®

ISO 14001 Certification   ISO 9001 Certification   CE

5AX SERIES

CH5-3000

Vertical Machining Center (5 AXES)

LITZ
CH5-3000

5 AXES
LITZ HITECH

LITZ HITECH CORP.

High-Speed Mechanism

Greatly Shortens Non-Machining Time

Acceleration and deceleration time of spindle and 3 axes, time of tool exchange and the shortening of non-machining time are the most important key factors in enhancing machine efficiency. By enhancing the speed of the main mechanisms, CH5-3000 shortens its machining time in overall operation.

Production Efficiency

Production efficiency increases by shortening of non-machining time

Different processed materials, such as composites, require to adopt different professional machines and machining technology to achieve high production efficiency.

+40°   -40°

+40°   -40°
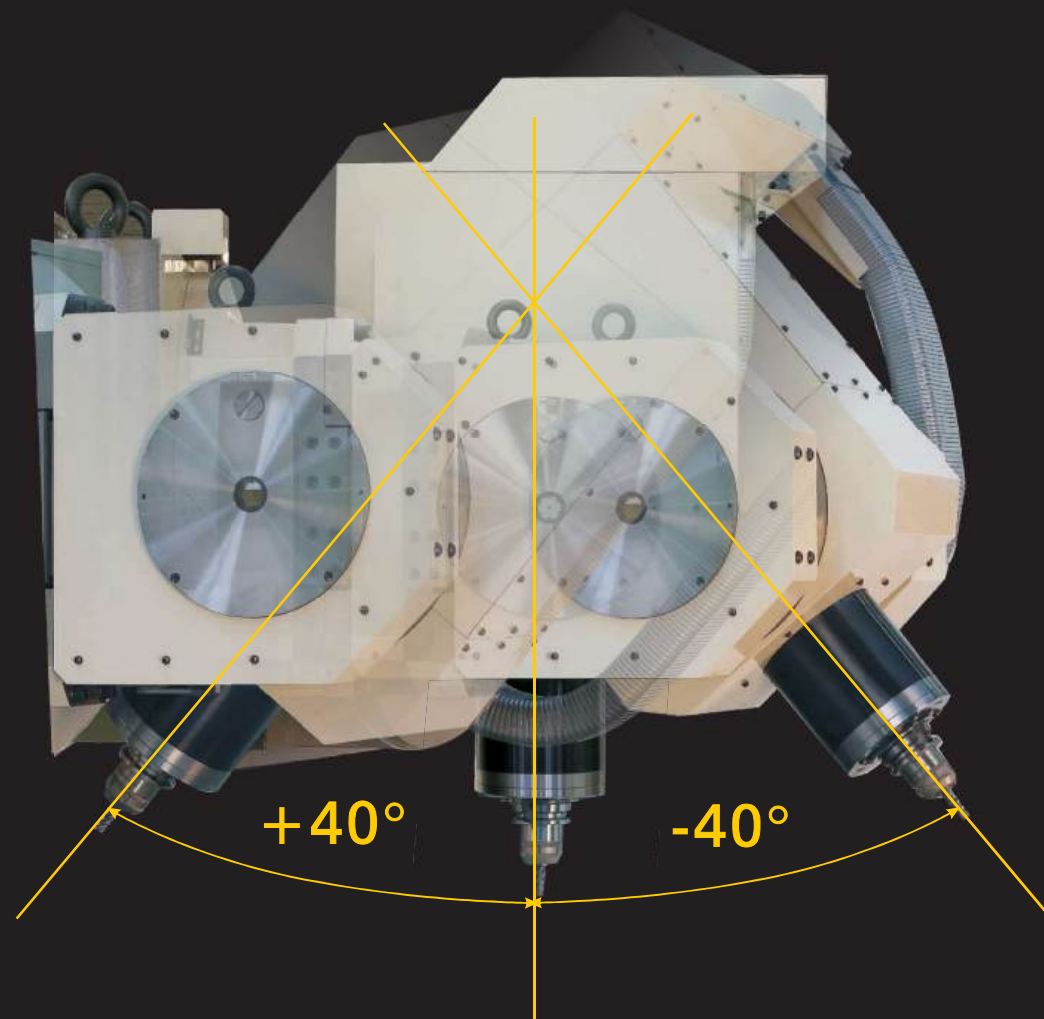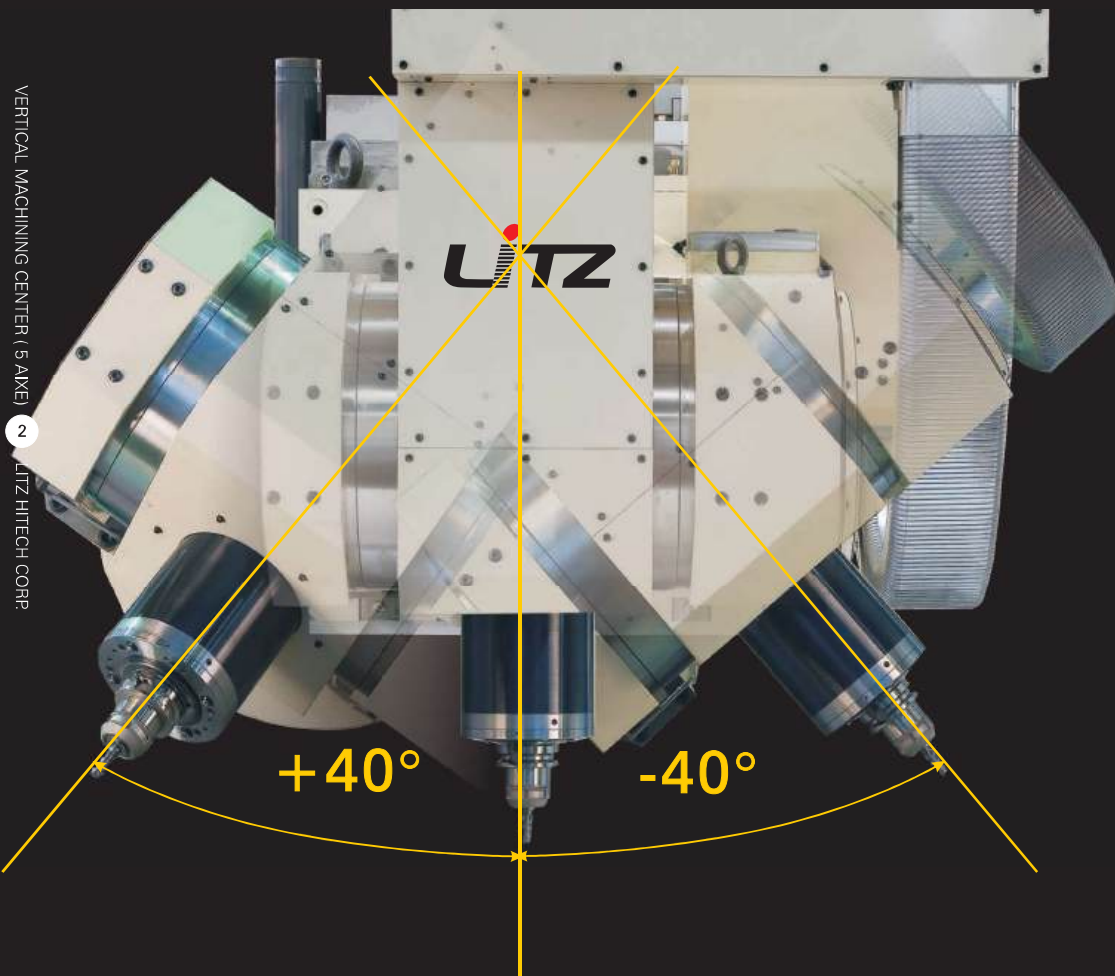
Highly Efficient 5-Axis Machining

CH5-3000 is designed mainly for highly dynamic machining of all sorts of materials. Structural rigidity of the machine is quite suitable for high-speed machining. CH5-3000 can satisfy all kinds of requirement, and assure ideal machining efficiency.

Engineering Conglomeration, 3-Dimensional Machining

CH5-3000 is designed for high-speed 5-axis machining on titanium aluminum alloy and composites. Structural design of high rigidity and lower vibration characteristic are the main features of this machine. Therefore, CH5-3000 has excellent dynamic performance, and is capable of perfect surface machining quality.

VERTICAL MACHINING CENTER (5 AIXE)

3

LUTZ HITECH CORP

High Precision 5-Axis Machining

- High-speed, high-torque machining of aluminum alloy, titanium alloy, hastelloy, etc.
- Contour machining of aluminum alloy, carbon fiber composites and new materials
- Sophisticated machining of aeronautical engine parts
- High-speed, high-torque machining of steel materials, aluminum alloy and nickel-iron alloy
- Machining of airplane wings, ailerons, and fuselage parts.

Machining Field of Airplane Parts

When the aeronautical industry uses titanium alloy and carbon fibers compound materials in the production of airplanes, it needs high-performance machines that are competent for the jobs. The perfect combination of main spindle power and stability of CH5-3000 is especially suitable for such jobs.

5-Axis Simultaneous Machining Center

Aeronautical parts require highly efficient 5-axis simultaneous machining. Inclinable spindle executes 3D machining on sophisticated configurations, and executes milling operation using round end-mill cutters to provide the best cutting conditions.

Outstanding Machining Performance

Absolute safety, resourceful working skills, light weight and highly stable materials are the targets by modern airplane manufacturers. To develop airplane lines and reduce consumables at the same time, the aeronautical industry must adopt machines which can adapt to the variability of materials and be professionalized with new working skills.

Structural Design for High Rigidity and High Speed

Robust yet Exquisite Body Structure

- Superior Meehanite cast iron adopted for main structure bodies to ensure stable structure and permanent precision.
- Method of finite element is adopted in computer calculation and analysis of cast components to ensure best compatibility of structural strength and reinforcing ribs, providing high rigidity to the machine.
- Base of inverted-T structural design with 3-point support concept, providing the machine with a firm foundation
- Work table is fully supported by base to ensure mobile straightness of X axis.
- X/Y axes designed with high rigidity and high precision linear guide ways, in combination with heavy-duty way block, to provide the best static and dynamic load rigidity.
- Z rail in box way design, providing Z axis and A, B axes with the best machining rigidity, and ensuring the best machining quality.
- Tool magazine is directly fixed to the floor, so that each moving axis can keep the machining quality because of isolation of the tool magazine.
- Main spindle taper in #50 design, providing high rigidity to tool holding; and the compact but robust structural design of main spindle can enlarge the machining range without interfering.

