VC 430 / VC 510
High Productivity Vertical Machining Center

Doosan Machine Tools
Optimal Solutions for the Future
VC 430 / VC 510

VC 430 / VC 510 is designed for high-speed and superior precision machining in a production environment. VC430/VC510’s powerful drives, heavy cutting, column-moving, and unsurpassed rigidity provide exceptional precision and high productivity.

- **Belt driven**
  - 10000 r/min
  - 6000 r/min* (VC 510 only)

- **Swiveling operator’s panel**

- **Pallet**
  - Large pallet dimensions

- **Spindle head cooling system**

- **Large capacity coolant tank with chip pan and box filter**

- **Improved screen filter**
High Productivity Vertical Machining Center

Direct-couple driven
12000 r/min

Dual contact spindle
(BBT40)

Work light for set-up

Roller type LMG
Improved rapid traverse with roller type LMG.

CAM type ATC
ISO #40, 7/24 TAPER
ATC time : 1.3s (T-T-T)
- 30 Tools
- 40 Tools

VC 430 model
High Speed

High speed spindle of high quality and rigidity increases the machine's efficiency and performance.

**Spindle Head**

The spindle is mounted directly to the Fanuc spindle motor for faster acceleration and deceleration, and to reduce vibration during high speed operation. The powerful 18.5kW (24.8Hp) spindle motor drives the 40 taper tools at speeds up to 10000 r/min.

**Belt Driven**

- **10000 r/min**
- **6000 r/min**

* : VC 510 only

**Direct-Coupled Driven**

- **12000 r/min**

**Spindle Head Cooling System**

The refrigerated spindle cooling system circulates cooling oil to maintain a constant temperature for high accuracy, regardless of the ambient temperature or cutting conditions.

Note) Provided as an standard feature in case of 10000 & 12000 r/min.

**Dual Contact (Big plus)**

The dual contact system offers simultaneous dual contact between the machine spindle face and tool holder flange face.
Minimized Non Cutting Time

Suitable for high productivity.

Tool Magazine

The 30 station, automatic tool changer accepts 40 taper tooling. Its reliable double arm system provides a 1.3 second tool-to-tool times. ATC has a bi-directional magazine that automatically takes the shortest path.

30 station

40 station

Automatic Tool Changer

Sophisticated mechanisms that significantly reduce non-cutting time.

Tool-to-tool: 1.3 s, Chip-to-chip: 4.3 s

Tool change time (T-T-T) 1.3 s
Tool change time (C-T-C) 4.3 s

Dual Indexing Pallet (APC)

The automatic 180 degree indexing pallet table is an integral part of the VC 430 / VC 510. The table mechanism is mounted directly to the bed of the machine on a horizontal plane to enhance the table rigidity. Because the table is stationary during machining, the non-cutting side of the indexing table can be set-up while the workpiece is being machined on the machine side. As an added feature, rotary table cables and work holding hoses can be run down from the sheet metal wall.

<table>
<thead>
<tr>
<th>Model</th>
<th>VC 430</th>
<th>VC 510</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallet change time</td>
<td>5 s</td>
<td>5.5 s</td>
</tr>
<tr>
<td>Pallet loading capacity</td>
<td>2-300 kg (2-661.4 lb)</td>
<td>2-350 kg (2-771.6 lb)</td>
</tr>
<tr>
<td>Pallet size</td>
<td>2-712 × 475 mm (2-28.0 × 18.7 inch)</td>
<td>2-860 × 570 mm (2-33.9 × 22.4 inch)</td>
</tr>
</tbody>
</table>
**High Rigidity**

Stable bed and column assemblies are designed for high speed and heavy duty machining.

**Rigid Body**

The one piece bed is a rigid, heavily ribbed, Meehanite casting that remains stable under the heaviest cutting conditions. Fine grained Meehanite cast iron is used for its excellent vibration absorbing characteristics. The VC 430 / VC 510 features a superior traveling column design. The table, and therefore the workpieces, remains stationary during machining. This design provides a uniform load to the guideways, ball screws and motors.

**Travel Axes (X/Y/Z)**

<table>
<thead>
<tr>
<th></th>
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<th>VC 510</th>
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<tr>
<td>X-axis</td>
<td>560 / 430 / 570 mm (22.0 / 16.7 / 22.4 inch)</td>
<td>762 / 516 / 570 mm (30.0 / 20.3 / 22.4 inch)</td>
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**Rapid Traverse**

Linear motion guideways and high speed servo motors apply high rapid axis movement. This reduces non-cutting time and machining time for greater productivity.

