-to-chip time (HSK)	sec.

SK50 / CAT 50 / HSK-A100	DMU 80 P / FD
Tool holder	SK50 (HSK-A100)*
Magazine type / maximum	123
Measurements (adjacent pockets occupied)	mm
Measurements (adjacent pockets free)	mm
Drilling bar measurements	mm
Weight	kg
Maximum torque	Nm
Chip-to-chip time (HSK)	sec.

\* DMU 80 FD only with HSK-A tool holder, \*\* DMC U / FD



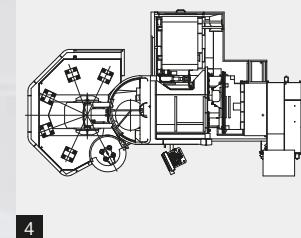
1



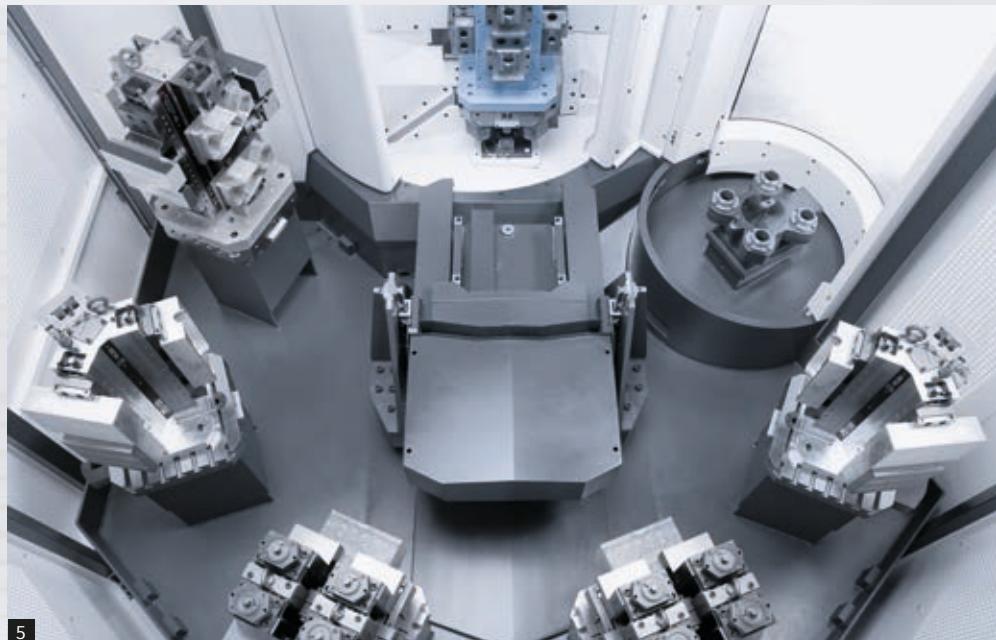
2



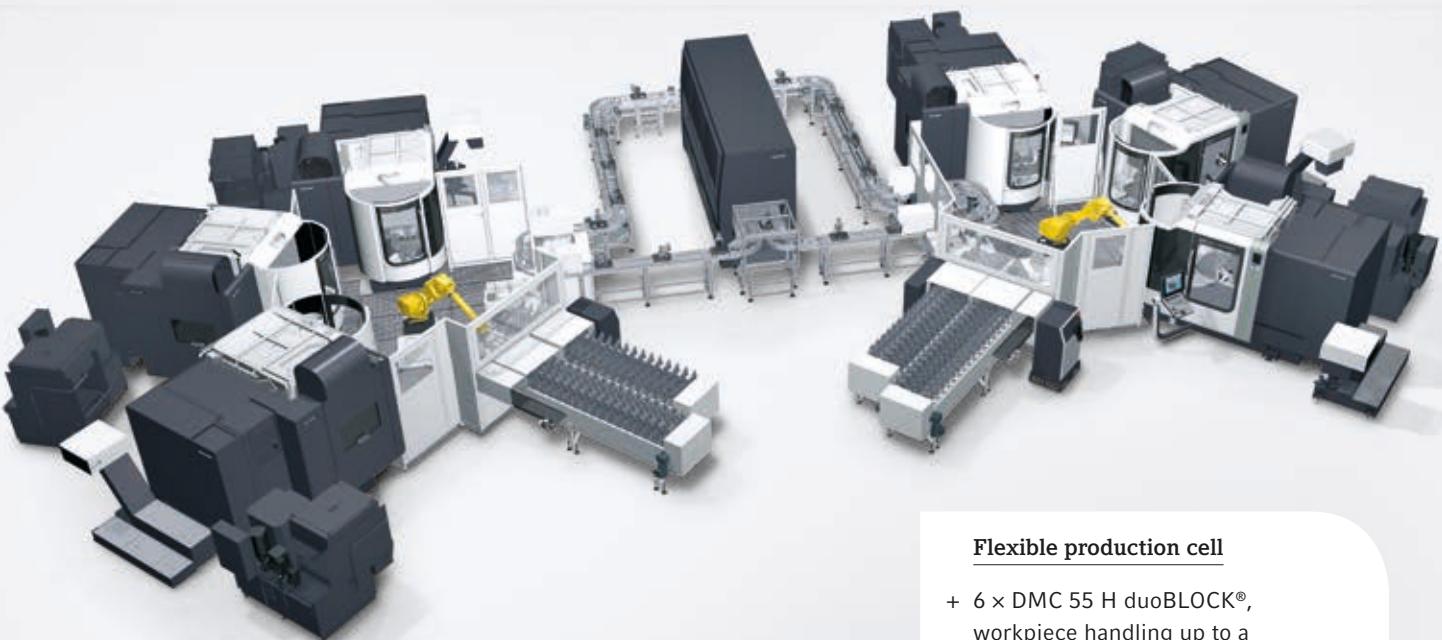
3



4



5



#### Flexible production cell

- + 6 × DMC 55 H duoBLOCK®, workpiece handling up to a maximum of 40 kg
- + Prioritised processing on the next available machine
- + Simultaneous machining of three different components

## duoBLOCK® – The basis for custom automation solutions.

	Workpiece handling Machines with and without pallet changer	Pallet handling Machines without pallet changer	Pallet handling Machines with pallet changer
<b>Automation solutions</b>			
Articulated robotic arms	•	•	•
Portal loader	•	•	•
RS7: 5-pallet rotary storage (7 pallets in the system)	–	–	–