Front view of A, B axes

Nitrogen balancing cylinder

Side view of A, B axes

Spindle speed: 12000 rpm

ATC unit

Z rail: box way

X, Y rails: linear guide way

Moving column in Y axis

Work table 3250x800mm

Worktable to floor 1075mm

Base of inverted-T structure
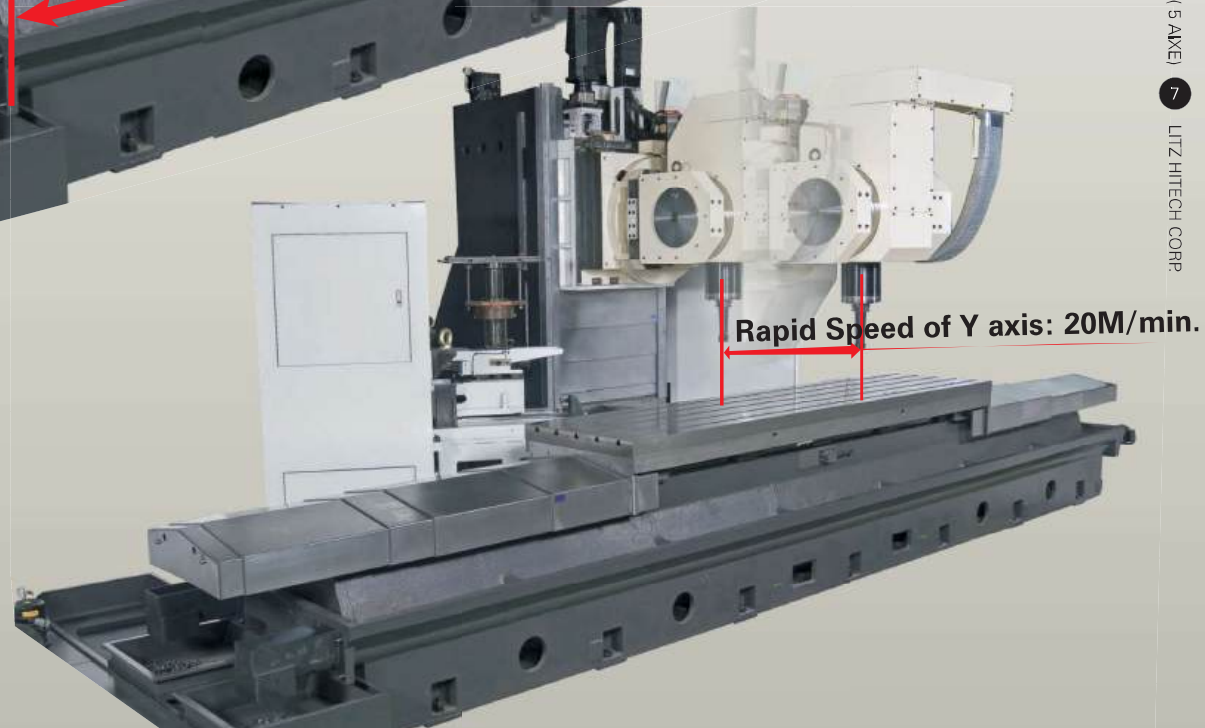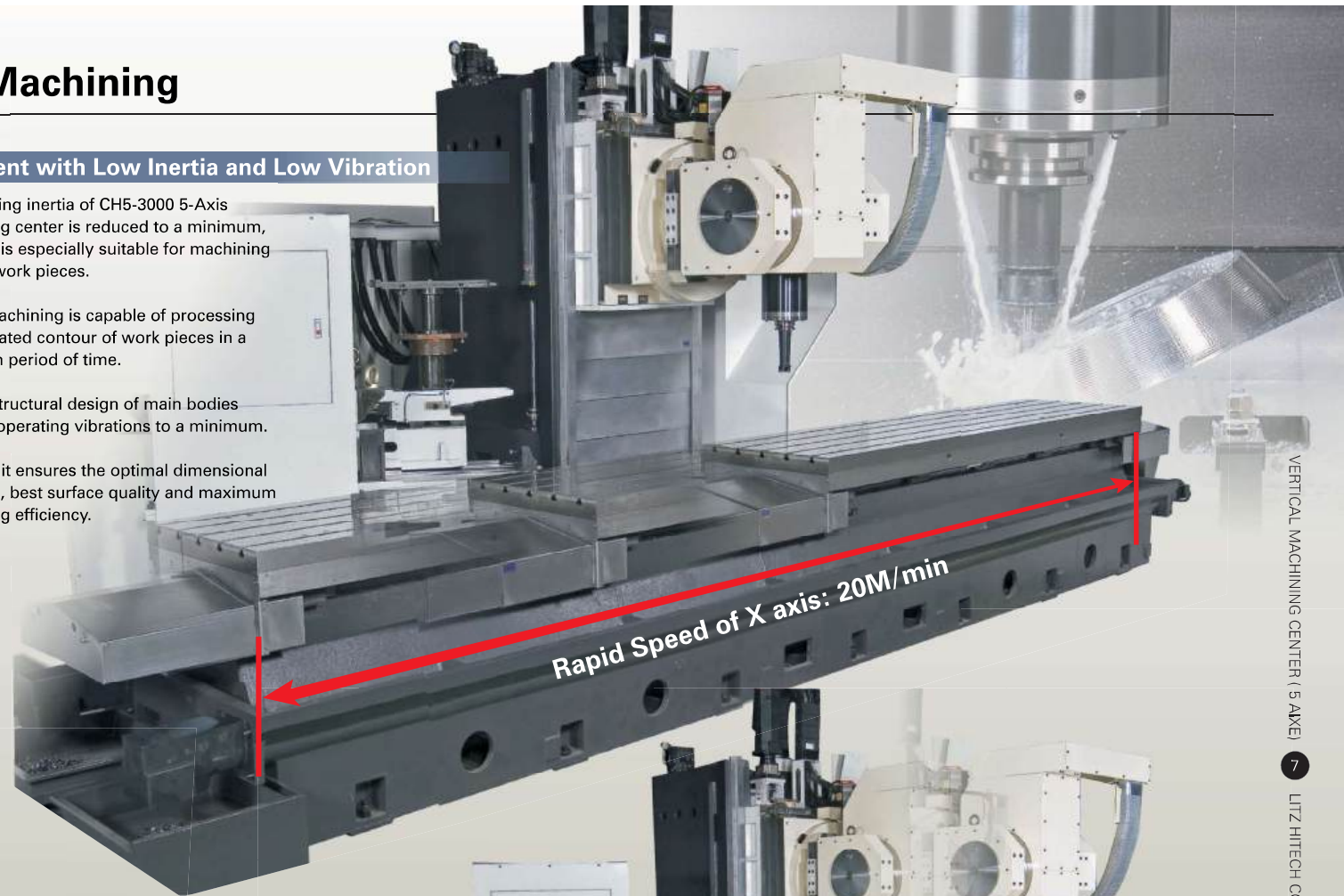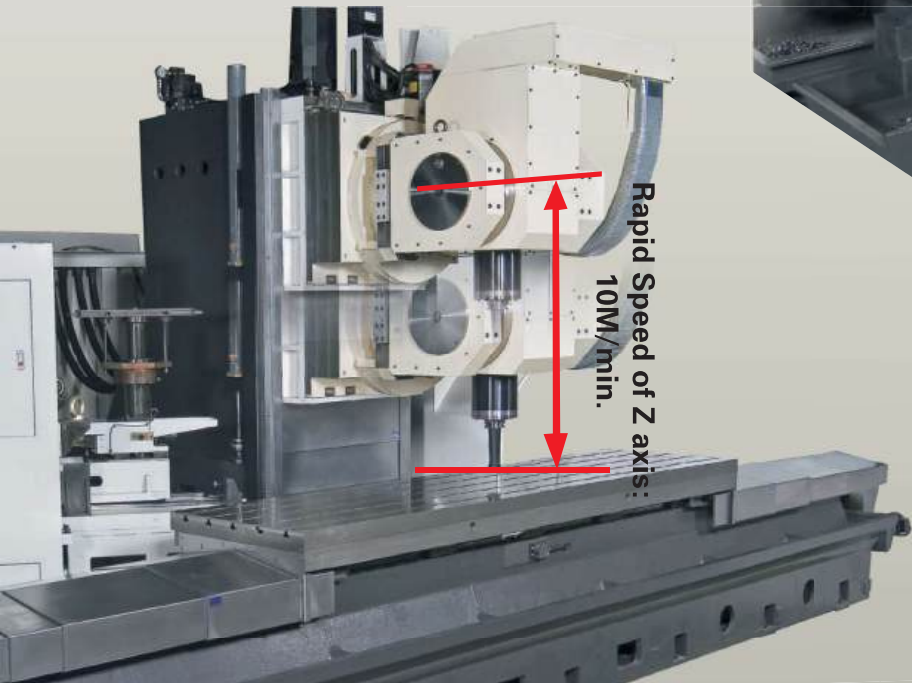
Work table with full span support

High Speed Feed System in Machining

Rapid Speed

■ X/Y axes designed with ball/roller linear guide ways respectively to enable rapid speed at 20m/min

■ Z axis designed with box way with rapid speed at 10m/min

■ Significantly shortening non-machining time, thereby enhance production efficiency.

■ Zero backlash in linear guide way; surface roughness is consistent in arc machining and incline surface machining.

■ Suitable for high speed operation, significantly reducing the driving power required by machine.

■ Linear guide way, rolling instead of sliding movement, resulting in less friction loss, quicker response and high positioning accuracy.

■ Simultaneously withstand loads from up/down, left/right directions, with multiple-point contacts on guide ways to maintain machining rigidity.

Movement with Low Inertia and Low Vibration

■ The moving inertia of CH5-3000 5-Axis Machining center is reduced to a minimum, so that it is especially suitable for machining of large work pieces.

■ 5-Axis machining is capable of processing sophisticated contour of work pieces in a minimum period of time.

■ Unique structural design of main bodies reduces operating vibrations to a minimum.

■ Thereby, it ensures the optimal dimensional precision, best surface quality and maximum machining efficiency.

Rapid Speed of X axis: 20M/min

Rapid Speed of Y axis: 20M/min.

Rapid Speed of Z axis: 10M/min.

Spindle and Main Spindle Motor

High Precision Built-in Motor Spindle

5-Axis machining technology is capable of producing perfect parts with sophisticated outlines of the work piece, excellent surface machining quality and saving large amounts of machining time.

