HC 400 / 500
High Performance Horizontal Machining Center
High Performance Horizontal Machining Center

High Speed, Precision and Highly Efficient, Space Saving Machine Offers Excellent Productivity. Get precision and reliability for a wide range of automation application and machining of any material. Combined with advanced technology feature to provide exceptional values.

HC 400 / 500
The high speed 8000 r/min 40 taper spindle is a true cartridge type unit supported by four precision class P4 high speed bearings which are permanently greased and lubricated. The spindle is driven by a high torque 18.5 kW A.C. motor delivering an impressive 235.5 N⋅m on HC 400.

Max. spindle speed
8000 r/min
{10000 r/min}

Motor (15 min)
18.5 kW
{26 kW}

Max. spindle torque
235.5 N⋅m (15 min) HC 400
353.4 N⋅m (5 min) HC 500

Oil cooler
A refrigerated spindle cooling system circulates cooling oil to maintain a constant temperature for high accuracy, regardless of the ambient temperature or cutting conditions.
The ATC is composed of tool magazine and change arm. The tools are selected by a fixed address method that follows the shorter path. All tools are returned to the pots from which they were originally taken so that collision problems involving large-sized tools need to be considered only once when they are first mounted.

**Automatic tool changer**

**Tool change time**

1.5 s *(T-T-T)*

Sophisticated mechanisms drastically reduce non-cutting time.

**Tool storage capacity**

40 tools

{Opt: 60/120/170/262}

The ATC is composed of tool magazine and change arm. The tools are selected by a fixed address method that follows the shorter path. All tools are returned to the pots from which they were originally taken so that collision problems involving large-sized tools need to be considered only once when they are first mounted.

- Tool driving mechanism
- Servo type
The possibility that chips might degrade the meshing accuracy of the pallet positioning mechanism increases at higher machining speeds. On the HC 400 and HC 500 strong jets of air are discharged from the tapered cones when a pallet is changed to clean any chips from the cones and assure accurate pallet positioning.

**Pallet change time**

8.0 s (HC 400)

8.5 s (HC 500)

<table>
<thead>
<tr>
<th></th>
<th>HC 400</th>
<th>HC 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallet size</td>
<td>400×400mm</td>
<td>500×500mm</td>
</tr>
<tr>
<td>Max.workpiece size</td>
<td>Ø 600×H 800mm</td>
<td>Ø 800×H 900mm</td>
</tr>
<tr>
<td>Max.workpiece weight</td>
<td>400 kg</td>
<td>500 kg</td>
</tr>
</tbody>
</table>
The machine is designed to build rigidity into a stable body. The construction of the machine was thoroughly examined from the stage of basic design to ensure consistent high-speed and high-accuracy operation. The deformation of the bed when subject to a load at the center was simulated to secure high level rigidity against bending. The HC400 and HC500 have a design with a basic structure using FEM advanced technology.

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Travel Axes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC400</td>
<td>600/560/565 mm</td>
</tr>
<tr>
<td>HC500</td>
<td>850/700/750 mm</td>
</tr>
</tbody>
</table>

**Guideways and Axis Drives**

The feed mechanism adopts heavy duty linear motion roller guideways that provide superior acceleration/deceleration performance to reduce non-cutting time.

**Rapid traverse**

<table>
<thead>
<tr>
<th>Model</th>
<th>Rapid Traverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC400</td>
<td>40 m/mim</td>
</tr>
<tr>
<td>HC500</td>
<td>40 m/mim</td>
</tr>
</tbody>
</table>

HC Series with oversized AC servo drives power through the toughest cuts in the toughest metal. The high torque servos are coupled directly to the ball screws. With no gears there is no risk of backlash or servo drag.
Chip Disposal

Separate chip conveyor and coolant tank provide easy cleaning and maintenance. A telescopic cover, inclined at a 30° angle, directs chips into the chip sliding cover to keep the area around the table clean. From the sliding cover, chips are flushed onto the chip conveyor by the screw conveyors to make quick and easy work of chip removal.

