Built Tough, Built SMART!

SMART MACHINE TOOL

NV 5500L II

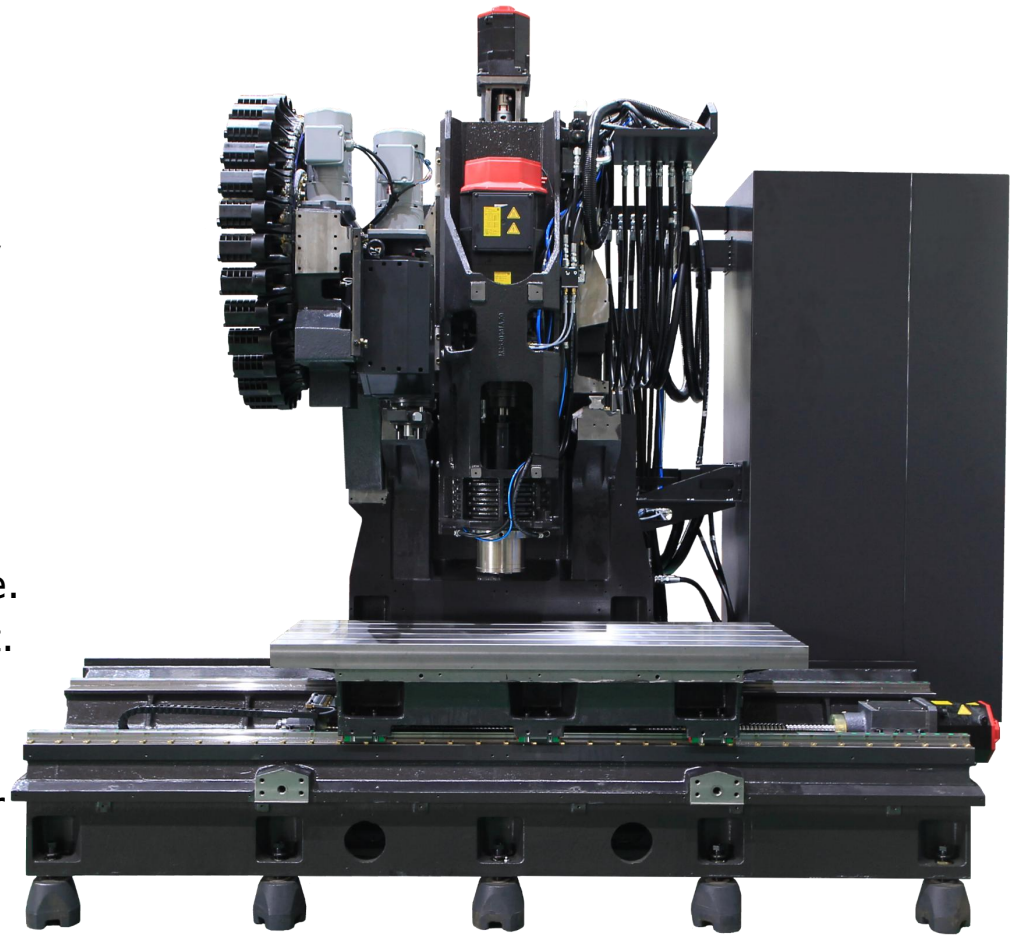
Vertical Machining Center

2025-04-08

Features

- **High performance**
  - High-performance direct coupled spindle with cooling system

  ensures maximum machining accuracy.
- **High rigid Single Column Bridge Type Frame**
  - Y-axis guide on the column instead of machine bed and the table only moves in X-axis eliminate table over-hang problem as no stacking axis, improve positioning accuracy and machining result quality.
- **Excellence accuracy and high-rigidity**
  - Pre-tensioned, heat treated and fixed double anchored ball screws.
  - Roller type LM guideways for all axis feed.
- **Accessibility**
  - Unique cover design for excellence accessibility to the table and spindle.
  - Magazine can be easily accessed via magazine service door in the front.
- **Superior chip disposal**
  - Slant bed design allowing chips fall directly to lift-up chip conveyor without the need of internal screw conveyor. Faster chip disposal, lower noise and less maintenance required.
- **Various options and equipment available**