When 5-Axis machining technology is adopted to machine sophisticated work pieces, it requires only one-time set-up to achieve the overall machining process, thereby significantly increasing machining precision and shortening machining time.
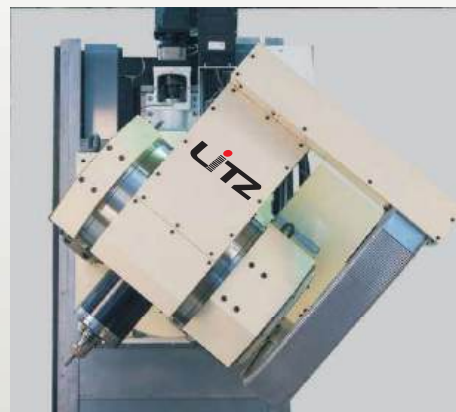
■ High precision, high speed and high torque built-in motor spindle

- Equipped on CH5-3000 is the built-in motor spindle that is the most suitable for contour machining of airplane parts, as well as for machining of large dies and moulds.
- The standard AC 30KW (41HP) 12000rpm high-speed motor spindle can obtain high productivity in the machining of curvature of sophisticated configurations using small diameter tools, or in high-speed machining of aluminum and other nonferrous metals.
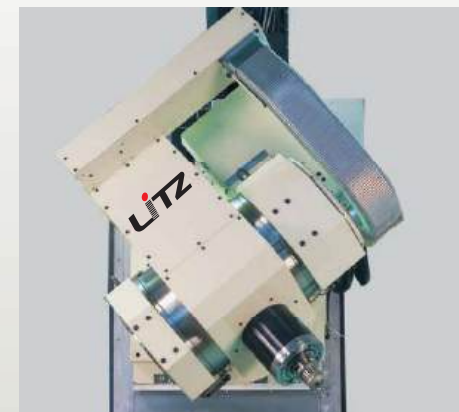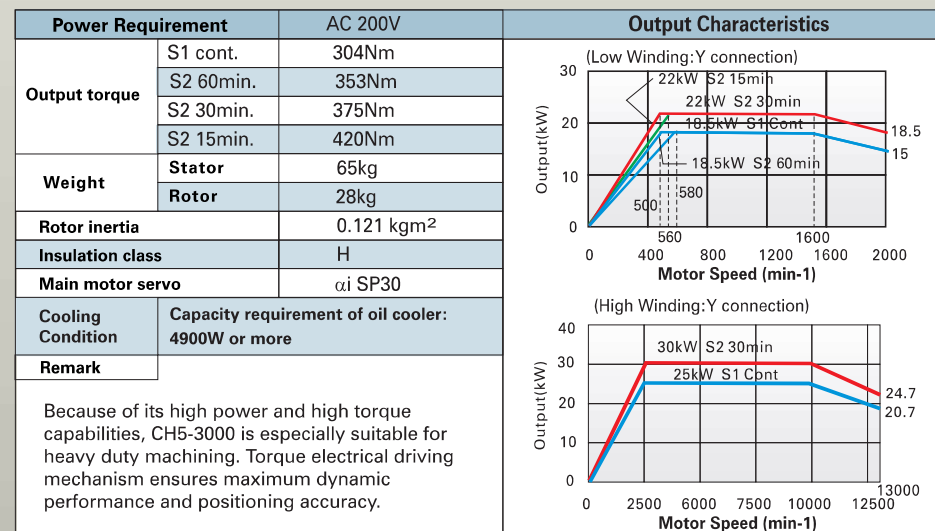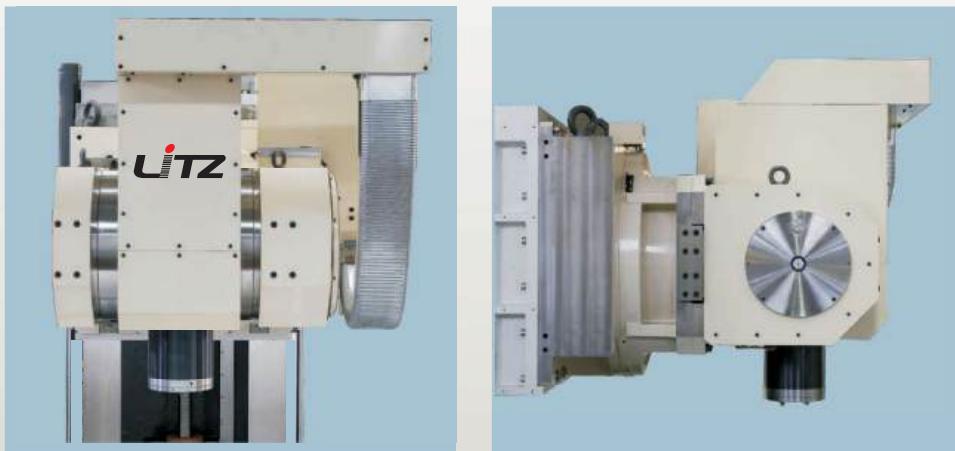
■ High precision machining with excellent heat radiation design

- Since spindle adopts built-in motor design, compared with the belt type spindle that requires the external connection to spindle motor, there will be no vibration effect caused by belt and gear driving devices, thereby upgrading machining precision and surface smoothness.
- Built-in motor spindle has no adverse effect of multiple point thermal effects caused by belt type belt and gear driving devices; therefore it will result in less thermal deformation such as inclination of spindle. It will reduce the thermal deformation to a minimum.
- The ceramic bearings are used in spindle and the bearing is lubricated by oil air system. Even after long high-speed machining time, thermal displacement can be controlled to a minimum, thereby obtaining stable machining precision.

● Main Spindle Motor Output Diagram ●

Model: FANUC α 160LL/13000i

Power Requirement		AC 200V
Output torque	S1 cont.	304Nm
	S2 60min.	353Nm
	S2 30min.	375Nm
	S2 15min.	420Nm
Weight	Stator	65kg
	Rotor	28kg
Rotor inertia		0.121 kgm²
Insulation class		H
Main motor servo		αi SP30
Cooling Condition		Capacity requirement of oil cooler: 4900W or more
Remark		

Because of its high power and high torque capabilities, CH5-3000 is especially suitable for heavy duty machining. Torque electrical driving mechanism ensures maximum dynamic performance and positioning accuracy.

Output Characteristics

(Low Winding:Y connection)

22kW S2 15min
22kW S2 30min
18.5kW S1Cont
18.5kW S2 60min
18.5
15

(High Winding:Y connection)

30kW S2 30min
25kW S1 Cont
24.7
20.7

A • B Axis in Rotary Unit

Suitable for machining of airplane parts and molds

Adopts delicately designed high rigidity, high precision spindle inclining mechanism,

CH5-3000 has the spindle inclining mechanism, A/B axis rotary unit that is free from shortcomings in conventional products, such as bulky size, complicated construction and too heavy weight. Using the latest engineering, technology and delicately designed inclining mechanism prove its outstanding performance, including its rigidity, precision and machining capabilities. Features include:

● increase machining speed and rapid speed
● enhance accuracy
● simple construction to avoid trouble but maintain very high reliability
● avoid the interference to workpiece to a minimum, so it is most suitable for machining of sophisticated profiles or workpieces with curvature

■ A/B Axis Specification

Item	Unit	A axis	B axis
Speed gear ratio		1/360	1/360
Minimum splitting angle	degree	0.001	0.001
Servo motor	FANUC	22/3000i	22/3000i
Feed rate of rotation	Deg./min	2000(motor 2000min-1)	2000(motor 2000min-1)
Clamping torque	N*m	12200(3.5MPa)	6860(3.5MPa)
Driving torque	N*m	4930	7840
Range of tilting angle	degree	-40~+40	-40~+40
Emergency stop angle	degree	-40,+40	-40,+40
Motor Spindle weight		300kg	
Total weight of Rotary Unit		2400kg	

±40° Ultra High Speed Spindle Inclination Capability (A,B axes)
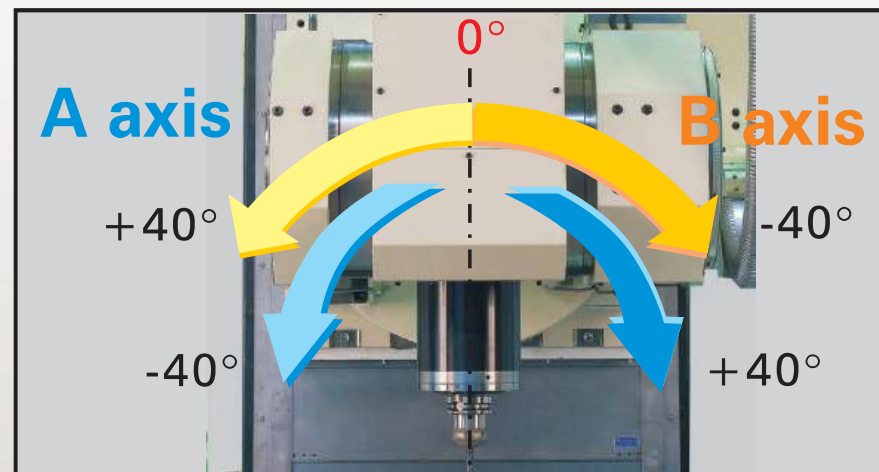
■ Fulfill the highest standard at fast tilting, cutting feed rate and large range of travel.
Rotating feed rate: 2000°/min.   Cutting feed rate: 2000°/min.
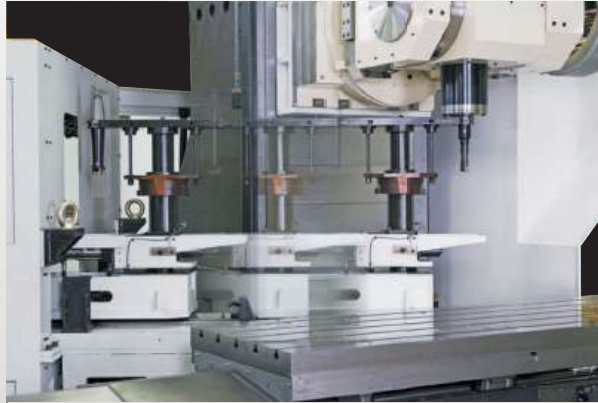Tilting angle (A, B axes): ±40°
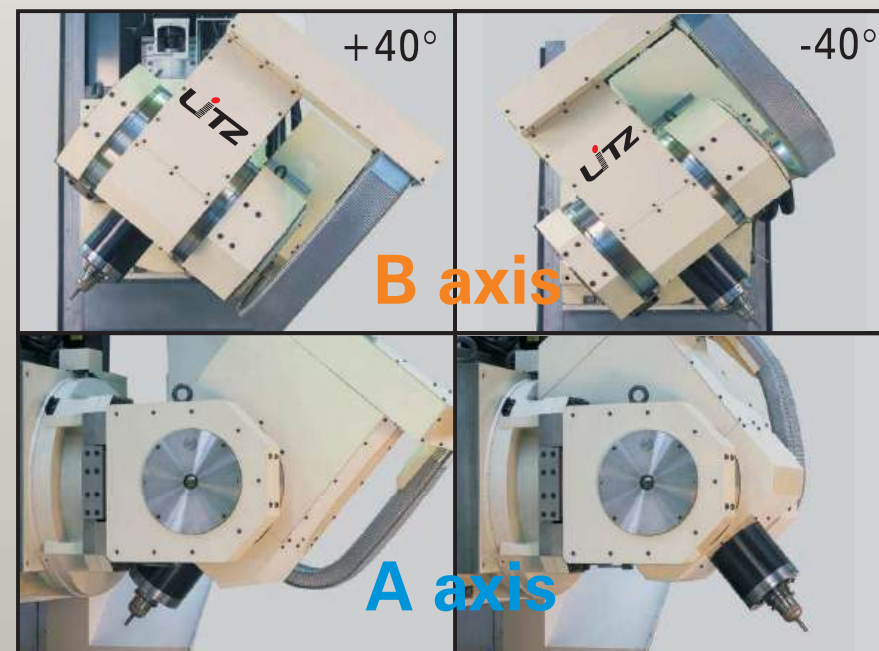
High Tool Capacity of Magazine Unit   High Speed Automatic Tool Changer Unit

Tool Magazine Unit

Tool magazine stations **32** **tools to suit various purposes**

Tool Changer Mechanism

▌ Fast, simple, and durable tool exchange device, providing steady and reliable exchange of tools.