Chip conveyor (Option)

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Steel</th>
<th>Cast</th>
<th>Aluminum and nonferrous metals</th>
<th>Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge type</td>
<td>○</td>
<td>×</td>
<td>X</td>
<td>×</td>
</tr>
<tr>
<td>Scraper type</td>
<td>×</td>
<td>○</td>
<td>△</td>
<td>○</td>
</tr>
<tr>
<td>Drum filter type</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

○: Available  ×: Unavailable  △: Asking for information

Some types of chips may not be completely removed from the chip conveyor.
Contact Doosan for more information.

Chip conveyor (Option)

Hinge type

Scraper type

Drum filter type

Contact Doosan Infracore for more information
**Ergonomic and Eco-Friendly Design**

**Easy setup**

**Distance to table**

- HC 400: 380 mm
- HC 500: 500 mm

**Height to table**

- HC 400: 1130 mm
- HC 500: 1160 mm

**Collection of waste lubrication oil**

Less waste lubrication oil extends the life time of the coolant water and cut down the grime and offensive smell of the machine inside.

**No coolant leakage**

Rigorously designed, manufactured and tested machine covers do not permit coolant leakage in any condition. The factory always keeps our environment clean.

**Adjustable thin operator’s panel**

**Oil skimmer (opt.)**

Another suggestion to prolong the life time of the coolant water. A belt-driven type oil skimmer picks up and removes waste oil from the coolant tank that is easily drained.
Flexible Multi Pallet System

- High Productivity & availability
- Flexible production solutions
- High efficiency system
- Compact designed technology
- Easy to extend stations (7,9,11,13st)

Application of multi pallet system

<table>
<thead>
<tr>
<th>Name</th>
<th>HC 500 (2 sets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Setup Station</td>
<td>1</td>
</tr>
<tr>
<td>Storage Capacity (500 x 500)</td>
<td>18 cells</td>
</tr>
</tbody>
</table>

Application technology of Multi-pallet system is the best solution for the high productivity in the machining shop.
Cutting Performance
Guarantees high-productivity and high-accuracy in a variety of machining operations

**HC 400**

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face mill</td>
<td>Carbon steel (SM45C)</td>
</tr>
<tr>
<td>Drill</td>
<td>Gray casting (GC25)</td>
</tr>
<tr>
<td>Tap</td>
<td>Gray casting (GC25)</td>
</tr>
</tbody>
</table>

**Machining rate**

- **HC 400**
  - Face mill: 380 cm³/min
  - Drill: 210 mm/min
  - Tap: M30 × P3.5

**Feedrate**

- **HC 400**
  - Face mill: 1500 r/min, 1200 mm/min
  - Drill: 250 r/min
  - Tap: 320 r/min, 1120 mm/min

**Tool**

- **HC 400**
  - Face mill: Ø80 Face mill (5Z)
  - Drill: Ø37 Drill (2Z)
  - Tap: Ø38.5 Drill (2Z)

**Cutting Performance**

Guarantees high-productivity and high-accuracy in a variety of machining operations

**HC 500**

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face mill</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Drill</td>
<td>Gray casting (GC25)</td>
</tr>
<tr>
<td>Tap</td>
<td>Gray casting (GC25)</td>
</tr>
</tbody>
</table>

**Machining rate**

- **HC 500**
  - Face mill: 2318 cm³/min
  - Drill: 100 mm/min
  - Tap: M30 × P3.5

**Feedrate**

- **HC 500**
  - Face mill: 2390 r/min, 6900 mm/min
  - Drill: 125 r/min
  - Tap: 320 r/min, 1120 mm/min

**Tool**

- **HC 500**
  - Face mill: Ø80 Face mill (5Z)
  - Drill: Ø49 Drill (2Z)
  - Tap: Ø38.5 Drill (2Z)
Standard Features