RS12: 10-pallet rotary storage (12 pallets in the system)	–	–	•
Container solutions	–	–	•
Flexible pallet systems (linear storage)	–	–	•
<b>Configuration levels / periphery</b>			
Central tool magazines	•	•	•
Wash	•	•	•
Deburr	•	•	•
Measure	•	•	•
Workpiece marking	•	•	•



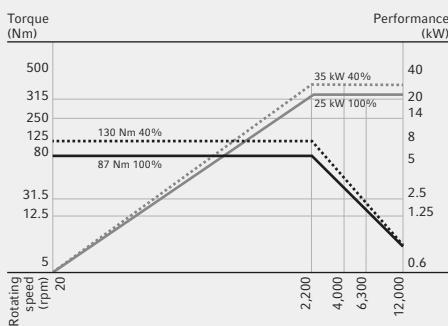
DMU 80 P duoBLOCK®:  
Combined pallet and  
tool handling

## DMU / DMC 80 P / U / FD duoBLOCK®

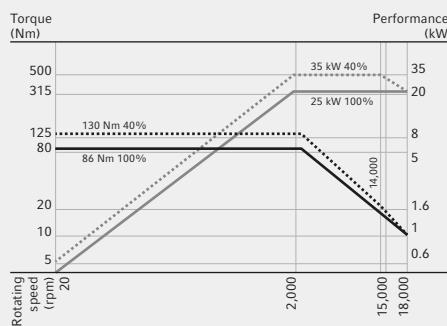
# Performance chart

**SK40 / HSK-A63 motor spindle**

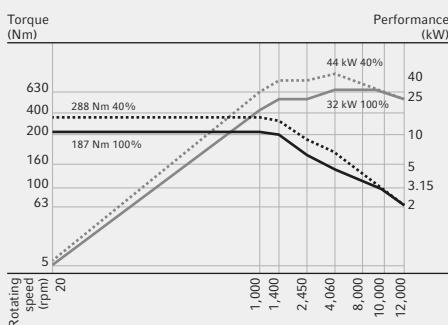
12,000 rpm / 35 kW / 130 Nm

**SK40 / HSK-A63\* motor spindle**

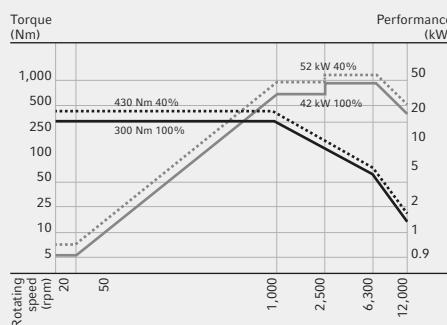
18,000 rpm / 35 kW / 130 Nm

**SK50\* / HSK-A100\* motor spindle**

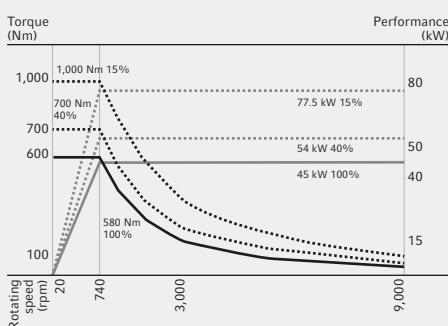
12,000 rpm / 44 kW / 288 Nm

**SK50\* / HSK-A100\* motor spindle**

12,000 rpm / 52 kW / 430 Nm

**powerMASTER SK50 / HSK-A100 motor spindle**

9,000 rpm / 54 kW / 700 Nm

**Spindle range****Speed // tool holder**

Performance (40 % DC), torque (100 % DC)