▌ Fast tool changer mechanism saves non-machining time, and enhances production efficiency.

▌ Unique tool exchange device design, advanced cam-drive mechanism and capable of random tools selecting can be achieved by PLC software control.

▌ Tool changer mechanism has been subjected to million times of operating tests to satisfy the requirement of high reliability.

Tool release cylinder

ATC chips protection door

Tool magazine door

ATC

High Efficiency Chips Disposal System
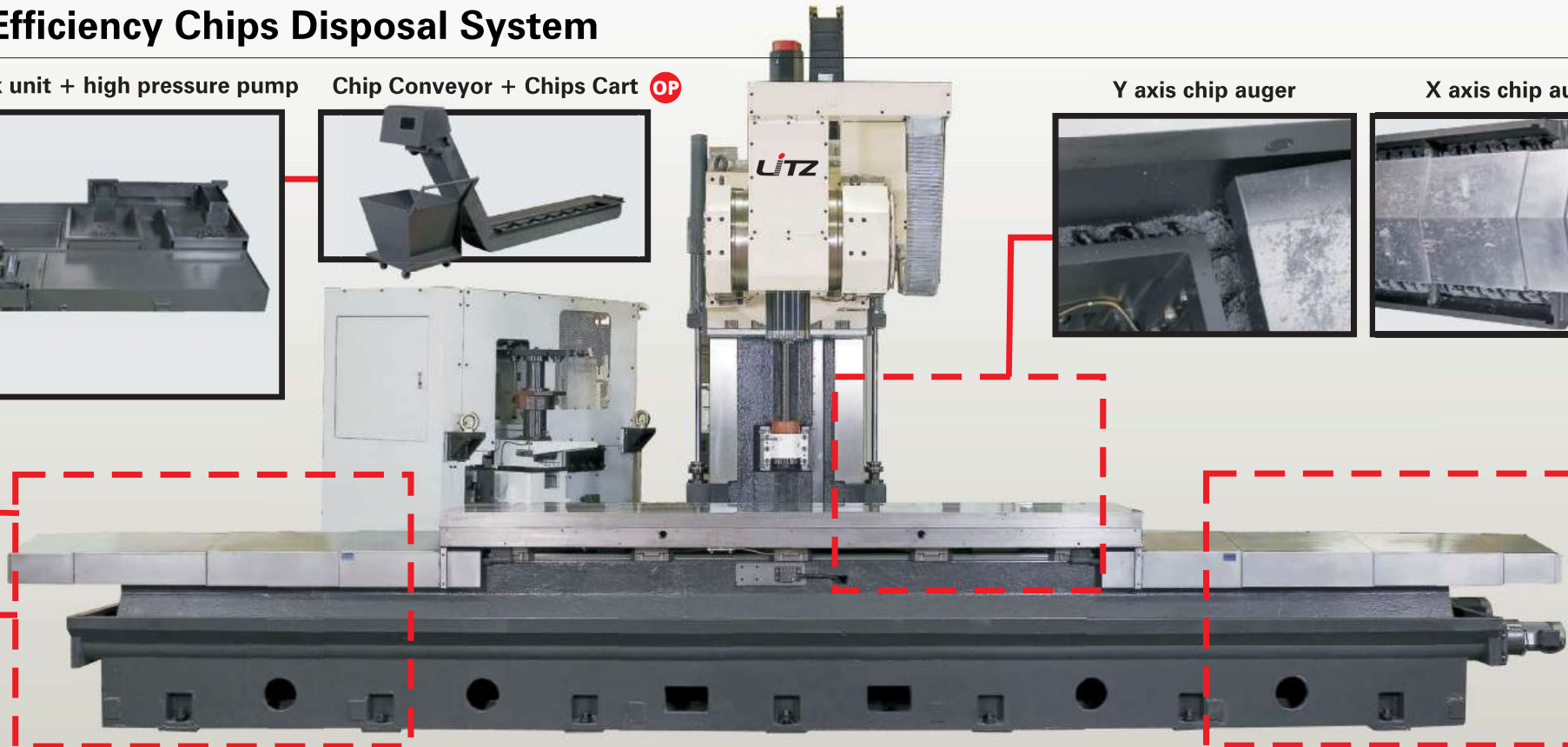
Coolant tank unit + high pressure pump

Chip Conveyor + Chips Cart OP

Y axis chip auger

X axis chip auger

Selection of chip conveyor

		○Recommended ●Optional		
Material	**Steel**	**Cast iron**	**Aluminum / Colored metal**	**Mixed chips**
Shape of chips				
Chips remover inside machine — Wash down			○	
Chips remover inside machine — Chip auger	○	○ (Dry cutting)		○
Enhanced chip conveyor — Bellows type				●
Enhanced chip conveyor — Scrape type		○ (Dry cutting)		
Enhanced chip conveyor — Tumbler type	●	○	○	○

Chip remover (chip auger)

Lift chip conveyor (bellows type)

Lift chip conveyor (tumbler type)

Tumbler type

Full enclosure design

Oil/Coolant Separation Design

High Torque and High Precision Transmission System

Lubricating Oil recycling at Linear Guide Way/Ballscrew
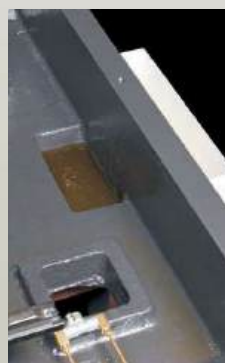

Oil/Coolant Separator System

Recycling pipe of lubricating oil

Oil/Coolant Separator System

Waste recycling box of lubricating oil

Waste recycling hole of lubricating oil

■ Separated coolant is guided to the main coolant tank for reuse. Lubricating oil is collected and treated as waste oil to meet the requirement of environmental protection.

■ The oil/coolant separation design can effectively separate lubricating oil from coolant and prevent deterioration of coolant and oil mixture, which influences the machining quality.

High Torque Speed Reducer

Gear ratio 1:3

Anti-colliding System
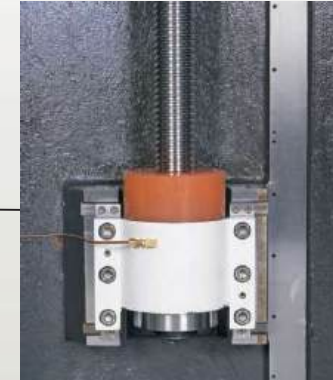
■ In case of machine trouble or operating error made by operator, the machine is equipped with a buffer device to absorb impact produced by colliding, thereby minimizing the damage that may be caused by impact force, and ensuring original precision.

Servo motor   Ballscrew
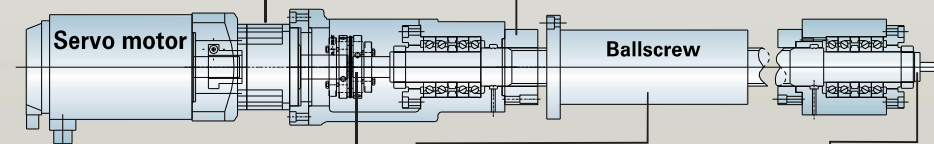
Direct Coupling & Pretension of Transmission System

■ Powerful servo motor and precision high-speed ballscrew are straightly connected in 3-axis. The usage of C3 class large ballscrew ensures high rigidity and excellent precision.

Pretension System

■ The pretension of ballscrew increases rigidity of ballscrew, reduces thermal displacement and enhances precision.

Spindle head balancing system

Nitrogen Balancing Cylinder

■ Z axis is equipped with a nitrogen balancing cylinder.
■ Balancing cylinder is used to balance the moment variation in vertical direction.
■ The high performance nitrogen balancing cylinder is easily accessible for maintenance and there is no sophisticated hydraulic piping or mechanical components.

Features of Nitrogen Balancing Cylinder
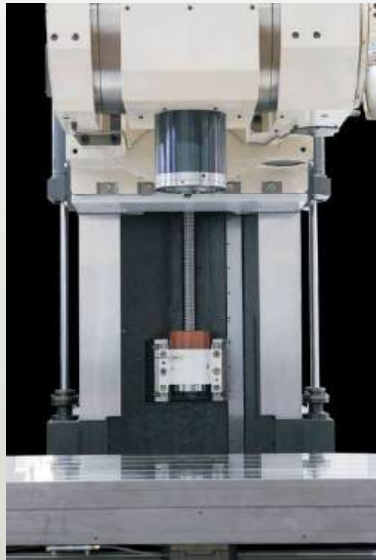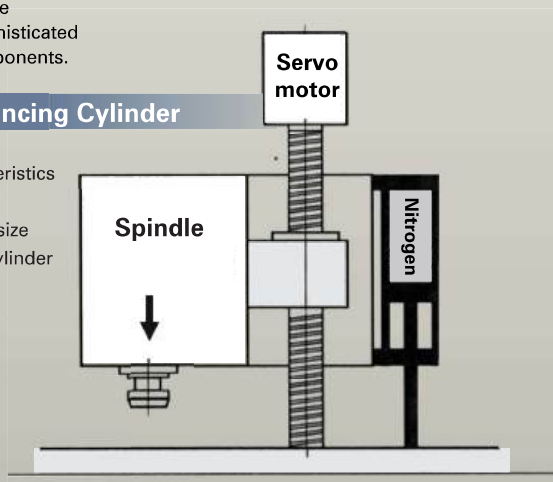
■ Extremely high response characteristics
■ No need of power source
■ Robust construction, compact in size
■ With little pressure change, the cylinder has stable balancing capability

Z axis brake system

■ Z axis is equipped with electrical brake system. Z axis has precise positioning capability to ensure
■ the spindle will not slip down.

