



LU-620

VERTICAL MACHINING CENTER (5AXES)

Pursue Quality. Create Added Value.



Technical Highlights:

- ▶ Innovative design, state-of-art technology
- ▶ Powerful 5-axis machining, excellent machining capabilities
- ▶ High-rigidity structural design, precision 5-axis machining
- ▶ High-speed X/Y/Z axes and high-rigidity B and C axes
- ▶ Built-in Precision Measurement System

LITZ HITECH CORP.

LU-620

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Main Sub-systems

ATC system



Measurement system



Maintenance and service



Drive system



Spindle system



Controller system



Center calibration system



Collision prevention system



Process application



Chip conveyer system



Thermal displacement control



B / C axis rotary table



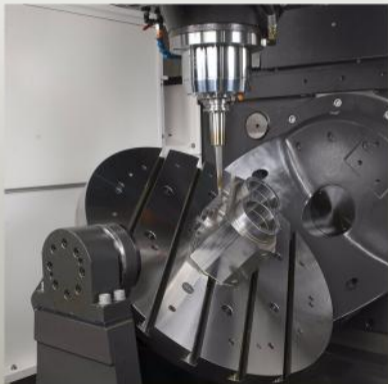
LU Series – Vertical Machining Center (5-axis)

The LU Series has reached a brand new realm of 5-axis machining; aside from being extensively perfected in aspects of technical precision, high-proficiency and state-of-the-art control technology, the LU Series also has the best performance/cost ratio.



Powerful 5-axis machining / Excellent process performance

The basic design concept of LU-620 is to target for perfect and quality machining performance of the powerful 5-axis machining by standardization and simple and yet reliable structure, so as to provide customers with the most economic 5-axis machining equipment for their versatile jobs.



High-precision 5-axis machining

On LU-620, a high efficiency and productivity comes true by the high-performance control systems which are capable of high-speed outline control for attaining optimal surface accuracy in a shortest machining time. Dynamic 5-axis simultaneous machining is capable of processing and producing complex parts and meets versatile machining requirements.



Innovative features:

Easy access to working area, convenient chip expelling performance, ergonomics design, servo drive, optical linear scale/encoder compensation for all axes, and direct measurement system are available features of the machine, making the 5-axis machining center with numerically controlled rotary table exceptional in all realms.

High-rigidity structure design

LU-620 5-axis machining center adopts rigid cast iron frames to support the rotation of single swivel B axis and C axis. X/Y/Z axes adopt the roller linear guide ways design that ensures optimal stability for the process precision and surface quality, providing the customer with maximized production efficiency.



Technical Features:

1. Extremely high efficiency: applicable to simple and complex 5-axis machining.
2. High precision: Optical linear scale/encoder available on X/Y/Z axes + B/C axes.
3. Powerful milling and turning spindle: Direct-coupled drive giving a torque up to 70 Nm.
4. Tool magazine: Capable of 32 tools.

High-precision Drive System

In an extremely high-standard processing, the linear technology is capable of improving process efficiency and machining precision. These machines set up new standards with steady and compact structural design; optimal repetitive precision and highest dynamic performance are made possible by the adoption of high-tech components and high cutting speeds.



X/Y/Z Axes Equipped with Optical Linear Scales **OP**



- X/Y/Z axes can be equipped with an optical scale system for prompt detection of thermal displacement resulting from high-speed movements, with the value of thermal displacement fed back to controller for making compensation. This is especially suitable for processing precision parts.
- The optical scale system is equipped with a pressured gas protection device to prevent it from being contaminated by dust and oil mist, for ensuring precision and prolonging service time.

B/C Axis of Rotary Table

The numerically controlled rotary table, equipped with encoder is adopted for the versatile applications in 5 axes technology. The rotation speed of the rotary table can be up to

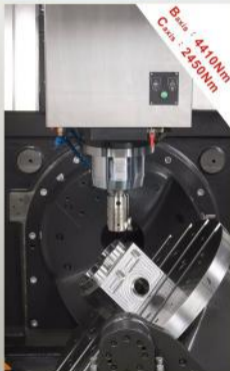
25 RPM for the B axis and **25** RPM for the C axis.