**Spindle run-up time****12,000 rpm // SK40 / HSK-A63\***

35 / 25 kW, 130 / 86 Nm

0–12,000 rpm: 1.4 sec.

**18,000 rpm // SK40 / HSK-A63\***

35 / 25 kW, 130 / 86 Nm

0–18,000 rpm: 2.2 sec.

**12,000 rpm // SK50 / HSK-A100\***

44 / 32 kW, 288 / 187 Nm

0–12,000 rpm: 3.5 sec.

**12,000 rpm // SK50 / HSK-A100\***

52 / 42 kW, 430 / 300 Nm

0–12,000 rpm: 4.5 sec.

**9,000 rpm // SK50 / HSK-A100\***

77.5\*\* / 54 / 45 kW, 1,000\*\* / 700 / 580 Nm

0–9,000 rpm: 2.2 sec.

\* Option, \*\* 15 % DC (2 min)

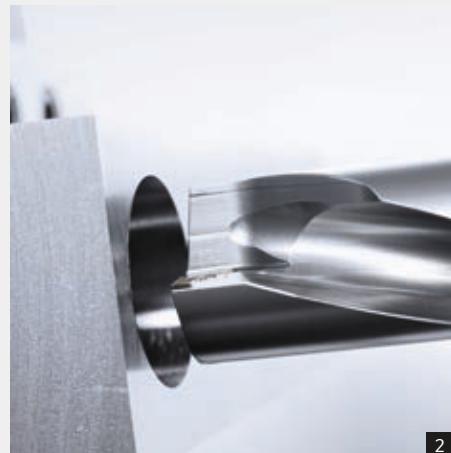


## Universal

With a large spindle range from the 18,000 rpm motor spindle rated at 130 Nm to the new high-performance 9,000 rpm powerMASTER motor spindle rated at up to 1,000 Nm and 77 kW.