Adoption of Nitrogen Balance to Obtain the Features of Counter-Weight Balance of Spindle Head

Alleviate loads to servo motor, reduce power consumption and heat generation.

■ In case there is no balancing device and only the servo motor is used to elevate and maintain the position of spindle, the motor will bear a heavy burden, resulting in increased power consumption. Besides, the heated motor will result in elongated ballscrew and influence to positioning precision.
■ Adoption of nitrogen balancing cylinder to balance its weight will alleviate burden on the servo motor, thereby reducing power consumption and thermal displacement due to the heat.

Alleviate loads to ballscrew and reduce heating

■ Without the use of the balancing device, the ballscrew will be subjected to a heavy load, and the heated ballscrew will be too elongated to ensure precision.
■ Use of nitrogen balancing cylinder to balance spindle head weight will reduce load to the ballscrew nut and reduce the heat.
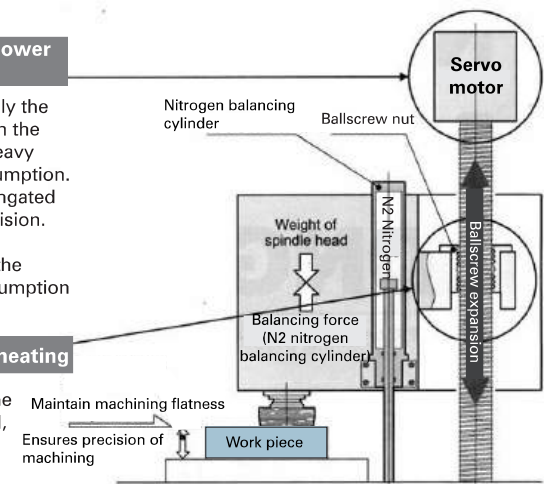
Enhance machining precision in high speed machining processes

■ Use of nitrogen balancing cylinder to obtain balance, thereby enhancing the tractability of spindle head during high speed machining processes, meanwhile increasing super-fine machining precision.

Reduce axial loads on ballscrew and spindle head

■ Due to its robust structure and compact size, nitrogen balancing cylinder can be easily installed in the neighborhood of gravity center of spindle head. Supporting the weight of spindle head properly will reduce the load on the ballscrew and the spindle head.
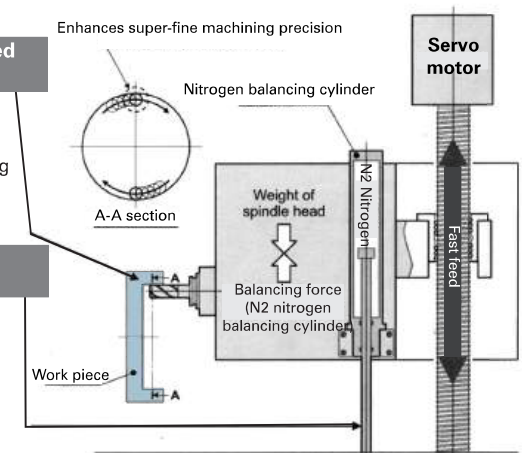
Simultaneous 5-Axis Machining Center

Machining of large size workpieces of aeronautical parts and molds and simultaneous 5-axes operation in machining processes

Spindle, A/ B Rotary Head made in Japan

FANUC 31i-A 5-Axis Control System

LITZ
CH5-3000

5 AXES
LITZ HITECH

High Performance Devices

Linear Scale OP
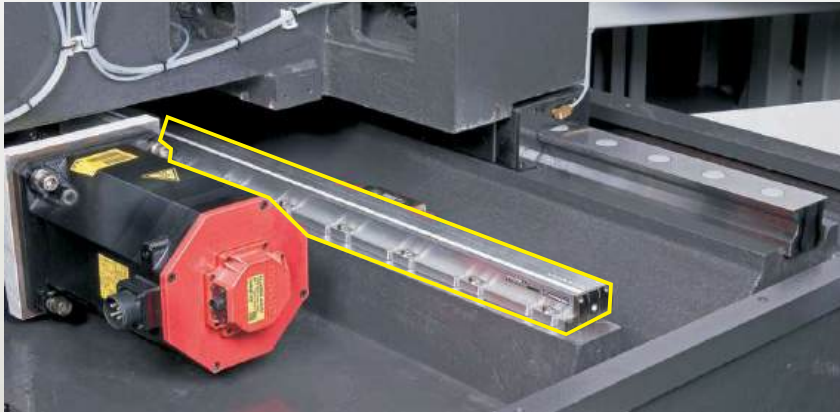
- X/Y/Z axes can be equipped with optical linear scale system to detect thermal displacement caused by rapid movement of the machine, and to feedback the measure of thermal displacement to the controller for compensation. It is especially suitable for machining of high precision parts.
- Optical linear scale system is equipped with gas protection device, to avoid contamination of dust and oil moisture on the scale. It is standard to ensure precision of scale and to extend its service life.

Coolant Through Spindle System OP

- The coolant through spindle system allows passage of coolant through the spindle center and coolant ejecting from the tip of cutting tool. By directly cooling the work piece and cutting edge of the tool, taking a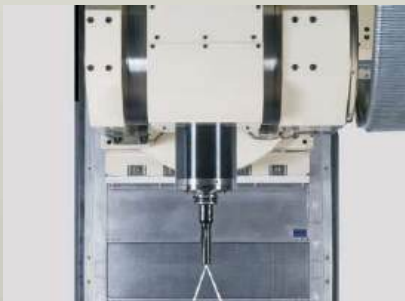way the heat produced in the machining processes, and ensuring machining quality, CTS is especially suitable for parts that need deep holes drilling or boring.
- The output pressure of the coolant through spindle is 18 bars as standard. There are 42 bars or 70 bars available to satisfy customer's special application.

- The filter system includes double filter elements. In case one filter element is clogged during operation, the operator can immediately switch to the second filter element manually, so there will be no interruption in the machining process.

Oil Demister OP
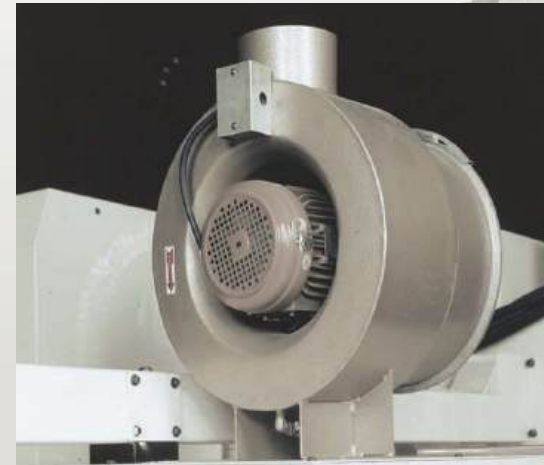
- CH5-3000 can be equipped with a dust collector to achieve safety and clean standard, particularly in the machining of carbon fiber materials that may involve powder dust.
- Fully enclosed type protective hood and the mist collector will effectively collect powder dust and mist produced during the process. Operators will not breathe in toxic substances and endanger their health.
- Production of high precision parts in an enclosed space or clean factory will result in effective control of air quality and satisfaction to the green technology requirement.

Protective Hood on Machine Top OP

Fully enclosed Protective Hood

Hermetic Protective Hood on Machine Top
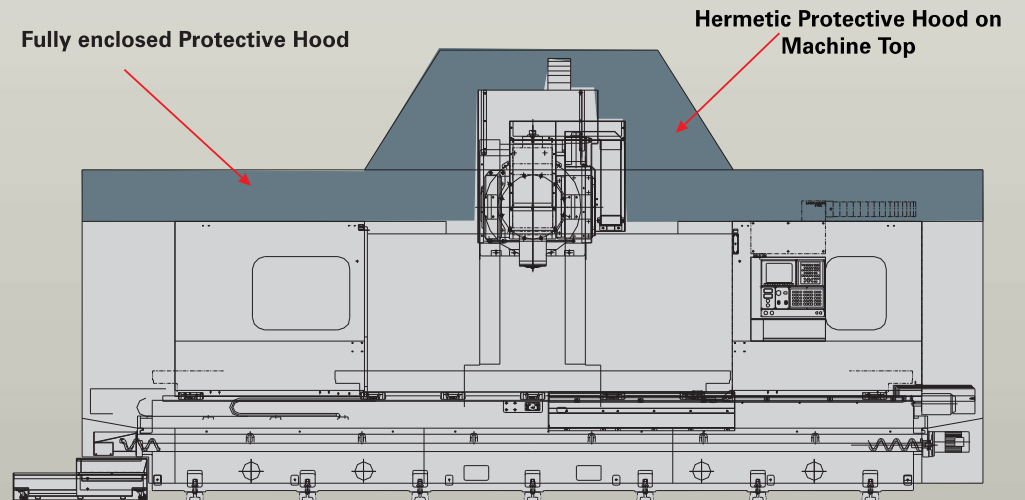
High Performance Devices

To shorten the non-operating time in maintenance, all machine parts can be accessed easily.

Centralized Electric Cabinet

■ Wiring in the electrical cabinet is satisfactory to the CE safety standard, to ensure operation of the controller system free from outside interference.
■ Use of high performance CNC controller with systemized, network development to satisfy modern requirement on high speed and high precision.

Centralized Pneumatic System

■ The pneumatic system is equipped with F.R.L unit, pressure detector, oil filter, high performance solenoid, sound muffler, oil gas collector, and high capacity lubricating oil unit.

Hydraulic Unit and Spindle Oil Cooling System

■ The oil temperature control in the spindle oil cooling system is effective in thermostatic control, and control of thermal displacement of spindle, to ensure high precision in high-speed operation.

Safety Door

■ When the door is not closed, the machining program shall not be executed, thereby ensuring safety to the operator.
■ When the door is opened during machining process, the program will be terminated to ensure operator safety.

Lighting System

■ Machine interior is equipped with high-luminosity work lamps to facilitate operator in executing loading/unloading and measurement jobs.
■ Equipped work lamps have the functions of dust protection, water resistance and prevention against explosion.
■ In case work lamp is in failure, spare parts are available on the market, to save maintenance and servicing time.

Disc Oil/Coolant Separator

■ Disc oil/coolant separator that can be installed easily at a compact space.
■ Disc oil/coolant separator enables effective separation of floating oil in coolant tank, to ensure the quality of coolant, extend service life of coolant and ensure machining quality.

Spindle Oil Air Lubricator

■ This system forcibly provides oil air to spindle bearings, to ensure the spindle bearings have sufficient lubricant and satisfactory quality.

Spindle Air Dryer

■ Before entering the spindle, air is thoroughly dehumidified by the dryer, to enhance quality and service life of the spindle.