- Flood coolant
- Operator call lamp (red/yellow/green)
- FANUC 21i-MB controller
- Portable MPG
- Work light
- APC operator’s panel
- Rigid tapping
- Oil cooler
- Screw conveyor

HC 400 / 500
Optional Equipment

- Multi pallet system
- Linear scale feedback system
- Built in Rotary Table (0.001")
- Chip conveyor / Bucket
- T-slot pallet
- Shower coolant
- Tool monitoring system
- Test bar
- Air gun
- Hydraulic line for fixture
- HSK tooling
- Rear side chip conveyor

- 120 Tools
- Automatic tool length measurement with sensor
- Automatic measuring system
- FMS
- Through the spindle coolant
- Coolant chiller
- Hyd. cooling / Heating device
- Center bush
- Automatic power off
- Matrix Magazine (170 Tools)
High compact CNC is realized through LCD display with integrated CNC and a flash memory card interface is standard features.

Provides many support functions for set-ups, such as tool measurement, workpiece measurement at the original point, and workpiece measurement inside the machine.

Uses one display screen to perform all operations including programming, checking by animation, and real machining.

User-Friendly Operation : Soft key Selection of Comprehensive Cycle Library

Guide for machining preparation

In preparation for machining, simple instructions on a selected screen allow to measure the setting error of workpiece and tool offset value for automated adjustment.
Tool Monitoring System (Opt.)

Tool Monitoring System is one of safety functions to protect Tool and Spindle against a possible damage of abnormal load caused by tool wear and breakage or others. This system monitors the tool status during machine operation by detecting the abnormal load of each axis and spindle.

- The screen shows a tool and pallet No., load meter of each axis and spindle limit load.
- This functions consisted of tool pre-check function, substitutive tool selection with tool life management and different tool & port number command function.

Easy operation system
One single screen provides handy operation guidance for programming through machine operation.

- For machining center, turning center and compound machine with milling and turning.
- Solid modeling provides high speed animation. (TFT-LCD Color Only)
- Icon menu soft-keys provide convenient programming for sophisticated milling and turning.
- Measurement cycles provide automatic offset measurement of workpiece (Available for machining center and for compound machine).

Machining condition selecting function
One single screen provides convenient operation & parameter setting for high speed and high precision machining instructions.

- Registration of parameter sets for high speed machining and/or for high precision machining with machine configurations.
- Instruction of precision level for desired machining selects appropriate parameters automatically.
- Precision level can be instructed through NC program.
External Dimensions