## DMU / DMC 80 P / U / FD duoBLOCK®

# High-performance milling, drilling and tapping.



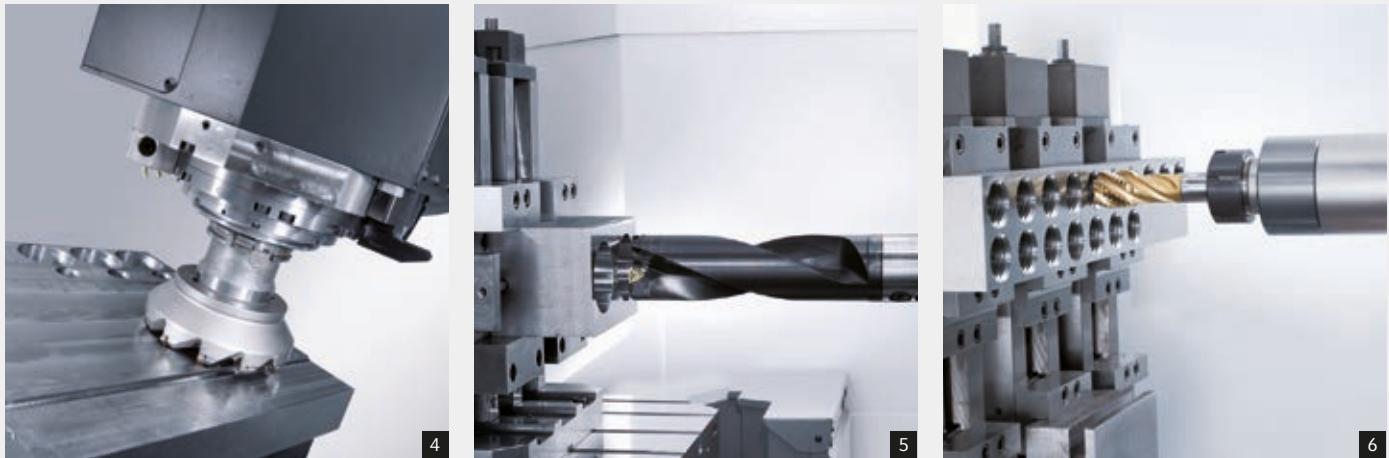
26

## 12,000 rpm / 35 kW / 130 Nm motor spindle

	1 High-performance milling	2 High-performance drilling	3 Tapping
Workpiece material	Steel (Ck45)	Steel (Ck45)	Steel (Ck45)
Material removal rate	224 cm³/min	205 cm³/min	–
Tool	Indexable insert cutter D = 80 (6 inserts)	Modular drill D = 44	Tap M20
Spindle speed	995 rpm (Vc = 250 m/min)	905 rpm (Vc = 125 m/min)	240 rpm (Vc = 15 m/min)
Feed	1,492 mm/min (Fz = 0.25 mm)	135 mm/min (Fz = 0.15 mm)	597 mm/min (Fz = 2.5 mm)
Cutting depth / width	2.5 / 60 mm	70 mm / –	– / –

## 18,000 rpm / 35 kW / 130 Nm motor spindle

	1 High-performance milling	2 High-performance drilling	3 Tapping
Workpiece material	Steel (Ck45)	Steel (Ck45)	Steel (Ck45)
Material removal rate	242 cm³/min	214 cm³/min	–
Tool	Indexable insert cutter D = 80 (6 inserts)	Modular drill D = 44	Tap M24
Spindle speed	995 rpm (Vc = 250 m/min)	905 rpm (Vc = 125 m/min)	80 rpm (Vc = 6 m/min)
Feed	1,611 mm/min (Fz = 0.27 mm)	141 mm/min (Fz = 0.16 mm)	240 mm/min (Fz = 3.0 mm)
Cutting depth / width	2.5 / 60 mm	70 mm	–



#### 12,000 rpm / 44 kW / 288 Nm motor spindle

	<b>4</b> High-performance milling	<b>5</b> High-performance drilling	<b>6</b> Tapping
Workpiece material	<b>Steel (Ck45)</b>	<b>Steel (Ck45)</b>	<b>Steel (Ck45)</b>
Material removal rate	<b>812 cm³/min</b>	<b>708 cm³/min</b>	–
Tool	Indexable insert cutter D = 100 (7 inserts)	Modular drill D = 70	Tap M30
Spindle speed	1,255 rpm (Vc = 394 m/min)	1,023 rpm (Vc = 225 m/min)	106 rpm (Vc = 10 m/min)
Feed	2,900 mm/min (Fz = 0.33 mm)	186 mm/min (Fz = 0.18 mm)	371 mm/min (Fz = 3.5 mm)
Cutting depth / width	3.5 / 80 mm	– / 100 mm	– / –

#### 12,000 rpm / 52 kW / 430 Nm torque spindle

	<b>4</b> High-performance milling	<b>5</b> High-performance drilling	<b>6</b> Tapping
Workpiece material	<b>Steel (Ck45)</b>	<b>Steel (Ck45)</b>	<b>Steel (Ck45)</b>
Material removal rate	<b>1,000 cm³/min</b>	<b>830 cm³/min</b>	–
Tool	Indexable insert cutter D = 160 (9 inserts)	Modular drill D = 80	Tap M42
Spindle speed	1,000 rpm (Vc = 500 m/min)	900 rpm (Vc = 225 m/min)	46 rpm (Vc = 6 m/min)
Feed	1,800 mm/min (Fz = 0.2 mm)	165 mm/min (Fz = 0.183 mm)	207 mm/min (Fz = 4.5 mm)
Cutting depth / width	4.5 / 120 mm	120 mm / –	– / –

#### powerMASTER 9,000 rpm / 77.5\* kW / 1,000\* Nm torque spindle

	<b>4</b> High-performance milling	<b>5</b> High-performance drilling	<b>6</b> Tapping
Workpiece material	<b>Stahl (Ck45)</b>	<b>Steel (Ck45)</b>	<b>Steel (Ck45)</b>
Material removal rate	<b>1,680 cm³/min</b>	<b>900 cm³/min</b>	–
Tool	Indexable insert cutter D = 100 (11 inserts)	Modular drill D = 100	Tap M42
Spindle speed	900 rpm (Vc = 280 m/min)	673 rpm (Vc = 200 m/min)	60 rpm (Vc = 8 m/min)
Feed	14,000 mm/min (Fz = 1.42 mm)	115 mm/min (Fz = 0.18 mm)	270 mm/min (Fz = 4.5 mm)
Cutting depth / width	2 / 60 mm	– / –	– / –

\*15 % DC (2 min)

Applications and parts

Highlights

Control technology

Overview

Technical data

- Example applications
- Technology integration

DMU / DMC 80 P / U / FD duoBLOCK®

## Example applications



**Knuckle – dimensions (unfinished part): 270 x 210 x 320 mm**  
**Machining time: 24 hours, clamping operations: 3**

Sector	Motor sport	Spindle	18,000 rpm
Number of tools	77	Power	35 kW
Material	Aluminium alloy	Torque	130 Nm

