Simultaneous 5-axis Machining

+ Integrated swivel rotary table with large-diameter bearings on the B and C axes achieves machining of heavy workpieces with superb accuracy
+ Swivel rotary table with large B-axis swivel ranges of up to 115° (−5° to +110°) enables a complex workpiece to be machined in one clamping
+ No. 40 taper spindle with a rapid traverse rate of 24 m/min (78.7 fpm) and maximum rotational speed of 20,000 min⁻¹ offers high-speed high-precision cutting

Optimal Space Efficiency

+ Excellent accessibility to the machining area, outstanding chip disposal, vertical walls, and large machining area in a compact body
+ Improved visibility to the machining area with new large glass windows

The Latest Operating System

+ 21.5” multi-touch screen allows for quick access to any application from the home screen
+ Customizable user authentication function enables individual setting of access privileges to the control unit and the machine (with internal USB memory)
DMU 50

Entry-level model for simultaneous 5-axis machining combining cutting-edge technology and functionality

Developed as an entry-level model for simultaneous 5-axis control machining, the DMU 50 is the ideal machine capable of high-accuracy, high-efficiency machining of complex workpieces. The model achieves highly dynamic performance that pushes the envelope of entry-level machines and delivers unmatched workability and operability with rapid traverse rates of up to 24 m/min (78.7 fpm) and spindle speeds of up to 20,000 min⁻¹; a compact machining area with good visibility; outstanding accessibility to the machining area; and the operating system CELOS with a multi-touch screen. The DMU 50 with the cutting-edge technologies responds to a wide variety of demand at every shop floor.
DMU 50:
5-axis control machining center that goes beyond the conventional concept of entry-level machines, with outstanding milling ability utilizing cutting-edge technologies and excellent operability achieved with the operating system CELOS

1. Swivel rotary table for simultaneous 5-axis machining
2. Powerful milling with the 20,000 min\(^{-1}\) spindle
3. Excellent accessibility to the machining area
The latest technologies to achieve 5-axis machining in a compact body

Thanks to the swivel rotary table, machining of a complex workpiece can be completed in up to two processes. It requires fewer fixtures, resulting in cost savings and improved workpiece accuracy. Large swivel ranges of up to $115^\circ$ (-5$^\circ$ to +110$^\circ$) make it possible to produce undercuts of up to 20$^\circ$.

DMU 50 with Cross-slide Design:
In combination with the polymer concrete bed, the cross-slide design with the optimally ribbed robust cast iron components provides maximum stability to achieve superb accuracy and surface quality.
1. **Heavy workpiece**
   The integrated swivel rotary table which employs large-diameter bearings on the rotary axes achieves high accuracy machining of heavy workpieces.

2. **Space-saving design**
   Outstanding accessibility to the machining area, excellent chip disposal due to steep walls, and the large machining area in a compact footprint.

3. **Tool magazine**
   Tool storage capacity: 30 tools / 60 tools*

4. **Direct scale feedback system from Magnescale**
   Ensures reliable quality and perfect machined surface.

5. **No. 40 taper spindle for high-speed cutting**
   15,000 min⁻¹ / 20,000 min⁻¹ spindles offer high-speed cutting.

6. **Superb accuracy**
   Achieved with the polymer concrete bed, integrated swivel rotary table and roller guides with wider guideways.

   + **Travel**
     - X-axis: 500 mm (19.7 in.)
     - Y-axis: 450 mm (17.7 in.)
     - Z-axis: 400 mm (15.7 in.)
     - B-axis (Integrated swivel rotary table): -5°—+110°
     - C-axis (Integrated swivel rotary table): 360°

   + **Rapid traverse rate**
     - X-, Y-, Z-axis: 24 m/min (78.7 fpm)

   + **Machine size (except operation panel)**
     - Width: 2,197 mm (86.5 in.)
     - Depth: 2,264 mm (89.1 in.)
     - Height: 2,802 mm (110.3 in.)
DMU 50

Unbeatable precision due to magnetic measuring system with 0.01 μm resolution.

- Superior precision with the Magnescale absolute linear measuring system featuring a standard resolution of 0.01 μm
- High-resolution, magnetic measuring system
- Resistance to oil and condensation due to a magnetic detection principle
- Impact resistance of 350 m/s² (13,779.5 in./s²)
- Vibration resistance of 150 m/s² (5,905.5 in./s²)
- Thermal expansion coefficient as cast iron

Direct measuring system from Magnescale

+ X-, Y-, and Z-axis, B-, C-axis

ATC, Tool magazine

Reliable ATC

The ATC arm equipped with a holding lever for securing a tool tightly holds a long and heavy tool, offering reliable tool change.