Tilting at Rotary Table



- B axis tilting angle: $-50^{\circ} \sim +110^{\circ}$
- C axis rotation angle: 360°
- Rotations of B axis and C axis are driven by separate servomotors.
- Max. table load capacity: 300kg

Locking Force of the B/C Axis



- LU-620 adopts rigid single swivel B axis and C axis configuration that ensures precision machining of synchronized processing of all five axes or at arbitrary table angle. This expands the application of the machine and satisfies highly complex machining requirements.
- The hydraulic braking system is used on both B axis and C axis, offering extremely high reliability.

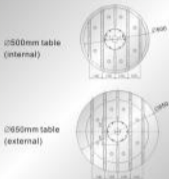
Rotary Table and Tailstock

Rotary Table Tailstock Support



- The large diameter table provides enhanced installation of workpiece and/or jig, expanding the working range.

Unique Internal/external Table Design



- The large Rotary Table provides larger workpiece mounting interface; the small Rotary Table minimizes interference zone of the process.

Rotary Table Unit



- Rotary Table is supported by tailstock, ensuring machining precision when the Rotary Table is under heavy load.

Hydraulic Brake Unit of Rotary Table



- High-performance hydraulic module provides for braking system of the Rotary Table, ensuring enough clamping force of the heavy-load Rotary Table.

Spindle Unit

Advanced spindle design greatly upgrades cutting efficiency and surface precision, especially applicable to mass production and precision machining requirements.

High-speed Spindle



Cooling System of Spindle



- Spindle and Spindle motor adjustment plate are provided with coolant systems for effective control over temperature change.

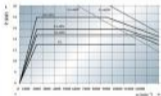
Power Chart of Spindle

Heidenhain iTNC530 QAN 200U

Duty cycle	Speed n	Power P	Torque M	Current I
31	1500 rpm	10.0 kW	63.7 Nm	25.0 A
	11000 rpm	10.0 kW	6.7 Nm	
	12000 rpm	8.8 kW	6.4 Nm	
36-60%	1500 rpm	12.5 kW	79.8 Nm	28.0 A
	3000 rpm	12.5 kW	11.9 Nm	
	12000 rpm	10.0 kW	6.0 Nm	
56-40%	1500 rpm	14.0 kW	80.4 Nm	32.0 A
	6000 rpm	14.0 kW	18.1 Nm	
	12000 rpm	11.0 kW	6.8 Nm	
96-25%	1500 rpm	17.0 kW	108.6 Nm	37.0 A
	7500 rpm	17.0 kW	21.7 Nm	
	12000 rpm	12.0 kW	9.5 Nm	

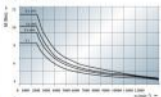
Power Chart of Spindle

Power characteristic curve



Torque Chart of Spindle

Torque characteristic curve



Oil Separator Design

Lubricant Collection



- The machine is designed with an oil-coolant separator for separating lubricating oil from cutting coolant, effectively preventing deterioration of the cutting coolant, ensuring quality of the process.

Oil-coolant Separator Tank



Spindle Clamping Force



- Spindle tool pulling force **1200kgf (11760N)**
- High tool pulling force of spindle for powerful tool clamping and high rigidity, enhancing cutting rigidity.
- Static rigidity of spindle: 25kg/um.
- Adoption of two-face restraint tool holder (NBT) enhances rigidity of tool holding by two contact faces at spindle.

Direct-Drive Spindle



IDD is the optimal solution for heat isolation

IDD (Isolated Direct Drive System)

- The IDD design isolates heat source and minimizes thermal displacement, providing accuracy and long lifespan of the Spindle.
- Coupling design with thermal isolation between motor and spindle; the entire spindle can be optionally controlled with a coolant temperature control system to attain higher precision control.
- Spindle is driven by direct-coupled motor without the need of transmission belt or gear, offering noise-free, back-gap-free and vibration-free operation.

ATC and Magazine Unit

Magazine Unit

A 32 tools magazine is comprised. Tools can be replaced during the processing.

ATC Operation Panel



Automatic Tool Change Mechanism



■ Arm-type Tool Change Mechanism and the magazine are installed on the left side of machine, offering a minimal waiting time for the standby tool.

Arm-type Tool Change Mechanism



■ High-speed tool exchange
■ Time of tool change (T to T): **5** seconds.

High-efficiency Chips Expelling Mechanism – Total solution for expelling chips from a 5-axis machining center

Chip Conveyor System (Standard)



The design comprises a simple and effective chip removal mechanism that brings cutting chips onto the chip conveyor in front of the machine by way of large amount of flush coolant. The chip conveyor then moves the chips to the chip cart on the left of the machine, where the user is allowed to clear the chips easily.