Machine Specifications

DESCRIPTION			UNIT	NV 5500L II
FEED	Travel distance	X axis	mm (inch)	1,400 (55.12)
		Y axis	mm (inch)	570 (22.44)
		Z axis	mm (inch)	510 (20.08)
	Rapid traverse rate	X axis	m/min (ipm)	36 (1,417)
		Y axis	m/min (ipm)	36 (1,417)
		Z axis	m/min (ipm)	30 (1,181)
	Distance from spindle nose to table top		mm (inch)	130 ~ 640 (5.12 ~ 25.2)
	Slide type		-	LM Roller Guide
TABLE	Table size		mm (inch)	1,600 x 590 (62.99 x 23.23)
	Table loading capacity		kg (lb)	1,000 (2,204.6)
SPINDLE	Taper		-	ISO #40
	Max. spindle speed		rpm	12,000
	Spindle output		kW(hp)	18.5/15/11 (24.8/20.1/14.8)
	Max. spindle torque		N.m (ft.lbs)	117.8 (86.9)
ATC	Type of tool shank		-	BBT 40 [CAT Big plus 40]
	Tool storage capacity		Ea	30
	Max. tool diameter	Continuous	mm (inch)	Ø80 (3.15)
		Without adjacent tools	mm (inch)	Ø125 (4.92)
	Max. tool length		mm (inch)	300 (11.81)
	Max. tool weight		kg (lb)	8 (17.64)
	Tool changing time	Tool-to-Tool	Sec	2.5
		Chip-to-Chip	Sec	4.3
CONTROLLER			-	Fanuc 0i-MF Plus (15” touch panel)

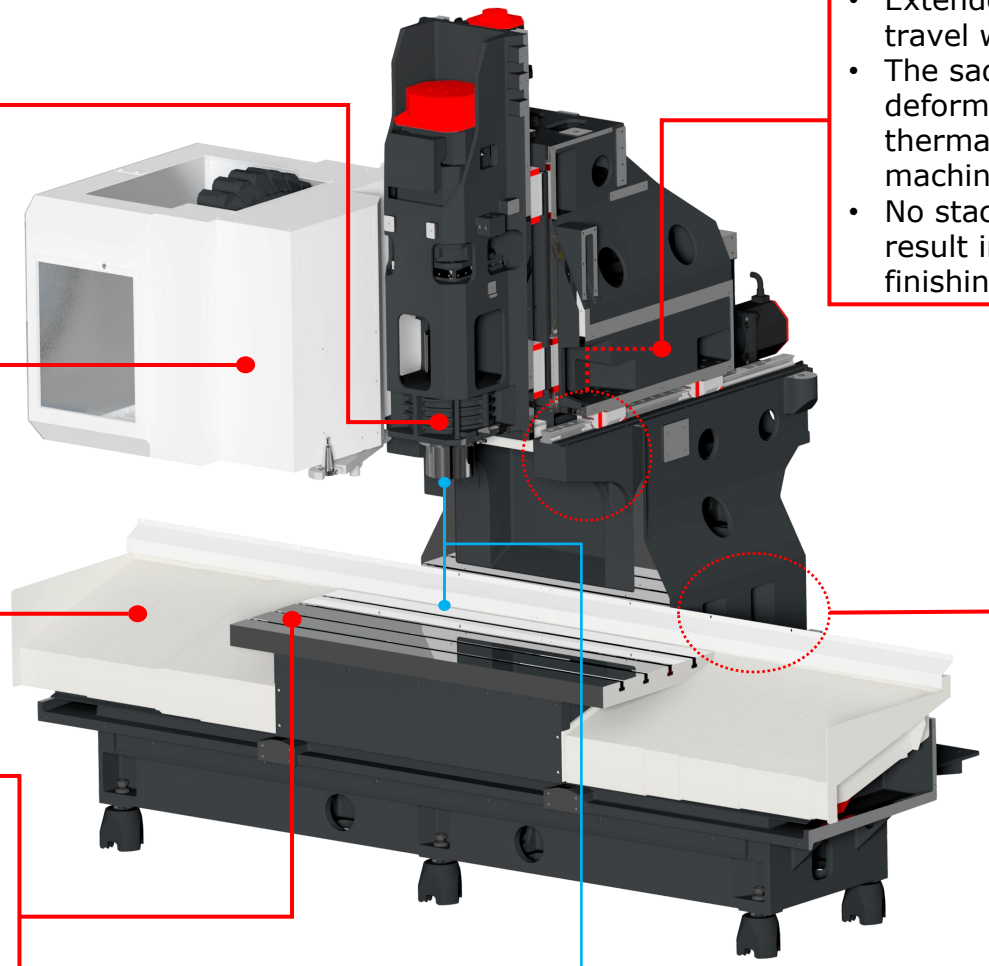
Machine Components

Spindle
- Directly coupled drive spindle
- Oil cooling system
- 12,000 rpm
- BT 40 [CAT 40]