5-Axis Machining

Machining Tools

5 axes Simultaneously. High performance machining with engineering conglomeration. Production efficiency moving up.

Tool Holder and Pull Stud

Unit: mm

BT-50 Tool Holder and Pull Stud (Standard)

CAT-50 Tool Holder and Pull Stud   OP

Features of Inclining spindle Machining

■ **Achieves maximum cutting capacity with minimum cutting load. Meanwhile, it minimizes the burden to the cutting tools.**
Compared with 3-axis machining center, 5-axis machining with inclining spindle can effectively use the cutting edges on the side of milling cutter. Even at a same cutting speed, it will have more cut-in depth and shorten the time required in the processes. Because of reduced burden on the cutting tool, it also extends the service life of the tool.

■ **Machining by inclined spindle without the need to install special tool or adaptor kit**
When machining the inclined sides of aeronautical parts or molds, a 3-axis machining center must be equipped with a special tool or adaptor kit. But CH5-3000 can execute required machining processes without the need to install aforementioned tool or adaptor kit. It not only saves trouble in operation, but also saves the cost to purchase special tool or adaptor kit.

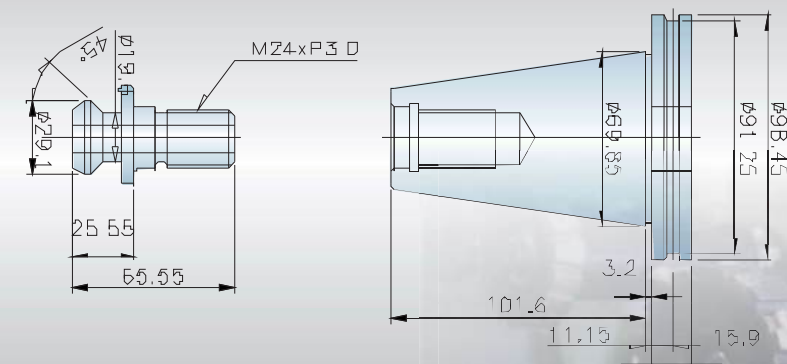■ **Only 5-Axis can achieve high speed and high precision machining**
In the machining of aeronautical parts and molds, the frequently used contour-line process requires only a single path to complete high precision machining. And because it can reduce subsequent manual finish operation, it can also significantly reduce the total time for the job.

Machining Capability

Face Milling Capability

Cutting conditions	
Tool	∅125mm Face cutter (7 blades)
Workpiece material	S50C
Spindle speed RPM	764
Feedrate mm/min	1200
Cutting depth mm	5
Chips removal cm^3/min	560
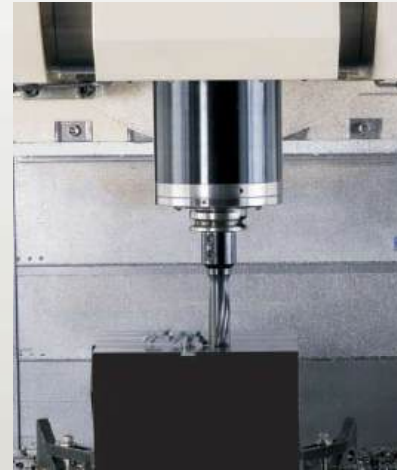
Drilling capability

Cutting conditions	
Tool	∅45mm Drill
Workpiece material	S50C
Spindle speed RPM	955
Feedrate mm/min	85
Chips removal cm^3/min	166

Tapping Capability

Cutting conditions	
Tool	M36xP4.0 Tap
Workpiece material	S50C
Spindle speed RPM	88
Feedrate mm/min	352

End Milling capability

Cutting conditions	
Tool	∅25mm end-mill
Workpiece material	S50C
Spindle speed RPM	2030
Feedrate mm/min	203
Cutting depth mm	25
Chips removal cm^3/min	125

Airplane frame parts

Airplane wing parts

Measurement System

Innovative solution proposed by Renishaw can reduce 90% of the auxiliary time
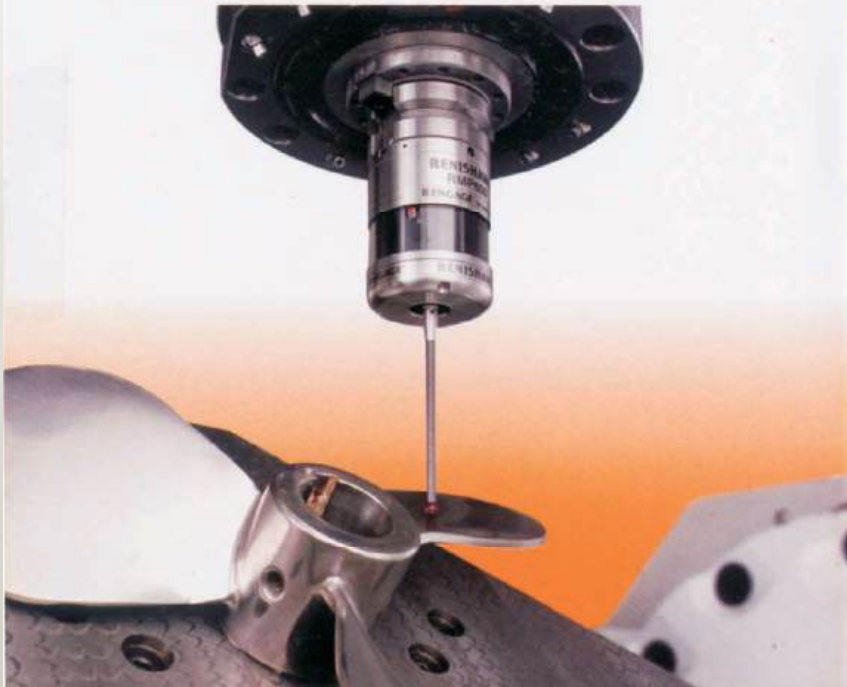
Saves 90% set-up time

Fast, accurate and automatic measurement of cutting tool and of coordinate- setting to workpiece

Significant Enhancement of Machining Capability

By using measuring head to monitor the machining process, the unmanned operation can upgrade machining capability

Innovative double heads system

Innovative MP700 workpiece measuring system and new OTS infrared tool measuring system, requiring only one optical receiver, can be simultaneously installed on a machine.
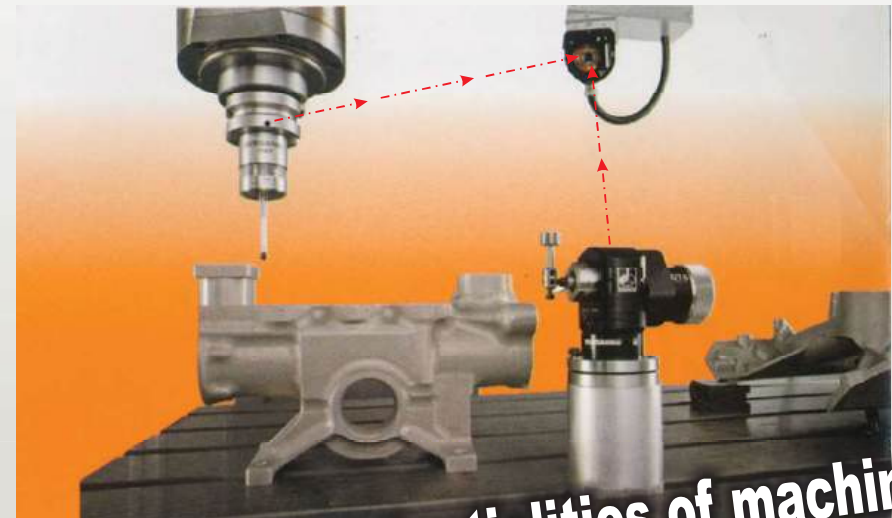
Stimulate all potentialities of machine

Solution of tool calibration and tool broken detection

New Product   New Product

VERTICAL MACHINING CENTER (5 AIXE)   21   LITZ HITECH CORP.

Next-Generation Corresponding Operation System

Operation box can be moved to suit operator convenience
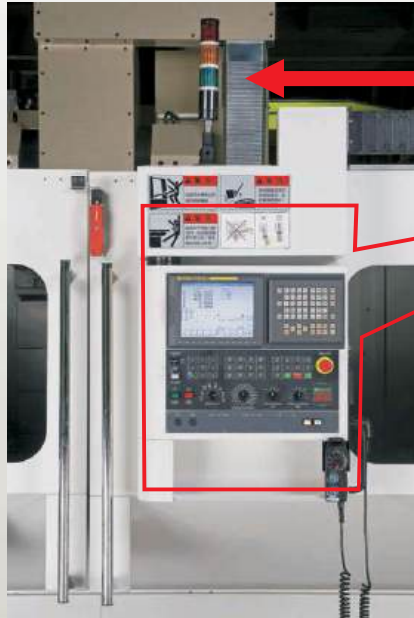
FANUC 31i-A Operator/ Machine Interface

■ FANUC CNC Controller continues to advance in providing flexible support in 5-axis machining field, so that user can conveniently set and use the 5-axis machine, and continues to present all sorts of compensation for errors, to improve machining precision.

Tool center point control for 5-axis machining (FS31i-A5)

Actual movement of tool

Program command point

■ Although the machining program for a 5-axis machine is normally specified in small blocks in many cases, many users want to easily program a complex machining profile with less blocks.

■ Tool center point control for 5-axis machining responds to this request. When the tool direction changes, the path and feedrate specified in the program, "If 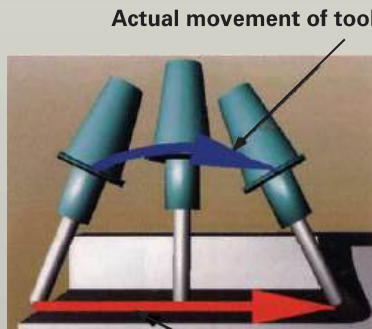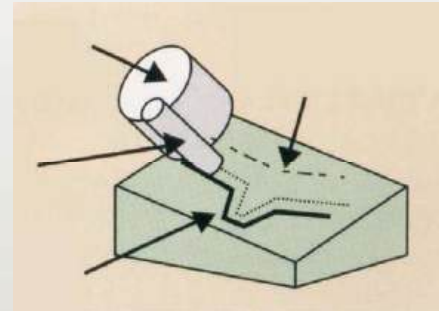you want to use the side face of a tool for machining, you can control the posture of the tool so that the side face of the tool moves on a desired plane."

■ As program specification formats, in addition to the "method in which the angle of the rotation axis is specified," the "method in which the angular displacement of the tool is specified" is available. The same program can be used for machining with different rotation axis mechanical configurations and different tool axe names. Machining programs created using CAD/CAM systems are applicable to various 5-axis machines at machining sites, which allows fiexible changes in production planning.