Machining focus: Surfaces from 0.4 Ra up to 0.6 Ra, precise position and size tolerance, contains 3 + 2 position machining and full five-axis simultaneous machining



**Chassis components – dimensions: 1,080 x 610 x 210 mm**  
**Machining time: 23 hours, clamping operations: 3**

Sector	Aerospace	Gear-driven	6,300 rpm
Number of tools	21	Power	32 kW
Material	Titanium 10-2-3	Torque	1,100 Nm

Machining focus: Reducing the machining time by 43 %, 5 µm positioning accuracy, high effectiveness of the heavy-duty machining package, very high surface finish of Ra 0.4 µm



**Tube mould – dimensions: 680 x 470 x 335 mm**  
**Machining time: 4 hours 56 min., clamping operations: 2**

Sector	Mould construction	Spindle	12,000 rpm
Number of tools	6	Power	52 kW
Material	Aluminium / C45	Torque	430 Nm

Machining focus: High surface finish of up to Ra 0.35, 3 + 2 axis and five-axis simultaneous machining, two components on the machine



**Mould for manufacturing PET bottles – dimensions: 400 x 360 x 400 mm**  
**Machining time: 86 min., clamping operations: 3**

Sector	Mouldmaking	Spindle	12,000 rpm
Number of tools	62	Power	52 kW
Material	GGG60	Torque	430 Nm

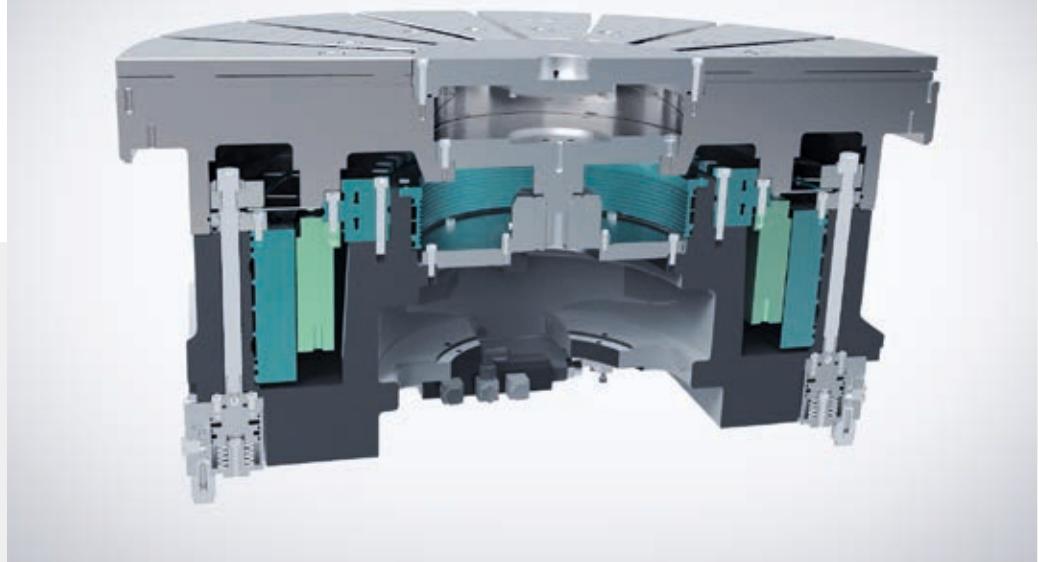
Machining focus: Full machining including in-process measuring with automatic contours and fully automatic serial production by means of a pallet system (FMS) including workpiece loading by a robot



**Drilling head – dimensions: 330 x 40 x 400 mm**  
**Machining time: 18 hours, clamping operations: 1**

Sector	Oil / gas drilling sector	Spindle	12,000 rpm
Number of tools	20	Power	44 kW
Material	21CrNiMo2 (1.6523)	Torque	288 Nm

Machining focus: Reducing machining time by 75 % from 70 hours to 18 hours, machining negative angles with the angle head, surface quality of Ra 1 µm, full machining in one clamping