ATC & Magazine
- Storage capacity: 30 ea
- Tool-to-Tool: 2.5 sec
- Chip-to-Chip: 4.3 sec

X-Axis Slant Slide Cover
- Slant slide cover
- Chips fall directly to lift-up Chip conveyor

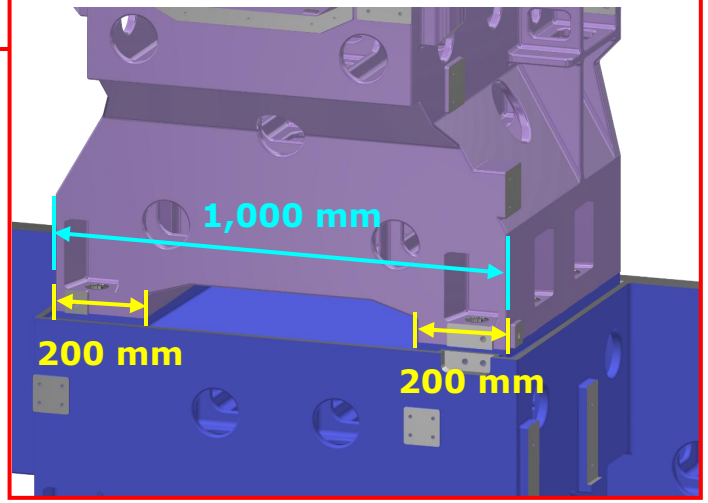
Table
- 1,600 x 590 mm (62.99” x 23.23”)
- Max. load: 1,000 kg (2,204.6)
- 6 LM blocks ensure high-rigidity.
- Table moves only in X-axis direction which prevent table over-hang problem, allow better movement stability.



Distance from Spindle Nose to Table Top
130 ~ 640mm (5.12” ~ 25.2”)

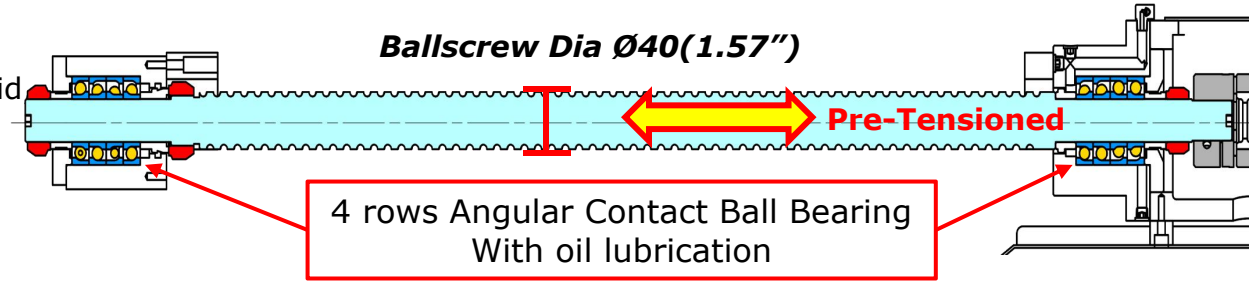
Single Column Bridge Type Structure
- Extended casting for column support allows longer Y-axis travel without losing machining stability.
- The saddle is mounted on the column, preventing deformation due to heat generation from the spindle, thermal displacement is minimized throughout the entire machine, enabling high precision machining.
- No stacking axis for table, the table only moves in X-axis result in higher rigidity, accuracy and better surface finishing result.

Wide Column Design
- Design for extra wide column base and increased width of the contact surface between the column base and the bed, improve vibration absorption ability and enhance machine stability and rigidity.