Recommended Chip Removers

● : Excellent ○ : Acceptable X : Poor

Material		Steel	Iron	Aluminum/ colored metal	Mixture of chips
Shape of chips					
Track-type chip conveyor	Scraper type	Carbon Femil	X	●	X
		Aluminum (light)	X	X	●
	Chain type	●	○	X	○

Chip Conveyor (Scraper type)



Chip Conveyor (Chain type) **OP**



Tool Laser Measurement System

Continuous monitoring of tool data allows early detection of tool depletion or tool fracture before the tool is extensively damaged. This prevents subsequent losses and lowers costs of defective workpieces or repair expenses of the same. Measuring cycles operate automatically. This ensures effective monitoring of the process including unmanned processes.

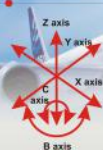
TL Series Laser Measurement System ensures high quality monitoring and measurement. High accuracy measurement and precision detection of wear and tear.

With the following features:

- Shorten down time
- Unmanned process
- Lower anomaly rate
- Higher production efficiency
- High and persistent production quality



Structure of 5-axis Movement Simultaneous



LU-620

Controller:
Heidenhain/Siemens/Fanuc available

12000 rpm Direct Drive Spindle

X/Y/Z-axis + B/C-axis

Rotary Table Tailstock Support

Cross slide design (X/Y axes)

32 Tool Magazine

Chip conveyor



High precision Measurement System

B-axis Encoder **OP**



- Tilted B axis equipped with Heidenhain high precision encoder available, ensure accuracy of the swivel axis.

C-axis Encoder **OP**



- Swivel C axis equipped with Heidenhain high precision encoder is available.

Center Calibration Function **OP**



- Rotary table center calibration is equipped with Heidenhain TC-740 high precision measure head and standard measuring sphere in combination with Heidenhain measurement software, capable of detecting center offset of the rotary table, for compensating into the control system to ensure accuracy of rotary table center.



Design of easy maintenance

Tool Magazine Loading/Unloading and Access Door Design



- An access door is provided for the tool magazine, for facilitating loading and unloading tools and performing maintenance.

Convenient Access Doors



- Hydraulic pipeline and cooling system piping are all located at the rear of machine for easy maintenance.

Easy-to-maintain Electrical Cabinet



- Wiring in the electrical panel complies with CE safety specifications, ensuring operation control uninterrupted by external interferences.
- High-performance digital controllers are adopted for meeting high-speed and high accuracy requirements of the era through systemized and networking developments.
- Ventilation type heat exchanger is equipped to promptly dissipate heat from the electrical cabin, keeping a constant temperature in the cabin for steady operation of the control system.

High-performance Layout

Safety Door System



- The process program will not start if the safety door is not closed, for the sake of safety of the operator.
- The process program will stop if the safety door is opened during the operation, for the sake of safety of the operator.

Fluorescent Light (Lighting)



- High luminance lighting is provided within the machine, facilitating the operator in carrying out loading/ unloading and measurement tasks.
- Lighting installations are provided with dust-proof, water-proof and explosion-proof features.
- Work lights comprise market available parts for easy maintenance and timely service.

Disc Type Oil-coolant Separator



- Disc type oil-coolant separator is easy to add and takes up small space.
- Disc type oil-coolant separator provides effective separation of floating oils in the water tank, ensuring the quality and prolonged lifespan of the cutting fluid, and the quality of the product.

Pneumatic and Lubrication System



- High performance and quality parts are used in the lubrication system and the compressor unit, ensuring a reliable system.

Extensive operating space and demister system

Hood on the Top 



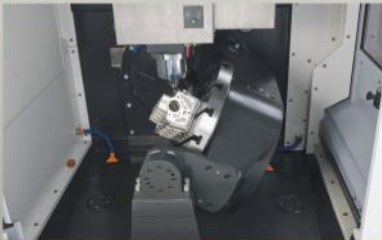
■ If the process employs a misty cutting coolant, a protection hood can be selected to accompany the use of a de-mist unit, so as to improve the air quality in the machining room.

Demister Unit 



- The fully enclosed hood of metal plate together with the mist collector can effectively recycle the dust and oily mist resulting from the process, so that the hazardous substances are not inhaled by the operator, for the protection of operators' health.
- Enables production of high precision parts in an enclosed space or a clean room, allowing effective control of air quality, resulting in conformity to requirements of a Green Technology.