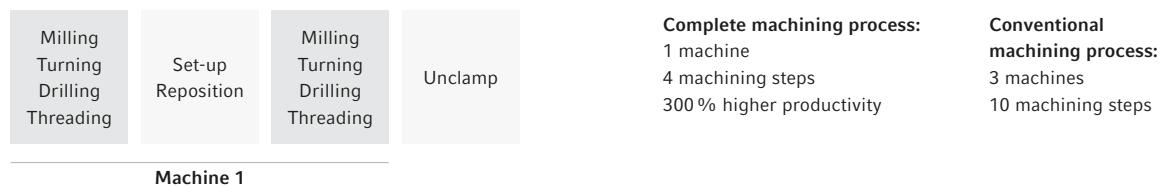


Maximised productivity  
with one-hit machining on  
the DMU 80 FD

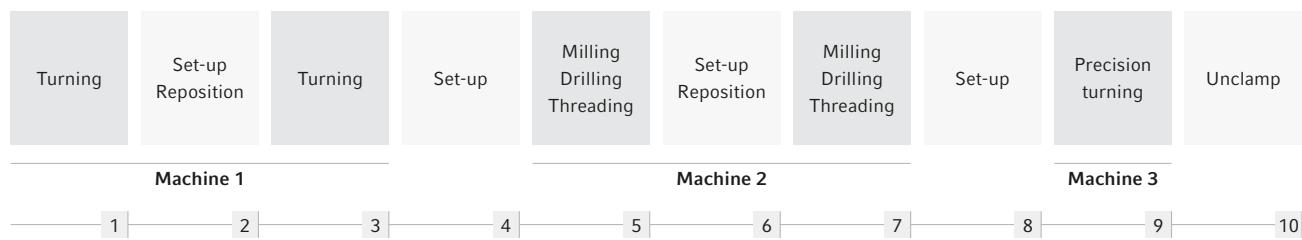
## Fourteen years of turn-mill technology with over 900 machines sold

- + Full machining, including milling and turning, on one machine in a single clamping with Direct Drive technology for up to 800 rpm
- + The strongest turn-mill table in its class, with 2,050 Nm
- + Lower unit costs with the highest precision thanks to faster machining; lower logistics costs thanks to reduced idle times and process steps
- + Exclusive DMG MORI turn-mill cycles
- + Less time needed and higher precision thanks to easy set-up
- + Less investment and lower space requirements with the use of just one machine
- + Oil mist filter and shatterproof safety glass panels as standard
- + Integral tool measurement
- + High workpiece weights of up to 1,300 kg and maximum workpiece diameter of 950 mm
- + Electronic balancing

### DMU / DMC 80 FD – complete machining process



### Single-purpose machines – conventional machining process





1



2



3

1: Turning 2: Tapping  
3: Gear hobbing with standard tools

DMG gearMILL®

## Gear production – complete machining



### Highlights

- + Complete machining on one machine for lower overall investment and space requirements:

**Turning**

**Drilling**

**Gear hobbing**

- + Soft and hard machining
- + Attainable gear quality  
Bevel spur gear DIN ≤ 5  
Spur gear DIN ≤ 6  
(depending on the pitch circle diameter)

DMG gearMILL® software – the software package for various gear production operations



### Highlights of the DMG gearMILL® software

- + **Calculation of the tooth geometry** of spur gears, straight and angular gear teeth, double angular gear teeth (double helical gears), couplings
- + **Calculation of the tooth geometry of bevel spur gears** with straight and angular gear teeth, spiral-toothed, shaft angle even or uneven 90°, with and without offset (hypoid gear)
- + **Calculation of the tooth geometry of worm gears, worm gear-toothed module, ZA flank profile, ZN flank profile, ZI flank profile**
- + **Generation of individual contact patterns**
- + **Individual tooth flank and profile modifications**
- + **Generation of four- and five-axis milling paths**
- + **Generator for 3D measurement data**
- + **Machine simulation**
- + **Quality control on the CNC milling machine with output protocol**
- + **Custom training concept with technology transfer**



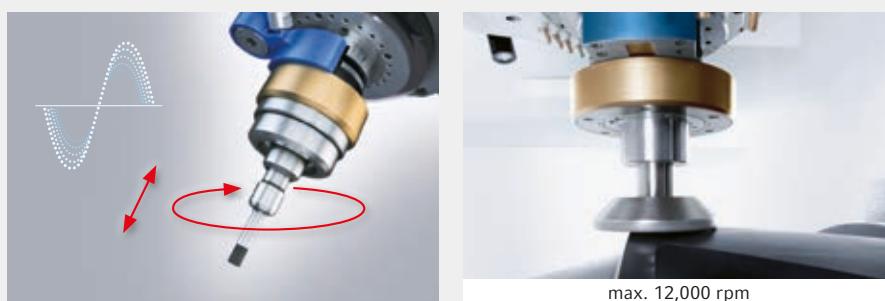
1: Optical component with thin-walled lightweight structures made from Zerodur    2: Si-quartz pump housing  
 3: Silicon nitride camera housing    4: CERP structural element (central console)

#### ULTRASONIC technology integration

## Unbeatable range of materials thanks to ULTRASONICS and milling on one machine.

ULTRASONIC machining is a pioneering technology for the production of complex geometries in high-tech materials which is finding its way into almost every sector with unbelievable speed. Thanks to the kinematic overlapping of the tool rotation with an additional oscillation, high-performance materials which are normally difficult to machine can be economically processed to the highest quality. The low process forces allow for the production of thin walls and result in longer tool service life and significantly reduced micro-cracks in the material. Depending on the material properties, outstanding surface finishes of  $Ra < 0.1 \mu\text{m}$  can be achieved.