Tool magazine

<table>
<thead>
<tr>
<th>Tool storage capacity</th>
<th>Tool attaching / detaching device (Option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 tools</td>
<td>Tools in the magazine can be attached / detached by lever operation</td>
</tr>
<tr>
<td>60 tools (Option)</td>
<td>Tools in the magazine can be attached / detached by lever operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool attaching / detaching device (Option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools in the magazine can be attached / detached by lever operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool detaching device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools in the magazine can be detached by button operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Holding lever</th>
</tr>
</thead>
</table>
Peripheral equipment

Coolant / Air blast switching (Option)

Spindle coolant effective for cooling the machining point and extending tool life is offered as standard, while the air blast system ideal for blowing away cutting chips adhering to the tool tip, removing dust or foreign matter during in-machine measurement and removing cutting chips in dry machining is available as an option. Coolant / air blast switching is possible with this specification.

In-machine measuring system <Table> (Option)

Tool length measurement / Tool breakage detection <Magnescale>

Highly reliable contactless magnetic type detector requiring low measuring load to enable measurement of small diameter tools.

- Repeatability: 1 µm or less
- Dust-proof and waterproof performance IP67
- Service life 5 million times
- Measuring capacity 0.6 ± 0.2 N

Tool length / diameter measurement / Tool breakage detection <Renishaw>

3D touch type tool measuring system that can measure tool length and diameter and detect tool breakage of a wide range of tools.

- Repeatability: 1 µm or less
- Dust-proof and waterproof performance IPX8
- Service life 1 million times
- Measuring capacity 1.3 ~ 2.4 N

Laser type tool measurement <BLUM>

Tool length and diameter can be measured at the spindle speed during machining. (Sphere center of ball end mill is measurable.) Contactless sensor detects tool wear along tool nose R shape of ball end mill, so that tool nose is not damaged during measurement.

- Repeatability: 1 µm or less
- Dust-proof and waterproof performance IP68
- Minimum measuring tool diameter 170 µm

* Results under the specified measuring and environmental conditions
Peripheral equipment

**Rotary axis measurement function (Option)**

The spindle sensor measures the position of the ball placed on the table to measure and correct the position error of the rotary axis center.

- **Position error of the rotary axis center**
- **Deterioration in machining accuracy**
- **Correction required**

**C-axis measurement**

![C-axis measurement diagram](image)

**B-axis measurement**

![B-axis measurement diagram](image)

**External chip conveyor (Option)**

**Scrapper type (Inner pan type)**

A high-performance external conveyor with excellent chip disposal capability. It handles both long and short chips on one unit.
Improved workability, Maintenance

Accessibility to spindle / table

Excellent accessibility to the spindle and the workpiece makes setup operations easy.

Distance from the front of the cover to the spindle

227 mm (8.9 in.)

+ Outstanding accessibility to spindle / table
+ Almost no interference, large machining area
+ Excellent visibility to the machining area
(large windows at the machine front and side)

Loading / unloading by crane

The opening at the machine ceiling allows for smooth setups by crane. The ceiling shutter can be opened / closed by hand.

Replacement of spindle unit

By changing the spindle unit to a cartridge, which even includes the rear bearings, we have dramatically reduced replacement time.

Daily maintenance & inspection

The devices and equipment requiring frequent inspection are placed in an easy-to-access location to facilitate maintenance / inspection. Also, the lubricating oil supply port is located at the bottom of the machine for easy oil supply.
CELOS from DMG MORI enables consistent administration, documentation and visualization of order, process and machine data. 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 visualization of orders, including NC program, equipment, etc.

**JOB ASSISTANT**
Process-defined orders
+ Menu guided set-up of the machine and conversational processing of production orders
+ Reliable error prevention thanks to windowsbased assistance instructions with a mandatory acknowledgement function

**CAD-CAM VIEW**
Visualize 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 system
ERGOline Control with 21.5-inch multi-touch-screen and FANUC

STANDARD
Standard user interfaces for all new high technology machines from DMG MORI

CONSISTENT
Consistent administration, documentation and visualization 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 50

High-Performance Operating System
MAPPS IV

MAPPS IV is a high-performance, smart operation system mounted on CELOS. It enables operators to easily control machine operation with touch operation.
Conversational automatic programming function

This function allows users to create programs simply by following the guidance on the screen. Much of the programming process has been simplified due to the minimal key entry required for even the most complex shapes.

3D interference checking function

Checks for interference in 3D for spindles, tables, tools, workpieces and fixtures. Since the machine will stop when interference is detected either in manual or in automatic mode, we have achieved the world’s safest system against interference.