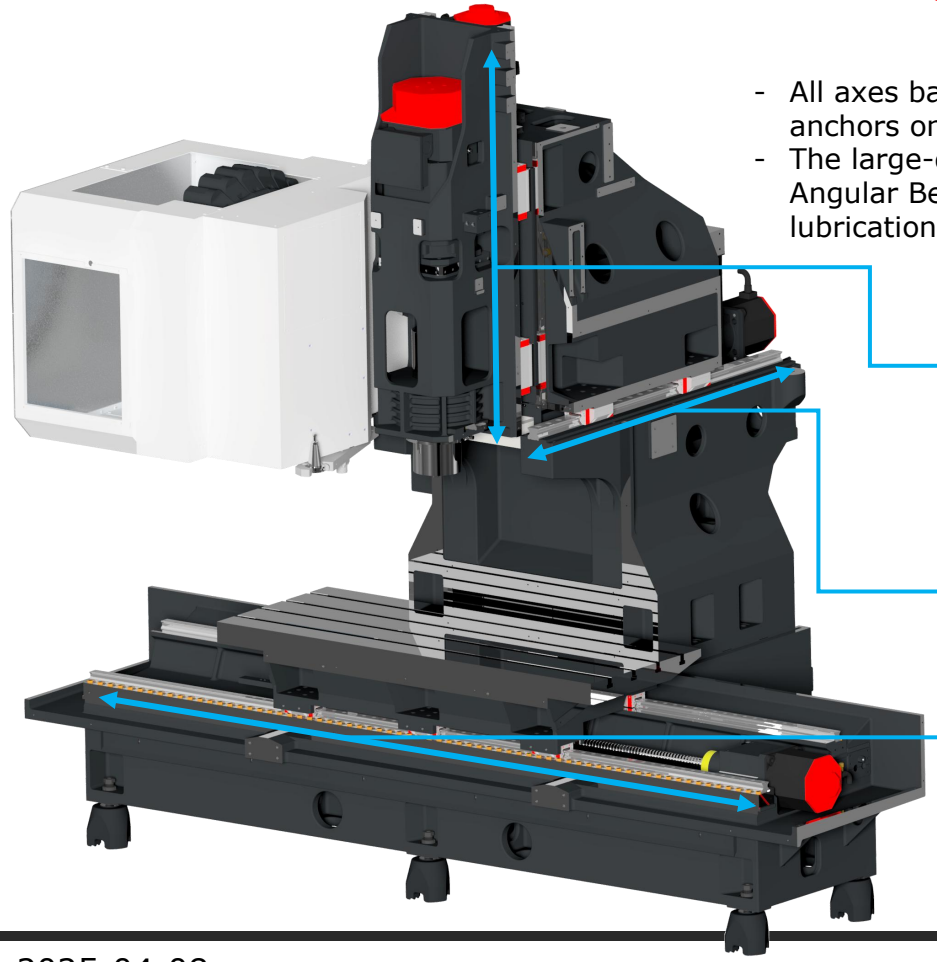
Guideways & Table

High rigid **roller type LM guideways** are applied for all the axis feed, ensure high rigid high accuracy and speed of axis movement.



6 LM blocks are applied to the table to improve load capacity and machine rigidity.

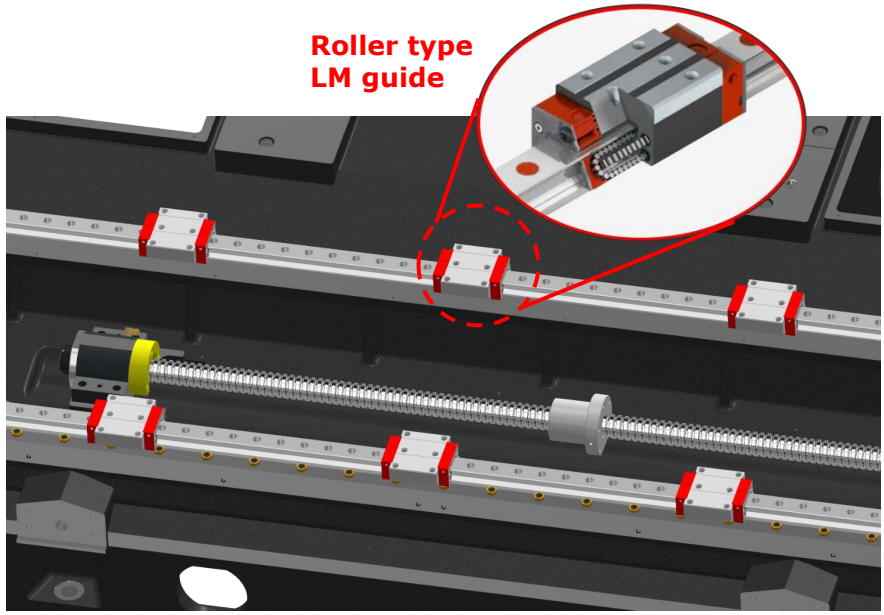
- All axes ballscrews are pre-tensioned, heat treated and fixed by double anchors on both ends, providing ultimate rigidity and minimal thermal growth.
- The large-diameter ballscrews are preloaded with 4 rows of P4 high precision Angular Bearings on both ends. Total of 8 bearing for each axis with oil lubrication ensure high rigidity and long life time.