Exceptionally Wide Processing Space



■ Wide processing space, fewer interference zones in the workpiece, easy chip expelling by the chip clearing system.

Conformity to Ergonomics and Space Saving

Access distances

Distance between operator and spindle: **305-830** mm

Distance between operator and machine center: **565** mm

Opening of front access door: **1000** mm

Elevation of Operation panel (above the ground): **900-1100** mm



Access distance and operation conveniences

Operation Conveniences



■ Document and working compartment.



■ Moveable operation panel offers convenient operation.



- The machine is provided with both a front door and a side door, offering an exceptionally wide space for working and loading/unloading, facilitating the operation.
- Wide window offers excellent visibility for monitoring process conditions.

User-friendly Interface

Ergonomically Designed Operation Panel

The ergonomically designed operation panel offers optimal comfort for the operator with an elevation of 0.9m-1.10m.

High-performance Software System

Heidenhain iTNC530 (5 multi-axis)
FANUC 0iMD (4+1 multi-axis)
3D software
15" TFT technology
User-definable softkey
SMARTNC

Features

Control System complies with high processing requirements either for processing or molding, for production or for high-speed processing, the LU-series offers exceptional performances and merits.

Safety Control

The safety control of the Control system complies with CE regulations and ECN safety specifications.

Event Message Software

Enhances operability of machine, lowers error occurrence. Remote service ensures prompt technical support both in the programming and operation aspects.



Control System Unit

Heidenhain iTNC-530 system, the most advanced 5-axis controller with innovative software functions upgrades precision, production efficiency and process safety. The system comes with networking ports for prompt and direct linkage with the external network.



Collision Prevention Software



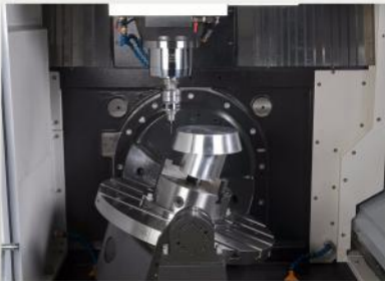
DCM(Software Function)
Dynamic Collision
Monitoring for iTNC 530

Prevents Collisions



Precision Process Tests

LU-620 5-axis machining center offers dynamic cutting tests based on the NAS979 standard, for checking out precision performances of the machine.



Roundness (synchronous control of 5 axes)
<NAS 979 Specification>

Roundness (actual reading) → **0.008mm**



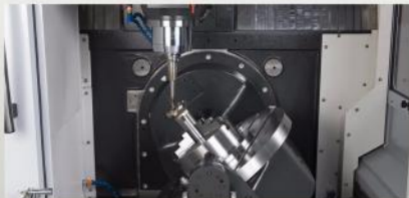
Cutting conditions:

Workpiece <JIS>	A7075 (Aluminum alloy)
Tool	Milling tool with super-hard tip Ø 40mm (2-tip)
Spindle speed	2000 rpm
Cutting speed	2000 mm/min
Workpiece dimensions	Ø216mmXØ250mmX H 63.5mm

5-axis Processing Applications

One-setup processing for a complex part

Equipped with Heidenhain iTNC-630 controller, the best 5-axis precision processing technology is available. LU-620 is your optimal 5-axis process solution that meets versatile needs of parts machining.



Application examples of high-efficiency 5-axis processing (in molding).

Vertical Machining Center (3-axis)




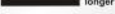


Surface finish: good





Vertical Machining Center (5-axis)



Surface finish: excellent

Price	 lower
Surface finish	 good
Tool lifespan	 shorter
Process time	 longer

Total Cost: A

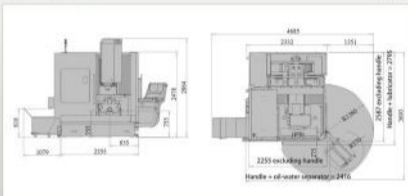
Price	 higher
Surface finish	 excellent
Tool lifespan	 longer
Process time	 shorter