**Interface for Additional Equipment**

- An additional hydraulic unit may be required according to rotary table specifications.
- Recommended rotary table size

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<tr>
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<th>VC 510</th>
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<tbody>
<tr>
<td>X-axis unit</td>
<td>40 (1574.8)</td>
<td>40 (1574.8)</td>
</tr>
<tr>
<td>Y-axis unit</td>
<td>40 (1574.8)</td>
<td>40 (1574.8)</td>
</tr>
<tr>
<td>Z-axis unit</td>
<td>36 (1417.3)</td>
<td>32 (1259.8)</td>
</tr>
</tbody>
</table>

**Connection Example of Additional Axis Interface**

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**Connection Example of Fixture Interface**

**Fixture check list (for hydraulic / pneumatic fixtures)**

- **Pressure source**
  - Hydraulic
  - P/T
  - A/B
  - Pneumatic
  - P/T
  - A/B
- **Number of ports**
  - 1 pair (2-PT 3/8” port)
  - 2 pair (4-PT 3/8” port)
  - 3 pair (6-PT 3/8” port)
  - 4 pair (8-PT 1/4” port)

**Hydraulic power unit**

- Supply scope : □ User □ Doosan
  (Please check the below detail specification, if you want Doosan to supply.)
- Use Doosan standard unit 24 L/min (6.3 gal/min) / 50 bar
- Special requirement _______ L/min (gal/min) at _______ MPa (psi)

**Contact Doosan for more information**
Advanced Performance & Units

Coolant System

The large capacity coolant tank is located on rollers. The coolant tank is isolated from the machine bed to prevent heat transfer and associated thermal distortion. Providing high volume flood coolant as a standard feature.

Through Spindle Coolant

The large-scale cutting oil pump and tank are located away from the machine’s main body to prevent heat transfer. The pump generates 60 HZ power when measured at the pump outlet. The main axis cutting oil device (T-S-C) is available as an option.

Coolant Chiller

The coolant chiller lowers coolant temperature, helping to cool both the workpiece and tool during the machining operation. When using insoluble cutting oils, a coolant chiller is recommended to cool heated oil and preserve machining precision.

Flood Coolant

The large-scale cutting oil pump and tank are located away from the machine’s main body to prevent heat transfer. The pump generates 60 HZ power when measured at the pump outlet. The main axis cutting oil device (T-S-C) is available as an option.

Lubrication

A lubrication system provides automatic lubrication to all guideways and ball screws. The way oil is delivered by piston distributors which precisely meter the volume. A low level alarm prevents the machine from restarting.

Rigid Tapping

A standard rigid tapping function allows synchronized, high-speed tapping with a standard collet chuck. This eliminates the need for special tap holders. The tapping depth can be accurately controlled.

Operating Panel

1. Swivelling operating console
   An easy-to-use operation panel which can swivel from 0-90°

2. The ATC operating button is accessible from the main panel.
   This can give much easier operation and maintenance for ATC.

3. Portable MPG
   Portable MPG makes a workpiece setting easier for the operator.

Magazine : CW
Magazine : CCW

Coolant tank

Coolant chiller
Machining Capacity

Provides high productivity and high accuracy in a variety of machining operations.

**Face mill** Carbon steel (SM45C)
- ø80mm (3.15 in.) Face mill (6Z)

- Machining rate: 432 cm³/min (26.4 in³/min)
- Spindle speed: 1500 r/min
- Feedrate: 2700 mm/min (106.3 ipm)

**Face mill** Gray casting (GC25)
- ø80mm (3.15 in.) Face mill (6Z)

- Machining rate: 691 cm³/min (42.2 in³/min)
- Spindle speed: 1500 r/min
- Feedrate: 3600 mm/min (141.7 ipm)

**Face mill** Aluminum (AL6061)
- ø80mm (3.15 in.) Face mill (6Z)

- Machining rate: 1785 cm³/min (109 in³/min)
- Spindle speed: 1500 r/min
- Feedrate: 5580 mm/min (219.7 ipm)

**End mill** Carbon steel (SM45C)
- ø30mm (1.2 in.) Endmill (6Z)

- Machining rate: 36 cm³/min (2.2 in³/min)
- Spindle speed: 222 r/min
- Feedrate: 80 mm/min (3.1 ipm)

**U-drill** Carbon steel (SM45C)
- Machining rate: 172 cm³/min (10.5 in³/min)
- Spindle speed: 750 r/min
- Feedrate: 84 mm/min (3.3 ipm)

**Tap** Carbon steel (SM45C)
- Tool: M30 x P3.5

- Machining rate: 64 mm (2.52 in.)
- Feedrate: 5 mm (0.2 in.)

Machining Accuracy

For increased repeatability and reliability.

Designed for exceptionally high accuracy and minimal thermal displacement and vibration.