Z-Axis
Travel: 510mm (20.08")
Rapid traverse: 30 m/min (1,181 ipm)
Motor: 3kW (4hp)
Ballscrew dia: 40mm (1.57")

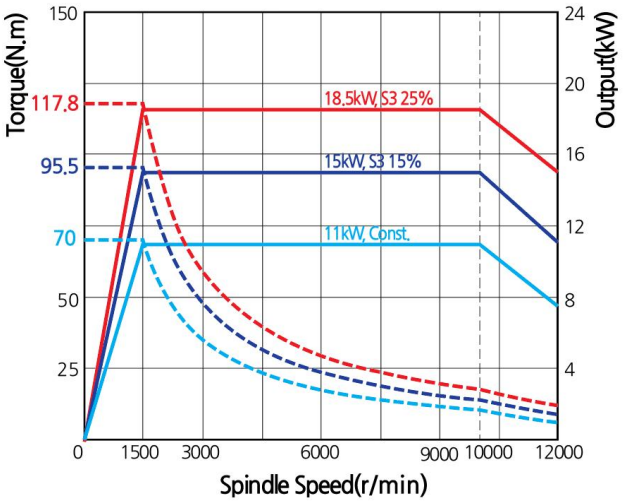
Y-Axis
Travel: 570mm (22.44")
Rapid traverse: 36 m/min (1,417 ipm)
Motor: 3kW (4hp)
Ballscrew dia: 40mm (1.57")

X-Axis
Travel: 1,400mm (55.12")
Rapid traverse: 36 m/min (1,417 ipm)
Motor: 3kW (4hp)
Ballscrew dia: 40mm (1.57")