HC 400

Front View

Top View

Side View

HC 500

Front View

Top View

Side View
## Machine Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>HC 400</th>
<th>HC 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis (column longitudinal)</td>
<td>600</td>
<td>850</td>
</tr>
<tr>
<td>Y-axis (head vertical)</td>
<td>560</td>
<td>700</td>
</tr>
<tr>
<td>Z-axis (pallet table cross)</td>
<td>565</td>
<td>750</td>
</tr>
<tr>
<td>Distance from spindle center to pallet top</td>
<td>50 - 610</td>
<td>50 - 750</td>
</tr>
<tr>
<td>Distance from spindle nose to table center</td>
<td>150 - 715</td>
<td>150 - 900</td>
</tr>
<tr>
<td>Pallet size</td>
<td>400 x 400</td>
<td>500 x 500</td>
</tr>
<tr>
<td>Pallet loading capacity</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Pallet surface</td>
<td>24 - M16 x P2.0</td>
<td></td>
</tr>
<tr>
<td>Pallet index degree</td>
<td>1° [0.001&quot;]</td>
<td></td>
</tr>
<tr>
<td>Max. spindle speed</td>
<td>8000</td>
<td>10000</td>
</tr>
<tr>
<td>Spindle taper</td>
<td>ISO #40, 7/24 Taper</td>
<td></td>
</tr>
<tr>
<td>Max. spindle torque</td>
<td>235.5 [165.5]</td>
<td>353.4 [165.5]</td>
</tr>
<tr>
<td>Rapid traverse rate (X/Y/Z)</td>
<td>40/40/40</td>
<td>20000</td>
</tr>
<tr>
<td>Tool storage capacity</td>
<td>40 [60/120/170/262]</td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter</td>
<td>ø75</td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter without adjacent tools</td>
<td>ø140</td>
<td></td>
</tr>
<tr>
<td>Max. tool length</td>
<td>500</td>
<td>400</td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Tool change time (tool-to-tool)</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Tool change time (chip-to-chip)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Number of pallet</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pallet change time</td>
<td>8</td>
<td>8.5</td>
</tr>
<tr>
<td>Pallet rotation in loading station</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Spindle motor (15min)</td>
<td>18.5 [26]</td>
<td></td>
</tr>
<tr>
<td>Feed motor (X/Y/Z/B)</td>
<td>4.0/4.0/4.0/1.6</td>
<td></td>
</tr>
<tr>
<td>Electric power supply (Rated capacity)</td>
<td>48.7</td>
<td>65</td>
</tr>
<tr>
<td>Compressed air supply</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Coolant tank capacity</td>
<td>550</td>
<td>650</td>
</tr>
<tr>
<td>Lubrication tank capacity</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>Machine height</td>
<td>2830</td>
<td>3020</td>
</tr>
<tr>
<td>Machine dimension (L x W)</td>
<td>4560 x 2250</td>
<td>5290 x 2680</td>
</tr>
<tr>
<td>Machine weight</td>
<td>11000</td>
<td>12500</td>
</tr>
</tbody>
</table>

**Note:** { } are optional

## Standard Feature

- Assembly & Operation tools
- Coolant tank, flood coolant
- Door interlock for safety
- FANUC 32i-A controller
- Full enclosure splash guard
- Installation parts
- Oil cooler & Spindle head cooling system
- Operator call lamp (red, yellow, green)
- Rigid tapping
- Screw conveyor
- Work light

- Design and specifications are subject to change without notice.
- Doosan is not responsible for difference between the information in the catalogue and the actual machine.
### NC Unit Specifications (Fanuc 32i-A)

**AXIS CONTROL**
- Controlled axes: 4 (X, Y, Z, B)
- Simultaneously controllable axes: 4 axes
- Positioning (G00)/Linear interpolation (G01): 3 axes
- Circular interpolation (G02, G03): 2 axes
- Backlash compensation
- Emergency stop / overtravel
- Follow up
- Least command increment: 0.001mm / 0.00001"
- Least input increment: 0.001mm / 0.00001"
- Machine lock: All axes / Z axis
- Reverse axis movement: Setting screen and MDI function
- Stored pitch error compensation: Pitch error offset compensation for each axis
- Stored stroke check: Overtravel controlled by software

**INTERPOLATION & FEED FUNCTION**
- Positioning: G00
- Linear interpolation: G01
- Circular interpolation: G02, G03
- dwell: G60
- Exact stop check: G09, G61 (model)
- Skip function: G50
- Reference point return check: G27
- Reference point return: G28
- 2nd reference point return: G29
- Feed per minute: mm / min / 100 mm
- Rapid traverse override: F0 (fine feed), 25 % / 50 % / 100 %
- Feed rate override: 0 - 200 %
- Jog override: 0 - 200 %
- Override cancel: M00, M02
- Manual handle feed: 1 unit
- Manual handle feedrate: 0.1 / 0.01 / 0.001 mm
- Automatic acceleration/deceleration
- NC Contour II: 80 block preview
- Machine condition selection function
- Thread cutting, non-synchronous cutting
- Program restart
- Automatic contour deacceleration (Specify AI Contour control ID)
- Feedrate clamp by circular acceleration
- Linear ACC/DEC before interpolation (Specify AI Contour control ID)
- Linear ACC/DEC after interpolation
- Control axis detach
- Rapid traverse bell-shaped acceleration/deceleration
- Smooth backlash compensation