**Roundness**
- 6.0 μm
  - Model: VC 430 / VC 510
  - Material: A7075F
  - Tool: Endmill ø12mm (ø0.5 in.) (4 blades)

**Roughness**
- Ra 0.2 μm
  - Spindle speed: 10000 r/min
  - Feedrate: 1500 mm/min (59.1 ipm)

*Machining results may differ from those shown here, reflecting differences in environmental and machining conditions.*
External Dimensions

VC 430

Top View

Front View

Side View

VC 510

Top View

Front View

Side View

Table

VC 430

VC 510

Tool Shank

BT40

* Pull Stud installation required with 15 degrees as the standard
Machine Specifications

<table>
<thead>
<tr>
<th>Features</th>
<th>Unit</th>
<th>VC 430</th>
<th>VC 510</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis (longitudinal movement of table)</td>
<td>mm (inch)</td>
<td>560 (22.0)</td>
<td>762 (30.0)</td>
</tr>
<tr>
<td>Y-axis (cross movement of saddle)</td>
<td>mm (inch)</td>
<td>430 (16.9)</td>
<td>516 (20.3)</td>
</tr>
<tr>
<td>Z-axis (vertical movement of spindle head)</td>
<td>mm (inch)</td>
<td>570 (22.4)</td>
<td></td>
</tr>
<tr>
<td>Distance from spindle nose to table top</td>
<td>mm (inch)</td>
<td>150<del>720 (5.9</del>28.3)</td>
<td>210<del>780 (8.3</del>30.7)</td>
</tr>
<tr>
<td>Distance from spindle center to column guideway</td>
<td>mm (inch)</td>
<td>495 (19.5)</td>
<td>530 (20.9)</td>
</tr>
<tr>
<td><strong>Feedrate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid traverse rate (X / Y / Z)</td>
<td>m/min (ipm)</td>
<td>40 / 40 / 36 (1574.8 / 1574.8 / 1417.3)</td>
<td>40 / 40 / 32 (1574.8 / 1574.8 / 1259.8)</td>
</tr>
<tr>
<td>Cutting feedrate</td>
<td>mm/min (ipm)</td>
<td>18000 (708.7)</td>
<td>16000 (629.9)</td>
</tr>
<tr>
<td><strong>Table</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pallet size</td>
<td>mm (inch)</td>
<td>2-712 x 475 (2-28.0 x 18.7)</td>
<td>2-860 x 516 (2-33.9 x 20.3)</td>
</tr>
<tr>
<td>Pallet loading capacity</td>
<td>kg (lb)</td>
<td>2-300 (2-661.4)</td>
<td>2-350 (2-771.6)</td>
</tr>
<tr>
<td>Max. workpiece height</td>
<td>mm (inch)</td>
<td>460 (18.1)*</td>
<td>520 (20.5)</td>
</tr>
<tr>
<td>Pallate surface</td>
<td>-</td>
<td>2-29-M16 x P2.0</td>
<td>42-M16 x P2.0 Taper</td>
</tr>
<tr>
<td>Max. spindle speed</td>
<td>r/min</td>
<td>10000 (12000)</td>
<td>10000 (6000, 12000)</td>
</tr>
<tr>
<td>Spindle taper</td>
<td>-</td>
<td>ISO #40 &amp; 24 Taper</td>
<td></td>
</tr>
<tr>
<td>Max. spindle torque</td>
<td>N-m (ft-lb)</td>
<td>117.7 (167.6) (86.9 (123.7))</td>
<td>117.7 (191.1, 167.6) (86.9 (141.0, 123.7))</td>
</tr>
<tr>
<td><strong>Automatic tool changer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of tool shank</td>
<td>-</td>
<td>MAS403 BT40</td>
<td></td>
</tr>
<tr>
<td>Tool storage capacity</td>
<td>ea</td>
<td>30 (40)</td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter</td>
<td>mm (inch)</td>
<td>80 (3.2) (3.0)</td>
<td>125 (4.9)</td>
</tr>
<tr>
<td>Max. tool diameter without adjacent tools</td>
<td>mm (inch)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm (inch)</td>
<td>220 (8.7)** / 300 (11.8)**</td>
<td></td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>kg (lb)</td>
<td>8 (17.6)</td>
<td></td>
</tr>
<tr>
<td>Tool change time (tool-to-tool)</td>
<td>s</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Tool change time (chip-to-chip)</td>
<td>s</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td><strong>Automatic pallet changer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pallet</td>
<td>ea</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pallet change time</td>
<td>s</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle motor (30min.)</td>
<td>kW (Hp)</td>
<td>18.5 (24.8) (10000, 12000 r/min)</td>
<td>15 (20.1) (6000 r/min)</td>
</tr>
<tr>
<td>Feed motor (X / Y / Z)</td>
<td>kW (Hp)</td>
<td>4.0 / 4.0 / 4.0 (5.4 / 5.4 / 5.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Power source</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric power supply (rated capacity)</td>
<td>kVA</td>
<td>40.3 (10000, 12000 r/min)</td>
<td>35.1 (6000 r/min)</td>
</tr>
<tr>
<td>Compressed air supply</td>
<td>MPa</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td><strong>Tank capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant tank capacity</td>
<td>L (gallon)</td>
<td>300 (79.3)</td>
<td>420 (111.0)</td>
</tr>
<tr>
<td>Lubrication tank capacity (available)</td>
<td>L (gallon)</td>
<td>2 (0.53)</td>
<td></td>
</tr>
<tr>
<td><strong>Machine Dimensions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine dimension (L x W x H)</td>
<td>mm (inch)</td>
<td>2960 x 2370 x 3110 (116.5 x 93.3 x 122.4)</td>
<td>3260 x 2580 x 3250 (128.3 x 101.6 x 127.9)</td>
</tr>
<tr>
<td>Machine weight</td>
<td>kg (lb)</td>
<td>7800 (17196)</td>
<td>9200 (20282.2)</td>
</tr>
</tbody>
</table>