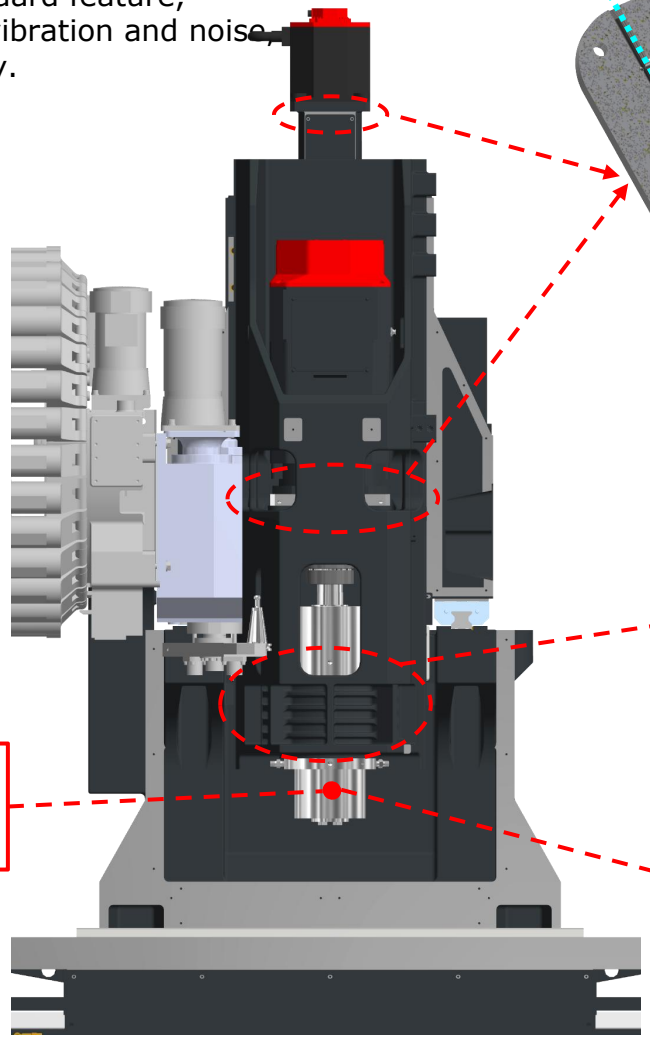


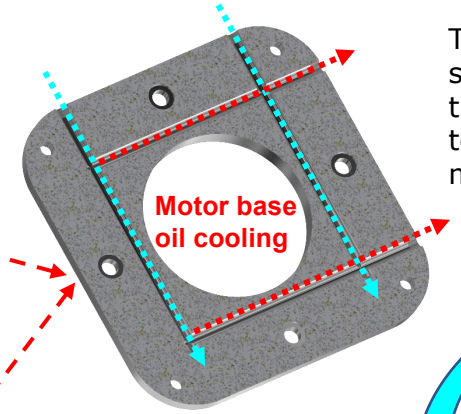
Spindle

High-performance, directly coupled spindle, with a maximum speed of 12,000 rpm as standard feature, allows high-speed processing with low vibration and noise, increase machining accuracy and quality.

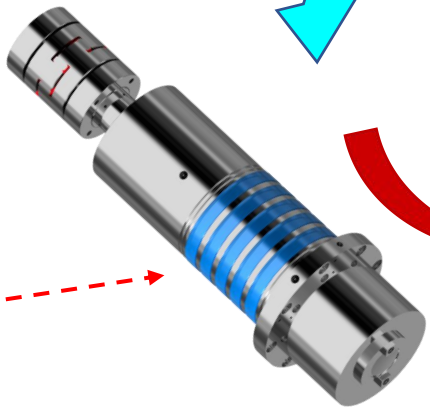


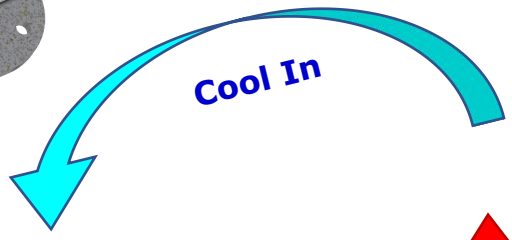
- Hydraulic force for tool unclamp.
- Through Spindle Coolant (TSC) is available as option (20/30/70 bar).



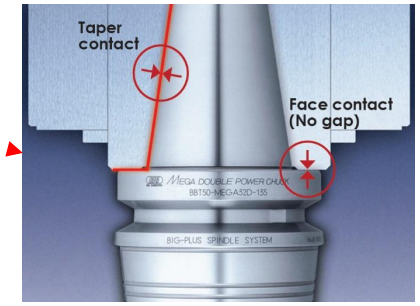


The cooling system not only cooling the spindle but also cooling spindle motor and Z-axis feed motor base as well. Minimizes thermal displacement, maintain low motor and spindle temperature, ensure stable machining performance and high machining accuracy even during a long period of machining.





Oil cooling unit



Dual Contact Spindle

The Big Plus spindle system provides contact between the spindle face and the spindle taper of the tool holder simultaneously.

- Enhanced machining rigidity and minimize deflection.
- Better machining accuracy and improve surface finish.
- Extended tool life.
- Improve ATC repeatability.
- Compatible with existing tools (BT 40 or CAT40).