FANUC 31i-A (Standard)   FANUC 31i-A5 (Optional)

Cutter compensation for 5-axis machining (FS31i-A5)

■ For machining with the side face of a tool tilted against the workpiece, several types of tools such as roughing and finishing tools may be used. In this case, you can use cutter compensation for 5-axis machining to machine the workpiece using only one program. The cutter compensation function automatically performs cutter compensation according to the specified cutter compensation. The direction of the tool can be changed for each block by rotary axes. You can also use cutter compensation for 5-axis machining together with tool

■ center point control for 5-axis machining. Machining with a tool with a large diameter tends to generate interference and excess cutting. For such machining, this function can be used to automatically avoid interference.

Workpiece position error compensation (FS31i-A5)

Rotating tool
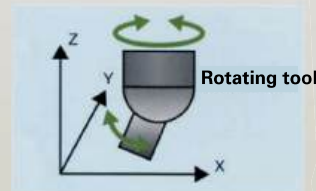
compensation for tool direction moved by rotary axes

■ A large workpiece to be machined with a large machine may not be positioned properly when installed on the table. In this case you can use workpiece position error compensation to automatically compensate the installation error and use the original machining program. You can use this function together with the 5-axis machining functions and other general functions such as scaling, coordinate system rotation, and canned drilling cycle.

Cutter compensation vector

Tool center point vector

Compensation the cutter compensation vector and tool center point control vector

Workpiece position error
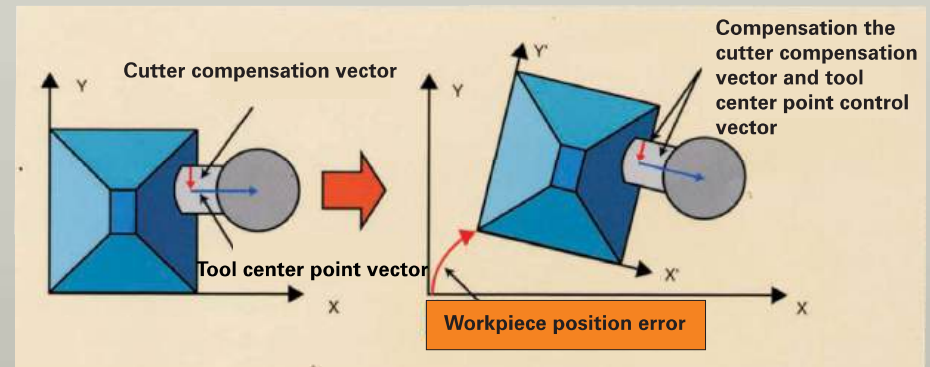
FANUC 31i-A (Standard)   FANUC 31i-A5 (Optional)

Tilted working plane command (FS31i-A5)

Coordinate conversion

Original machining program

Tool axis direction control
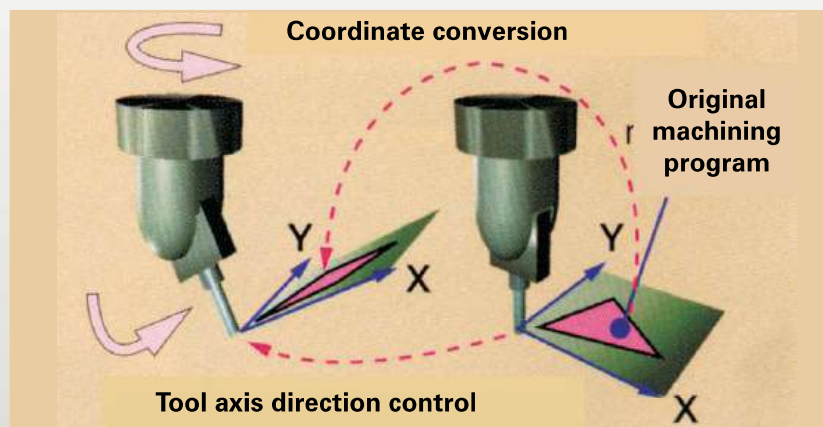
- For machining a hole, pocket, or another figure on a tilted plane on a workpiece, the machining place can be specified with plane (X, Y) to make programming very easy. The tilted plane machining command enables this specification and also position the tool automatically so that the tool becomes perpendicular to the tilted machining plane without specifying the tool direction.
- With three-dimensional coordinate conversion, which has been available, this function makes programming for a tilted machining plane easier.

Manual feed for 5-axis machining (FS31i-A5)

Tool axis direction feed

Tool axis right-angle direction feed

Tool tip center rotation feed
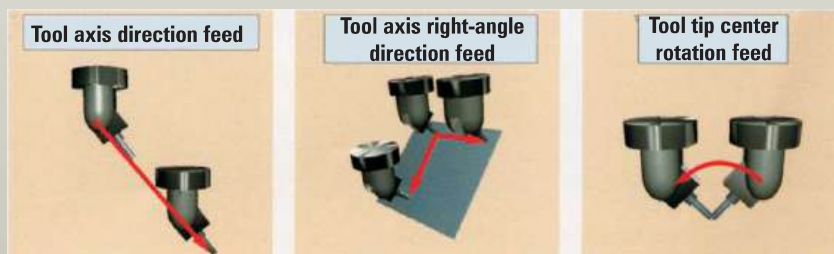
- By handle, JOG or incremental feed, the tool position can be changed along the slope, in the direction of tool axis or with maintaining tool tip point.
- This function makes the preparation of machining easy.
- During right-angle direction feed of manual feed for 5-axis machining in the tilted working plane command mode, the tool can be moved in the X or Y direction on the tilted plane defined in a tilted working plane command.

Tool radius compensation (FS31i-A5)

Tool axis

Compensation plane

Compensation vector

Compensation path

Command path

- Tool radius compensation value on the plane perpendicular to tool axis, may follow command direction and set left/right hand side of the path. When tool radius is changed due to worn out, there is no need to modify the machining program.
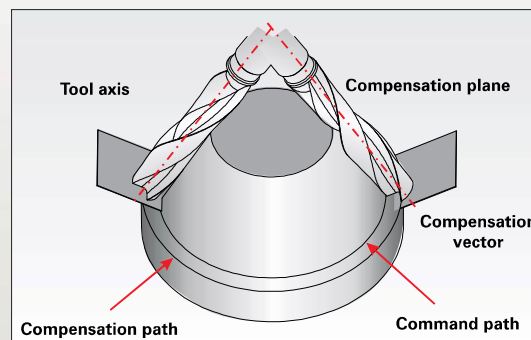
Tool tip Compensation Function (FS31i-A5)

Tool vector

Used tool

Reference tool

Tool center path after compensation

Command path

Tool compensation vector

Total tool compensation
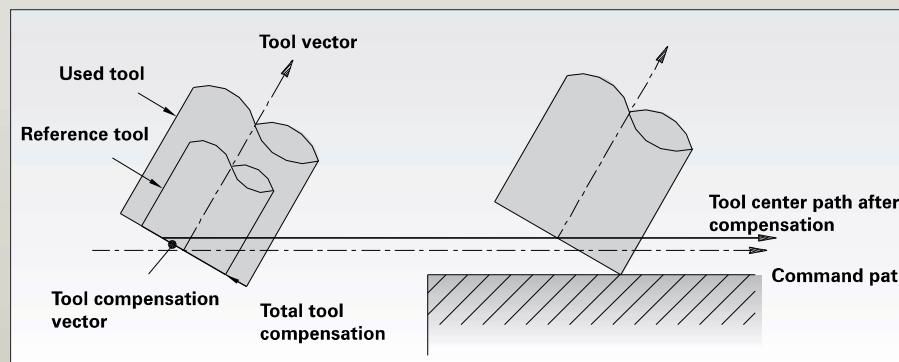
- Tool tip compensation: when tool radius compensation is made on a plane, the system will calculate the tool contact point on machined side depending on different inclining angles so that the accurate outline can be maintained. When the cutter radius is changed, there is no need to modify the machining program.
- As far as the 5-axis machining center is concerned, in the face of high efficiency machining on sophisticated configurations, it will seek high quality machining operation. From tool path command, it will calculate the actual command control point and best moving speed of machine. The 5-axes machining center simultaneously fulfils the requirements for high speed and high precision.

3-D Interference Confirmation (FS31i-A5)

- For the 5-axis machining center, or complex machines, it can execute machining operation without having to load or unload the workpiece in a sophisticated machining process. Equipped with 2 kinds of 3-dimensional interference confirmation function, it offers the choice for particular jobs or purpose.

Standard specification

Controlled axis	
Increment system	IS-A, IS-B
Flexible feed gear	Optional DMR
HRV2 control	
Interlock	All/each axis, each direction, block start, cutting block start
Machine lock	All/ each axis
Emergency stop	
Over travel	
Stored stroke check 1	
Mirror image	each axis
Follow-up	
Servo off/mechanical handle	
Interpolation functions	
Nano interpolation	
Positioning	G00(Linear interpolation type positioning is possible)
Exact stop mode	G61
Tapping mode	G63
Cutting mode	G64
Exact stop	G09
Linear interpolation	
Circular interpolation	
Dewell	Second specified or rpm specified (rpm of milling bench series specifies pause requiring thread cutting and synchronous feed options)
Skip	G31
Torque limit skip	
Reference point return	G28
Reference point return check	G27
2nd reference point return	
Program input	
Tape code	EIA/ISO
Label skip	
Parity check	Horizontal and vertical parity
Control in/out	
Optional block skip	1
Max. programmable dimension	±9 digits (R, I,J and K Is ±12 digit)
Program file name	32 characters
Sequence number	8 digit

Absolute/incremental programming	Combined use in the same block
Decimal point programming/ pocket calculator type decimal point programming	
Input unit 10 time multiply	
Diameter/radius programming	
Program input	
Plane selection	G17, G18, G19
Rotary axis designation	
Rotary axis roll-over	
Coordinate system setting	
Automatic coordinate system setting	
Manual absolute on and off	
Programmable data input	G10
Programmable parameter input	
Sub-program call	
Circular interpolation by R programming	R, I, J, K 12 digit
Auxiliary/Spindle speed function	
Auxiliary function	M8 digit
Auxiliary function lock	
High-speed M/S/T/B interface	
Waiting function	Only for more than 2 path cor
Multiple command of auxiliary function	3
Spindle speed function	S5 digit, binary output
Tool function/ Tool compensation	
Tool function	T8 digit
Tool offset pairs	32
(Note) Specify total of tool offset pairs of each path, Max. digit of too offset is 9.	
Accuracy compensation function	
Backlash compensation	
Backlash compensation for each rapid traverse and cutting feed	
Smooth backlash compensation	
Editing operation	
Program Storage size (All paths in total)	64 Kbyte
Number of registerable programs	63