### The operating principle – flexible ULTRASONICS integration via HSK



#### Advantages of ULTRASONICS

- + Reduced process forces for outstanding surface finishes  $Ra < 0.2 \mu\text{m}$ , minimised micro-cracks in the material, longer tool service life
- + Up to two times higher removal rates compared to conventional grinding processes
- + The cutting edge sharpens itself thanks to micro-splinters in the diamond grains
- + Optimised particle removal in the active zone

	HSK-A63	HSK-A100
Maximum milling speed rpm	24,000	12,000
Maximum ULTRASONIC speed rpm	18,000	8,000
Tool interface	ER 20 H7 shrink fit	ER 20 H7 shrink fit
easySONIC Control (automatic ULTRASONIC frequency detection)	○	○

○ optional

[Applications and parts](#)[Highlights](#)[Control technology](#)[Overview](#)**Technical data**[Options](#)[Floor plans](#)**DMU / DMC 80 P / U / FD duoBLOCK®**

# Technical data / Options

		<b>DMU 80 P / FD dB®</b>	<b>DMC 80 U / FD dB®</b>
<b>Working area</b>			
X-, Y- and Z-axes	mm	800 × 1,050 × 850	800 × 1,050 × 850
<b>Distance from spindle centre to table</b>			
Horizontal milling head	mm	50 to 900	50 to 900
Vertical milling head	mm	-300 to 750	-300 to 750
<b>Distance from spindle nose to table</b>			
Horizontal milling head	mm	-200 to 850	-200 to 850
Vertical milling head	mm	150 to 1,000	150 to 1,000
<b>Table / Workpiece mounting surface / Workpieces</b>			
NC rotary table	rpm	40	40
Table size	mm	Ø 900 × 700	Ø 800 × 630
Maximum table load	kg	1,500	1,400
Turn-mill table	rpm	800	800
Table size	mm	Ø 800	Ø 800 × 630
Maximum table load	kg	1,300	1,200
<b>NC-controlled swivelling milling head (B-axis)</b>			
Swivel range (0 = vertical / 180 = horizontal)	Degrees	-30 to 180	-30 to 180
Rapid traverse and feed	rpm	30	30
<b>Five-axis options</b>			
NC-controlled swivelling milling head (A-axis)		•	•
Swivel range (0 = vertical / -90 = horizontal)	Degrees	-120 / +10	-120 / +10
Rapid traverse and feed	rpm	30	30
<b>Main drive</b>			
Integrated SK40 motor spindle (turn-mill: HSK-A63)	rpm	12,000	12,000
Power (40 / 100 % DC)	kW	35 / 25	35 / 25
Torque (40 / 100 % DC)	Nm	130 / 86 (FD: 111 / 77)	130 / 86 (FD: 111 / 77)
<b>Tool changer</b>			
Tool holder		SK40	SK40
Tool magazine wheel	Pockets	40 (63 / 123)	63 (123 / 183 / 273 / 363)
<b>Linear axis (X / Y / Z)</b>			
Feed speed, rapid traverse speed	m/min	60	60
Acceleration	m/s²	7	7
Feed force	kN	13 / 13 / 9	13 / 13 / 9
P max. (X / Y / Z) – VDI DGQ 3441 / ISO-230-2	µm	5	5
P smax. (X / Y / Z) – VDI DGQ 3441 / ISO-230-2	µm	4	4
<b>Machine data</b>			
Space requirements of base machine plus chip conveyor, without internal coolant supply	m²	18.7	21.4
Machine height (standard machine)	m	3.1	3.4
Machine weight	kg	15,500	18,000