- The 3D interference checking function will check for interference accurately as long as the 3D model exactly matches the actual configuration of the spindles, tables, tools, workpieces and fixtures.
- If you need special modifications to the machine model data (internal covers, spindle, table with the standard design) for an interference check, please consult our sales representative.
- A cutting simulation that shows how material is removed as machining proceeds cannot be carried out during a 3D interference check.
DMU 50

Environmental performance

To conserve limited resources and protect global environment.
The DMU 50 pursues a high "environmental performance" that is required of machine tools.

Power-saving Functions

Energy-efficient Components
The latest, energy-efficient components with low power consumption and LED lighting are employed.

Visualization of Energy-saving Effect and Power-saving Setting

The energy-saving application of CELOS enables visualization of the energysaving effect. The running time, power consumption, and CO₂ emission statuses are displayed individually.

Running time

Power consumption

CO₂ emissions
DMU 50

General view

Front view

Plan view
# DMU 50

## Main Machine Specifications

<table>
<thead>
<tr>
<th>Travel</th>
<th>DMU 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis travel (longitudinal movement of saddle) mm (in.)</td>
<td>500 (19.7)</td>
</tr>
<tr>
<td>Y-axis travel (cross movement of ram) mm (in.)</td>
<td>450 (17.7)</td>
</tr>
<tr>
<td>Z-axis travel (vertical movement of spindle head) mm (in.)</td>
<td>400 (15.7)</td>
</tr>
<tr>
<td>Distance from table surface to spindle gauge plane (horizontal table position) mm (in.)</td>
<td>150–550 (5.9–21.7)</td>
</tr>
<tr>
<td>B-axis travel</td>
<td>-5°—+110°</td>
</tr>
<tr>
<td>C-axis travel</td>
<td>360°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Table working surface mm (in.)</td>
<td>φ630×500 (φ24.8×19.7)</td>
</tr>
<tr>
<td>Table loading capacity kg (lb.)</td>
<td>300 (660)</td>
</tr>
<tr>
<td>Max. workpiece swing diameter mm (in.)</td>
<td>φ540 (φ21.2)</td>
</tr>
<tr>
<td>Max. workpiece height mm (in.)</td>
<td>445 (17.5)</td>
</tr>
</tbody>
</table>

| Spindle                                      |                         |
| Max. spindle speed min⁻¹                     | 15,000 (20,000)         |

| Feedrate                                     |                         |
| Rapid traverse rate mm/min (ipm)             | X, Y, Z: 24,000 (944.9) |
| Cutting feedrate (With AI contour control) mm/min (ipm) min⁻¹ | X, Y, Z: 24,000 (944.9) |
| Cutting feedrate (Without AI contour control) mm/min (ipm) min⁻¹ | B, C: 20                |

| ATC                                          |                         |
| Type of tool shank                           | BT40 (HSK-A63)          |
| Tool storage capacity mm (in.)               | 30 (60)                 |
| Max. tool diameter (With adjacent tools / Without adjacent tools) mm (in.) | 80 / 130 (3.1 / 5.1)   |
| Max. tool length mm (in.)                    | 300 (11.8)              |
| Max. tool mass kg (lb.)                      | 8 (17.6)                |
| Tool-to-tool sec.                            | 1.5                     |
| Tool changing time (chip-to-chip) sec.       | 30 tools specification: 4.6 [60 tools specification: 5.2] |
| Cut-to-cut sec.                              | 30 tools specification: 6.2 (Max.) / 5.2 (Min.) [60 tools specification: 18.2 (Max.) / 5.9 (Min.)] |

| Motors                                        |                         |
| Spindle drive motor min⁻¹ kW (HP)             | 37 / 18.5 (50 / 24.7) <15%ED / cont> |
| [20,000 min⁻¹ (High-speed)] kW (HP)           | (37 / 18.5 (50 / 24.7) <15%ED / cont>] |

| Machine size                                  |                         |
| Machine height mm (in.)                       | 2,802 (110.3) <at shipment: 2,521 (99.3)> |
| Floor space <width X depth> mm (in.)          | 2,197×2,264 (86.5×89.1) <30 tools: excluding chip conveyor, operation panel> |
| Mass of machine kg (lb.)                      | 5,530 (12,166)          |

| Control unit                                  |                         |
| FANUC                                        |                         |

1 Option. ISO: International Organization for Standardization
JIS: Japanese Industrial Standard
1 The time differences are caused by the different conditions <travel distances, etc> for each standard.
2 Depending on the arrangement of tools in the magazine, the cut-to-cut (chip-to-chip) time may be longer.
3 Without ATC shutter
- Max. spindle speed: Depending on restrictions imposed by the workpiece clamping device, fixture and tool used, it may not be possible to rotate at the maximum spindle speed.
- ANR: ANR refers to a standard atmospheric state, i.e., temperature at 20°C (68°F), absolute pressure at 101.3 kPa (14.7 psi), and relative humidity at 65%.
- Power sources, machine size: the actual values may differ from those specified in the catalogue, depending on the optional features and peripheral equipment.
- Compressed air supply: Please be sure to supply clean compressed air (<air pressure: 0.7 MPa (101.5 psi), pressure dew point: 10°C (50°F) or below>.
- A criterion capacity to select a compressor is 90 L/min (23.8 gpm) per 0.75 kW (1 HP).