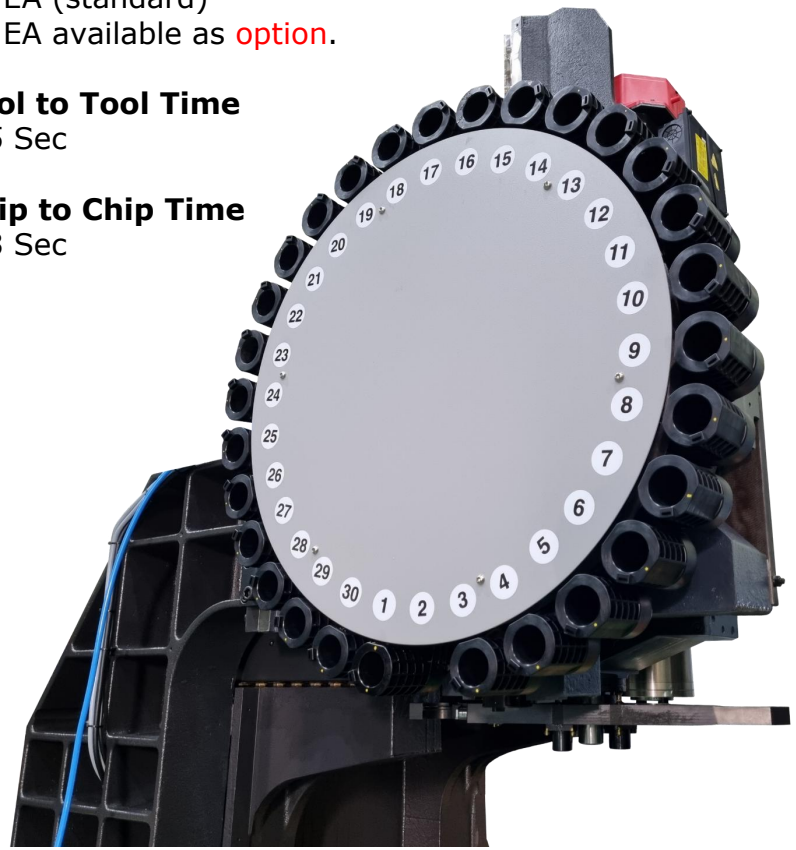
ATC & Magazine

High speed ATC. Reliable and fast twin arm type, significantly reduce machining cycle time and increase productivity.

Tool Storage Capacity
30 EA (standard)
50 EA available as option.

Tool to Tool Time
2.5 Sec

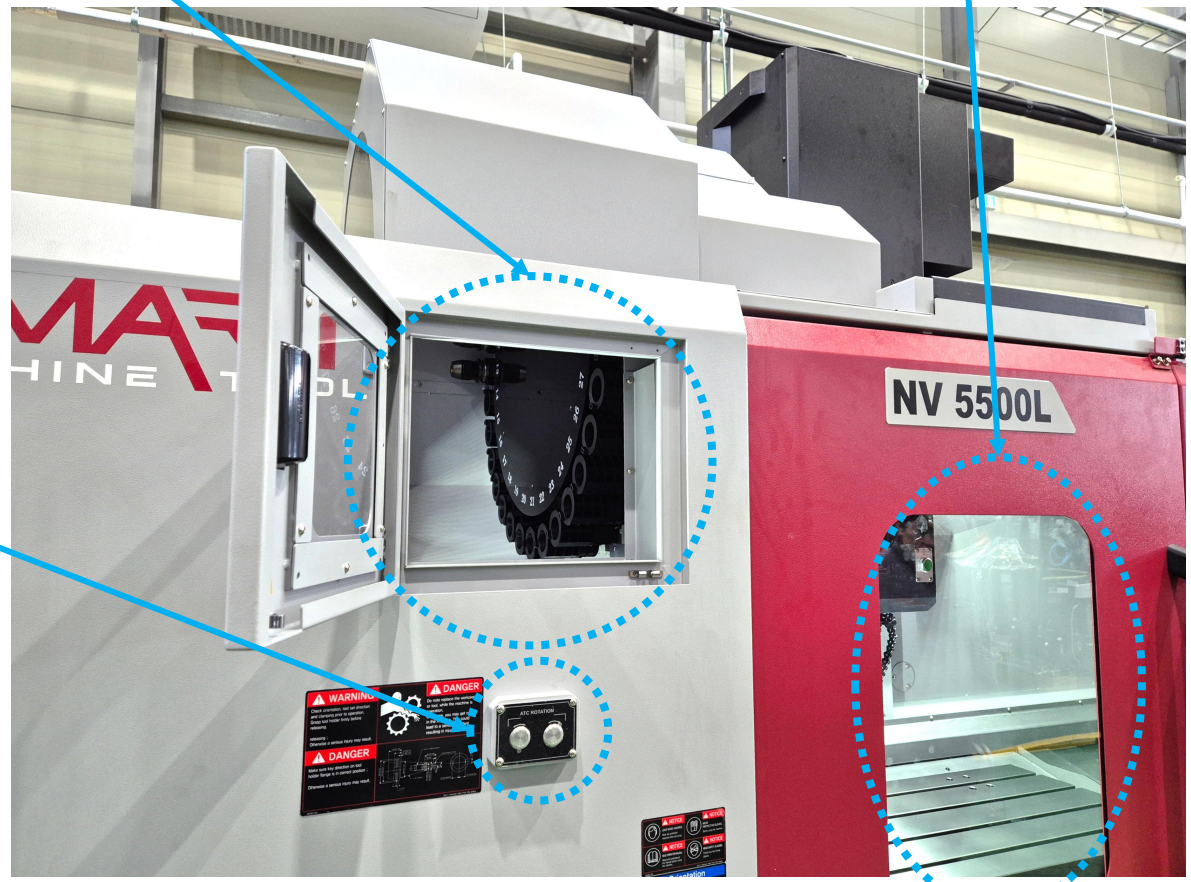
Chip to Chip Time
4.3 Sec



Easy Magazine Maintenance
Tool magazine service door in the front of the machine for easier, faster and more convenient access.