**SPINDLE & M-CODE FUNCTION**
- M-code function: M 5 digits
- Spindle orientation
- Spindle serial output
- Spindle speed command: 95 digits
- Spindle speed override (10% increments): 10 - 150 %
- Spindle output switching
- Interpolation for rapid tapping
- Rigid tapping: G84, G74

**TOOL FUNCTION**
- Tool nose radius compensation: G40, G41, G42
- Number of tool offsets: 200 ea.
- Tool length compensation: G43, G44, G49
- Tool number command: T3 digits
- Tool life management
- Tool offset memory: C
- Tool offset memory: H, D code: Geometry / Wear memory
- Tool length measurement

**PROGRAMMING & EDITING FUNCTION**
- Absolute / Incremental programming: G90 / G91
- Auto Coordinate system setting
- Background editing
- canned cycle: G75, G74, G70, G80 - G89, G99
- Circular interpolation by radius programming
- Plane selection: G17, G18, G19
- Custom macro B
- Custom software size: 512K
- Extended P-code Variables size: 512K
- Addition of custom macro common variables: +100 to +999, +500 to +999
- Decimal point input
- Reader/puncher interface: RS-232C
- Inch / metric conversion: G21 / G20
- Data buffer
- Local / Machine coordinate system: G52 / G55
- Maximum commandable value: ±99999.9999mm (±99999.9999 inch)
- Part program storage size: 64m (1280m)

### OTHERS FUNCTIONs (Operation, Setting & Display, etc.)
- Alarm display
- Alarm history display
- Actual cutting speed display
- Clock function
- Cycle start / Feed hold
- Display of PMC, alarm message
- Message display when PMC, alarm occurred
- Dry run: G50
- Ethernet function (Embedded)
- Graphical display
- Tool path drawing
- Help function
- Coordinate display
- DISPLAY-MDI area: 30 x color TFT LCD / Keyboard for data input, soft-keys
- Memory card interface
- Operation functions: Tape / Memory / MDI / Manual
- Operation history display
- DNC operation with memory card
- Program restart
- Run hour and part number display
- Search function: Sequence N0 / Program N0
- Self - diagnostic function
- Servo setting screen
- Single block
- External data input
- Multi language display

### OPTIONAL SPECIFICATIONS
- 3-dimensional coordinate conversion
- Addition of tool pairs for tool life management: 304 pairs
- Additional controlled axes: Max. 6 axes per path
- Automatic contour override: G62
- Chipping function: G81, G80
- Cylindrical interpolation: G92
- Data server
- Dynamic graphic display: Machining profile drawing
- When the EZ Guide i is used, the Dynamic graphic display cannot application
- Interpolation type pitch error compensation
- EZ Guide (Doosan infracro/Conversational Programming Solution)
- Tape format for FS15, Increment system: U-10
- Figure copying: G72 1, G72 2
- Manual handle feed: 2/3 unit
- Handle interruption
- High speed skip function
- Machining time clamp function
- Machining time clamp function
- No. of Registered programs: 1000 ea.
- Number of tool offsets: 400 ea.
- Optional block skip addition: 2-9 blocks
- Part program storage: 512K (1280m)
- Max. (byte): 1MB (256mb)
- Playback function
- Solar coordinate command: G15 / G16
- Solar coordinate interpolation: G121 / G121.1
- Programmable mirror image: G501 / G511
- Remote buffer
- Scaling: G50, G51
- Single direction positioning: G60
- nth reference return
- Stored stroke check: 2 / 3
- Tool load monitoring function (Doosan)
- Doosan tool management package: 1
- Tool offset: G45 – G49
- Position switch
- Optional angle chamfering / corner R

*) Prior consultation is required.