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**Standard Feature**
- APC guard for safety
- ATC guard for safety
- Assembly & operation tools
- Coolant tank & chip pan
- Door interlock
- Full enclosure splash guard
- Installation parts
- Signal tower (red, yellow, green)
- Spindle head cooling system
- Rigid tapping
- Work light

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**Optional Feature**
- 4th axis preparation
- Automatic front door
- Automatic power off
- Automatic tool measurement
- Automatic workpiece measurement
- Chip conveyor & chip bucket
- Hydraulic line for work fixture system
- Oil skimmer
- Pneumatic line for work fixture system
- Rotary table
- Shower coolant
- Test bar
- Through spindle coolant

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*The specifications and information above-mentioned may be changed without prior notice.*
*For more details, please contact Doosan.*
NC Unit Specifications

DOOSAN Fanuc i series

**AXES CONTROL**
- Controlled axes: 3 (X, Y, Z)
- Simultaneous controlled axes: Positioning (G00) / Linear interpolation (G01): 3 axes, Circular interpolation (G02, G03): 2 axes
- Backlash compensation
- Follow up
- Least command increment: 0.001mm (0.0001 inch)
- Least input increment: 0.001mm (0.0001 inch)
- Machine lock: all axes / 2 axes
- Mirror image: Reverse axis movement (setting screen and M-function)
- Stored pitch error compensation
- Pitch error offset compensation for each axis
- Stored stroke check 1
- Overtravel controlled by software
- Absolute pulse coder

**INTERPOLATION & FEED FUNCTION**
- 2nd reference point return: G30
- Circular interpolation: G02, G03
- Cylindrical interpolation: G07.1
- Dwel: G04
- Exact stop check: G09, G61 (mode)
- Feed per minute
- Feedrate override (10% increments): 0 - 200 %
- Helical interpolation
- Jog override (10% increments): 0 - 200 %
- Linear interpolation: G01
- Manual handle feed: 1 unit
- Manual handle feedrate: 0.1 / 0.01 / 0.001 mm
- Override cancel: M48 / M69
- Positioning: G00
- Rapid traverse override: F0 (fine feed), 25 / 50 / 100 %
- Reference point return: G27, G28, G29
- Skip function: G31

**SPINDLE & M-CODE FUNCTION**
- M-code function: M 3 digits
- Spindle orientation
- Spindle serial output
- Spindle speed command: 55 digits
- Spindle speed override (10% increments): 10 - 150 %

**TOOL FUNCTION**
- Tool nose radius compensation: G40, G41, G62
- Number of tool offsets: 400 ea
- Tool length compensation: G43, G44, G69
- Tool life management
- Tool number command: T2 digits
- Tool offset memory C: Geometry / Wear and Length / Radius offset memory
- Tool position offset: G45, G46

**PROGRAMMING & EDITING FUNCTION**
- Absolute / Incremental programming: G90/G91
- Automatic Coordinate system setting
- Background editing
- Canned cycle: G73, G74, G76, G80 - G89, G99
- Circular interpolation by radius programming
- Custom macro B
- Addition of custom macro common variables: #100 - #199, #500 - #999
- Decimal point input
- Extended part program editing

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- Extended part program editing

**OPTIONAL SPECIFICATIONS**
- Additional controlled axes: 4 axes in total
- AICC II (AI Contour Control II) with Hardware: 200 block preview
- Fast Data server
- Fast Ethernet
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EN 140829SU

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