Part program editing	
Program protect	
Extended part program editing	
Memory card program edit & operation	Max. 63 programs
Parameter set supporting screen	
Help function	
Self-diagnosis function	
Periodic maintenance screen	
Display of hardware and software configuration	
Servo information screen	
Digit input/output	
External key input	
External workpiece number search	9999
Memory card input/output	
Screen hard copy	
Automatic data backup	
Interface function	
Embedded Ethernet	

Optional specification

Controlled axis	
Synchronous/Composite/ Superimposed control by program command	
Axis synchronous control	Max. 6 pairs
Twin table control	
Arbitrary angular axis control	
Tandem control	
Tandem disturbance elimination control	Axis synchronous control is required
Torque control	
Included in PMC axis control	
Pole position detection function	
Control axis detach	
Chopping	
Increment system C	0.0001mm, 0.0001deg, 0.00001inch
Increment system D	0.00001mm, 0.00001deg, 0.000001inch
Increment system E	0.000001mm, 0.000001deg, 0.0000001inch

Arbitrary command multiply	1/9999～9999 times
Learning control	
Preview repetitive control	
Learning control for parts cutting	
Dual position feedback	
HRV3 control	
HRV4 control	
Inch/metric conversion	
Stroke limit external setting	
Stored stroke check 2, 3	
Stored limit check before move	
Interference check for rotary area	
Unexpected disturbance torque detection function	
FANUC SERVO MOTOR β Series unexpected disturbance torque detection function	
Interpolation function	
Single direction positioning	G60
Exponential interpolation	
Polar coordinate interpolation	
Cylindrical interpolation	
Helical interpolation	Circular interpolation plus max. 2 axes linear interploation
Involutes interpolation	
Hypothetical axis interpolation	
Conical/spiral interpolation	
Smooth interpolation	
Nano smoothing	Requires A1 outline control ｜or｜｜
Thread cutting, synchronous cutting	Requires main shaft serial output
Multi threading	
Thread cutting retract	
Continuous threading	
Variable lead thread cutting	
Circular thread cutting	
Polygon turning	
Polygon machining with two spindles	
Multi-step skip	
High-speed skip	Input signal is 8 points
3rd/4th reference position return	
Floating reference position return	
Normal direction control	

NURBS interpolation	
Index table indexing	
Program input	
Optional block skip	9
Dynamic switching of diameter/radius specification	
Polar coordinate command	
Workpiece coordinate system	
Workpiece coordinate system preset	
Addition of workpiece coordinate system 48 pairs	48 sets
Addition of workpiece coordinate system 300 pairs	300 sets
Direct input of workpiece origin offset value measured	Included in workpiece coordinate system
Optional chamfering corner R	
Customer macro	
Addition of customer macro common variables	#100~#199, #500~#999
Customer macro common variables between each path	Only for 2 path control
Interruption type customer macro	
Canned cycle for drilling	
Auxiliary / spindle function	
2nd auxiliary function	B8 digit
Spindle serial output	S5 digit, serial output (max. 6 spindles)
Constant surface speed control	
Spindle override	0~254%
Spindle orientation	1 spindle
Spindle orientation expansion	Max. 6 spindles
Spindle output switching function	1 piece
Spindle output switching expansion	Max. 6 spindles
Spindle synchronous control	
Simple spindle synchronous control	
Multi spindle control	
Spindle positioning	
Rigid tap	
Rigid tap by manual handle	

Arbitrary position reference setting for Cs axis	
M code group check	
Spindle speed fluctuation detection	
Live tool control with servo motor	
Tool function / Tool compensation	
Tool offset pairs	64
	99
	200
	400
	499
	999
	2000
Tool offset memory B	Geometry/wear memory
Tool offset memory C	Distinction between geometry and wear or between cutter and tool length compensation
Accuracy compensation function	
Stored pitch error compensation	
Interpolation type pitch error compensation	Stored pitch error compensation is required
Bi-directional pitch error compensation	Stored pitch error compensation is required
Extended bi-directional pitch error compensation	Stored pitch error compensation, bi-directional pitch error compensation are required
Periodical secondary pitch error compensation	Stored pitch error compensation is required
Inclination compensation	Stored pitch error compensation is required
Straightness compensation	Stored pitch error compensation is required
Interpolation type straightness compensation	128 points. Stored pitch error compensation is required
3-D error compensation	Stored pitch error compensation is required
Thermal growth, Compensation along tool vector	
Hobbing / Electronic gear box	
Single Electronic gearbox	
Skip function for EGB axis	
Electronic gearbox 2 pairs	
Electronic gearbox automatic	

phase synchronization	
Spindle electronic gearbox	
Flexible synchronous control	
Editing operation	
Part program storage size	128Kbyte
	256Kbyte
	512Kbyte
	1Mbyte
	2Mbyte
	4Mbyte
	8Mbyte
Number of registerable programs	Expansion 1 max. 1000
	Expansion 2 max. 4000
Key and program encryption	
Playback	
Machining time stamp	
Background editing	
Multi part program editing	Including background editing
	only available on 15" and 10" display unit
Memory card program entry count extension	Max. 1000 programs
Machining condition selection functions	AI control I	or II is required
Spindle information screen	
Trouble diagnosis	
Editing operation	
Machine alarm diagnosis	

Graphic function	
Touch panel control	
External touch panel interface	
Virtual MDI key	
Data input/output	
Reader/puncher interface	Reader/puncher (Ch.1) interface
	Reader/puncher (Ch.2) interface
Fast data server	Only 1 path control/option board is required
Data server buffer mode	Fast data server is required
External tool offset	
External machine zero point shift	
External message	
External data input	Including external tool offset, external message, and external machine zero point shift
External program number search 1~9999	
Power Mate CNC manager	
External I/O device control	
One touch macro call	
Interface function	
Fast Ethernet	Option board is required
PROFIBUS-DP master	Option board is required
PROFIBUS-DP slave	Option board is required
DeviceNet master	Option board is required
DeviceNet slave	Option board is required
FL-Net	Option board is required

Differences in Function between FANUC		31i-A5	31i-A
Simultaneously Control Axes	J803#	5	4
Nano Smoothing	S687	O	O
Tool Center Point Control	S677	O	O
Smooth TCP	R639	O	O
Tilted Working Plane Command with Guidance	R522	O	O
3 Dimensional Manual Feed	S679	O	O
3 Dimensional Tool Radius Compensation	S667	O	O
Workpiece Setting Error Compensation	S993	O	O
Manual Interruption of 3D Coordinate Conversion	S949	O	O
Nano Smoothing 2	R512	O	----
Tool Posture Control	S994	O	----
Tool Length Compensation in Tool Axis Direction	S670	O	----
Cutting Point Command	S996	O	----

Machine Dimension Diagram

Outline

Unit: mm

Top view

Front view

2503

5360

1975

3002

2063

565

7410

3778

2220

1075

80

Floor space and Foundation Diagram

Unit: mm

1318

Base bolt M26xP2.0
No.1B3MA1026A
Nut, base bolt
No.1B3MA1027A
Base Pad
No.1W63A1003A

I.D=Ø21

184

75

I.D=Ø20

Ø140

A VIEW (21 PLACES)

21-A

267

798
798
386 798
908
992

5914
5200

714

926 926 926 926 926 926 927

714

160

7410

T-Slot Dimension

Unit: mm

$+0.024$
$+0.006$ G7

18

20 ± 0.5

34

12^{+2}_{0}

30^{+2}_{0}

Table Dimension

Unit: mm

100 150 150 150 100
800

3250

Machine Specification

Subject		CH5-3000
Travel		
X-axis travel	mm(inch)	3000(118.1)
Y-axis travel	mm(inch)	1000(39.4)
Z-axis travel	mm(inch)	750(29.5)
A-axis travel	degree	-40 ~ +40
B-axis travel	degree	-40 ~ +40
Spindle nose to table	mm(inch)	100-850(3.9-33.5)
Table		
Table size	mm(inch)	3250x800(128x31.5)
T-slot (No. x Width x Distance)	mm(inch)	5x18x150(0.2x0.7x5.9)
Table height	mm(inch)	1075(42.3)
Maximum load capacity	kg(lb)	3000(6600)
Spindle		
Max. spindle speed	RPM	12000
Spindle taper		7/24Taper,No.50
Tool clamping force	KN	18
Feed rate		
X/Y/Z axis rapid speed	M/min(fpm)	15/12/10 (49.2/39.4/32.8)
Cutting feed rate	mm/min(ipm)	1-8000 (0.04-315)
Jog feed rate	mm/min(ipm)	1260(49.6)
Automatic Tool Change (ATC)		
Tool shank		ISO 50 or BT-50 or CT-50
Magazine station	tool	32
Maximum tool diameter (without adjacent tool)	mm(inch)	250(9.8)
Maximum tool length	mm(inch)	350(13.8)
Maximum tool weight	kg(lb)	25 (55.1)
ATC type		ARM

Subject		CH5-3000
Motor		
Spindle motor (cont./30 min.)	KW(HP)	25/30(33.3/40)
Axes motor X/Y/Z	KW (HP)	4/4/9(5.3/5.3/12)
Power		
Power requirement	KVA	45
Air Source	kg/cm2(PSI)	6(85)
Oil/Coolant tank capacity		
Coolant tank capacity	L (gal)	800 (211.3)
Hydraulic system capacity	L(gal)	60(15.9)
Lubricating system capacity	L(gal)	4(1.1)
Controller		
Fanuc		31i-B5
Machine size		
Machine height	mm(inch)	3778(149)
Floor space	mm(inch)	7410x5439 (291.7x214.1)
Machine weight	kg(lb)	28550 (62942)

Standard Accessories

- Alarm lamp/work lamp
- Air dryer
- Base bolts and pads
- Chips auger (4 sets)
- Tool box
- Z axis nitrogen balancing system
- Mechanical oil/coolant separator
- Safety door
- Disc type oil/coolant separator
- Spindle oil cooling system

Optional Accessories

- Linear scale system
- Coolant through spindle system
- Work piece measuring system
- Tool length measuring system
- Tool broken detection device
- Coolant cooling system
- Oil demister
- Top protective hood
- Conveyor & chips cart
- Controller system: Fanuc/ Siemens/ Heidenhain
- Five axes simultaneous system

■ All diagrams on the catalog are for reference only. In case of discrepancy with actual machine parts, the actual machine shall prevail.

■ We reserve the right to modify or discontinue the use of product specification, appearance and equipment.

LITZ ®

Manufacturer	Agent
LITZ HITECH CORP. **No.18 Yu 9 Rd., Yu Shih Ind. Park, Tachia** **Dist., Taichung City 437, Taiwan** Tel : +886-4-26815711 Fax: +886-4-26815712 , 26815108 http://www.litzhitech.com E-mail: sales@litzhitech.com	