Total Cost: A

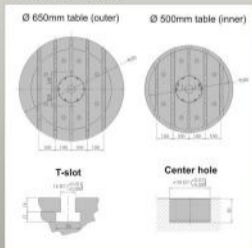
Machine dimensions

Outline Dimensions

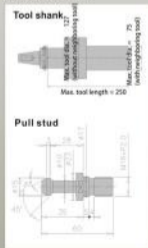
Unit: mm



Rotary Table Dimensions



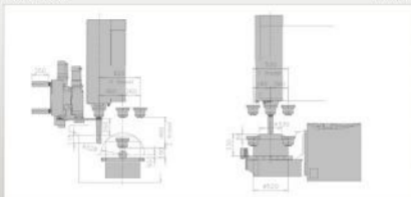
Tool Specifications



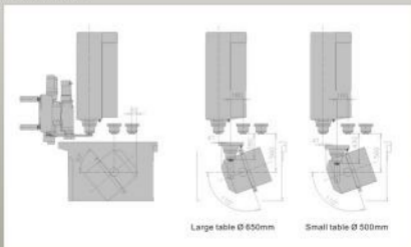
Working Area and Interference Area

Working area

Unit: mm



Interference area



Machine specifications

Model		LU-620
Travel		
Travel, X/Y/Z	mm	620/520/460
Tilted B-axis swivel range	Deg.	-50° ~ +110°
Rotation C-axis swivel range	Deg.	360°
Spindle nose to rotary table surface	mm	150-610
Spindle		
Spindle drive		Direct coupling
Tool shank		ISO 40
Spindle speed	rpm	12000
ATC Tool Change System		
Tool number	No.	32
Max. tool length	mm	250
Max. tool diameter (without neighboring tool)	mm	Φ76 (Φ127)
Motor		
Spindle motor (continuous/30min.)	Kw	10 / 12.5
X/Y/Z-axis motor	Kw	7.2 / 5.0 / 7.2
B/C-axis motor	Kw	9.6 / 5.0
Rotary table		
Table diameter (external/internal)	mm	Φ650/Φ500
Center hole size	mm	Φ50H7X30 Depth
T-slot (No x width x center)	mm	5x100x18
Max. size of workpiece	mm	Φ520x330L
Max. load of workpiece	kg	300
Rapid Speed		
X/Y/Z rapid speed	M/min	36/36/36
B/C rapid speed	rpm	25
Cutting feedrate	mm/min	1-20000
Controller		
Model		HEIDENHAIN ITNC 530(5)
Miscellaneous		
Machine weight	kg	8800
Coolant tank capacity	L	240
Machine dimension	mm	2260x2560x3000
Power requirement	KVA	25
Compressed air source	kg/cm ² (l/min)	6 (1600)

Accessories overview

● Standard ○ Optional ☆ To be advised

Spindle

Spindle speed 12000RPM	●
Spindle oil cooling system	●
Spindle motor plate cooling system	●
Coolant through spindle system	○
Spindle air-sealing system	●

Cooling System

Programmable air blow system	●
Oil hole holder stopper and tool system	○
Programmable coolant nozzle system	☆○
Splash ring system	●
Coolant cooling system	○

Chip conveyer system

Chip conveyer	○
Chips cart	○
Portable coolant spray-gun	●
Portable air spray-gun	●
Wash down system	○
Top Hood	○
Full enclosure	●

Measurement System

Laser tool length measurement TL Micro 200	○
Contact type tool length measurement TT140	○
Wireless workpiece measurement TS640	○

Rotary Table Unit

Rotary Table Tailstock Unit	○
Air source at Rotary Table	○
Large table Ø 650mm	●

Safety System

Front door/Side door safety switch	●
CE requirement	○

Oil-Coolant Separation System

Disc type oil-coolant separator	○
Mechanical oil/coolant separation system	●

ATC System

Automatic Tool Change (ATC)	●
Tool shank NBT-40	●
Tool shank ISO-40/CAT-40	○
Magazine capacity: 32 tools	●

Drive System

Roller type linear guide way X/Y/Z	●
Linear scale X/Y/Z	○
B-axis encoder	○
C-axis encoder	○
Z axis brake motor system	●

Electrical Appliances

Working light	●
Warning light	●
M30 automatic power off	●
Electrical Cabinet Heat Exchanger	●
Electrical Cabinet Air Conditioner	○

Controller

FANUC DMD (4+1 multi-axis)	○
Heidenhain iTNC-530 (5 multi-axis)	○
Transformer Unit	☆○
Collision Prevention Software	☆●
Center calibration function	☆○

Others

Demister unit	○
Visible rotation window	○

Manufacturer

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