	<b>DMU 80 P / FD dB®</b>	<b>DMC 80 U / FD dB®</b>
<b>Table options</b>		
Clamping hydraulics 2 / 4 for working table and set-up station	●	●
<b>Tool holder</b>		
HSK-A63 / BT40 / CAT40 HSK-A for turn-mill machines as standard	●	●
HSK-A100 / BT50 / CAT50 HSK-A for turn-mill machines as standard	●	●
<b>Automation / Measurement / Monitoring</b>		
3D quickSET®	●	●
Infrared measuring sensor: Heidenhain TS640 / Renishaw PP60 (OMP 60)	●	●
Tool measurement in the working area, Blum Laser NT hybrid	●	●
Mechanical tool breakage detection in the tool magazine	●	●
Combined tool measurement in the working area, laser system for milling tools, 3D scanner for turning tools	(FD) ●	(FD) ●
Four-colour signal lights	●	●
<b>Coolants / Chip disposal</b>		
Production package with 600 litre coolant unit, paper band filter, 40 bar internal coolant supply	Standard	–
Production package with 980 litre coolant unit, paper band filter, 40 bar internal coolant supply	●	Standard
80 bar internal coolant supply frequency-controlled	●	●
Temperature control for the 600 / 980 litre internal coolant supply system	●	●
Coolant gun with 1-bar pump, 40 litres per minute	●	●
Minimum quantity lubrication through the spindle and through nozzles externally	●	●
Oil and emulsion mist delivery equipment	●	●
Air cooling through the spindle	●	●
<b>Optional Heidenhain TNC 640 control systems</b>		
Application Tuning Cycle ATC	●	●
Electronic TNC 640 hand wheel	●	●
Control console for tool magazine loading station	●	●
Active Chatter Control ACC	●	●
<b>Optionen Siemens 840D solutionline operate</b>		
Electronic Siemens 840D hand wheel	●	●
Control console for tool magazine loading station	●	●
DECKEL MAHO Package MDynamics	●	●
<b>General options</b>		
Shatterproof safety glass viewing panels	●	●
Operating mode 4 "Process monitoring in production"	●	●
Package for increased precision	●	●

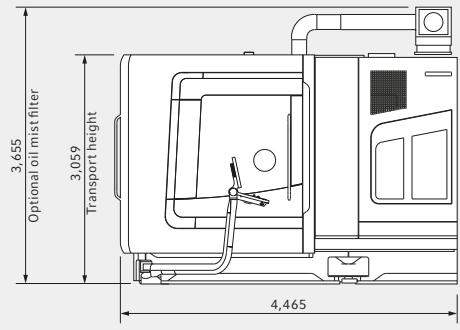
● optionally available

**DMU / DMC 80 P / U / FD duoBLOCK®**

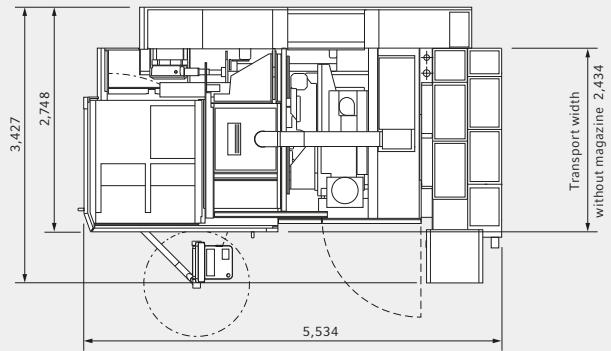
## Floor plans

**DMU 80 P / FD duoBLOCK® floor plan**

Side view

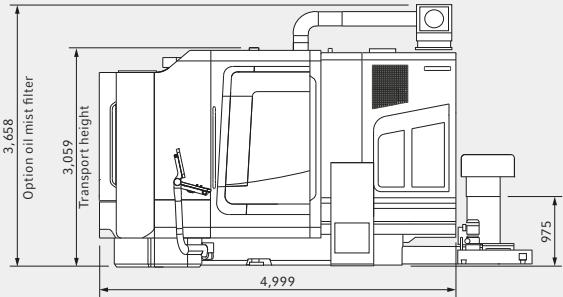


Top view with wheel magazine, 40 pockets

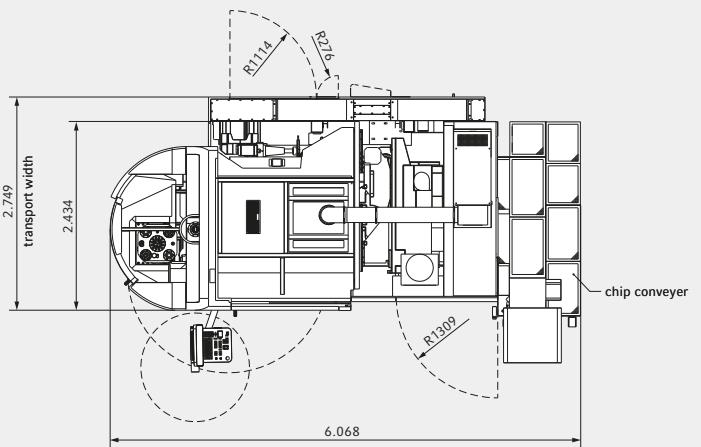


**DMC 80 U / FD duoBLOCK® floor plan**

Side view



Top view with wheel magazine, 63 pockets



B-axis with  
20 % more  
stiffness



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