However, this figure may differ depending on the type of compressors and options attached. For details, please check the compressor specifications.
- The information in this catalog is valid as of November 2016.
# DMU 50

## Main Standard & Optional Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Standard</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spindle</strong></td>
<td>BT40</td>
<td></td>
</tr>
<tr>
<td>Type of tool shank</td>
<td>CAT40</td>
<td>o</td>
</tr>
<tr>
<td></td>
<td>HSK-A63</td>
<td>o</td>
</tr>
<tr>
<td>15,000 min⁻¹ (High-speed)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>20,000 min⁻¹ (High-speed)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td><strong>Magazine</strong></td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Tool storage capacity</td>
<td>30 tools</td>
<td>o</td>
</tr>
<tr>
<td></td>
<td>60 tools</td>
<td>o</td>
</tr>
<tr>
<td><strong>Coolant</strong></td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Coolant gun</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Through-spindle coolant system (Separate type)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Center through</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>1.5 MPa (Water-soluble)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>3.5 MPa (Water-soluble)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Interface &lt;1.5 MPa (217.5 psi), Ogura clutch&gt;</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Interface &lt;3.5 MPa (507.5 psi), Ogura clutch&gt;</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td><strong>Chip disposal</strong></td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Chip conveyor (Scraper type (Inner pan type))</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td><strong>Coolant/Air blast switching</strong></td>
<td></td>
<td>o</td>
</tr>
<tr>
<td><strong>Measurement</strong></td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>In-machine measuring system (table)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Touch sensor (Renishaw)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Touch sensor (Magnescale)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Touch sensor (Blum)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>In-machine measuring system (spindle)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Optical type touch sensor PP60 (Renishaw)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Rotary axis measurement function*³</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Signal light</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>4 layers (LED type red, yellow, green, blue)</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td>Manual pulse generator (separate type)</td>
<td></td>
<td>o</td>
</tr>
</tbody>
</table>

* DMQP (DMG MORI Qualified Products)
*¹ Oil-based coolant cannot be used for the mist collector AFS-1600. When using oil-based coolant, select HVS-220.
*² Available only when oil-based coolant is used.
*³ The optical touch sensor (RENISHAW) must be selected.

⚠️ Flammable coolant such as oil-based coolant has a high risk of ignition, and will cause fire or machine breakage if ignited.

If you have to use a flammable coolant for any reason, please be sure to consult our sales representative.

The information in this catalog is valid as of November 2016.
Specifications, accessories, safety device and function are available upon request. Some options are not available in particular regions. For details, please consult our sales representative.
<Precautions for Machine Relocation>

**EXPORTATION:**

All contracts are subject to export permit by the Government of Japan. The Customer shall comply with the laws and regulations of the exporting country governing the exportation or re-exportation of the Equipment, including but not limited to the Export Administration Regulations. The Equipment is subject to export restrictions imposed by Japan and other exporting countries and the Customer will not export or permit the export of the Equipment anywhere outside the exporting country without proper government authorization.

To prevent the illegal diversion of the Equipment to individuals or nations that threaten international security, it may include a "Relocation Machine Security Function" that automatically disables the Equipment if it is moved following installation. If the Equipment is so-disabled, it can only be re-enabled by contacting DMG MORI or its distributor representative. DMG MORI and its distributor representative may refuse to re-enable the Equipment if it determines that doing so would be an unauthorized export of technology or otherwise violates applicable export restrictions.

DMG MORI and its distributor representative shall have no obligation to re-enable such Equipment. DMG MORI and its distributor representative shall have no liability (including for lost profits or business interruption or under the limited service warranty included herein) as a result of the Equipment being disabled.

+ DCG, DDM, ORC, speedMASTER, powerMASTER, SX-torqueMASTER, ZEROCHIP, CELOS, ERGOline, SLIMline, COMPACTline, DMG MORI SMARTkey, DMG MORI gearMILL and 3D quickSET are trademarks or registered trademarks of DMG MORI CO., LTD. in Japan, the USA and other countries.

+ If you have any questions regarding the content, please consult our sales representative.

+ The information in this catalog is valid as of November 2016. Designs and specifications are subject to changes without notice.

+ The machines shown in the catalog may differ from the actual machines. The location and the size of the nameplates may also differ from the actual machines, or the nameplates may not be attached to some machines.

+ DMG MORI is not responsible for differences between the information in the catalog and the actual machine.