Big Size Window
- Big size window for high visibility.

Magazine rotate button

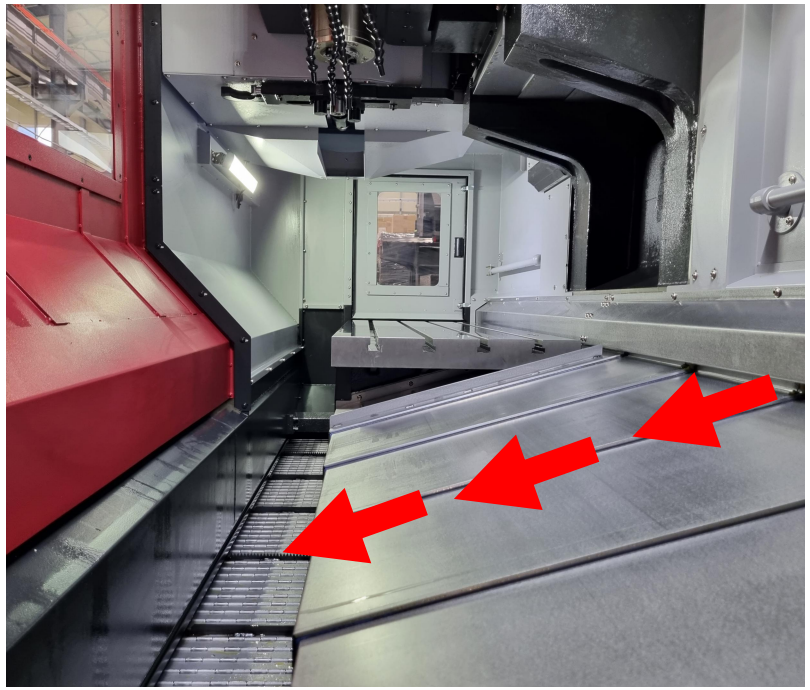


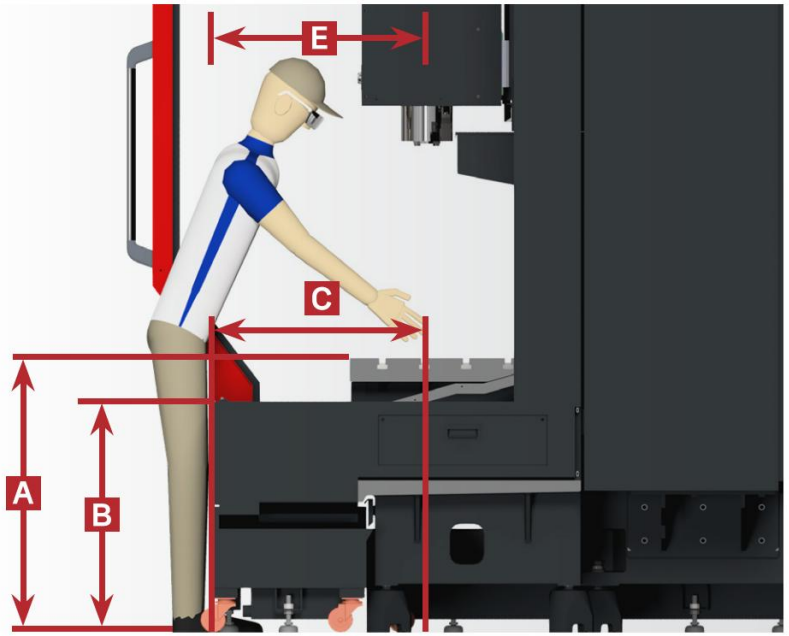
SMART Operation

Slant Bed Design
The moveable table as X-axis and the slant bed design allowing chips generated during machining to fall directly to chip conveyor without the need for installing internal screw conveyor. Such design enables superior chip dispose out of the machine, less noise and require less maintenance compared to machines that equip with internal screw conveyors.

High Accessibility
NV series is designed to have excellent access to the table, by lowered the table and the lowered end of front door, provide convenience to the operator when performing setup operations.

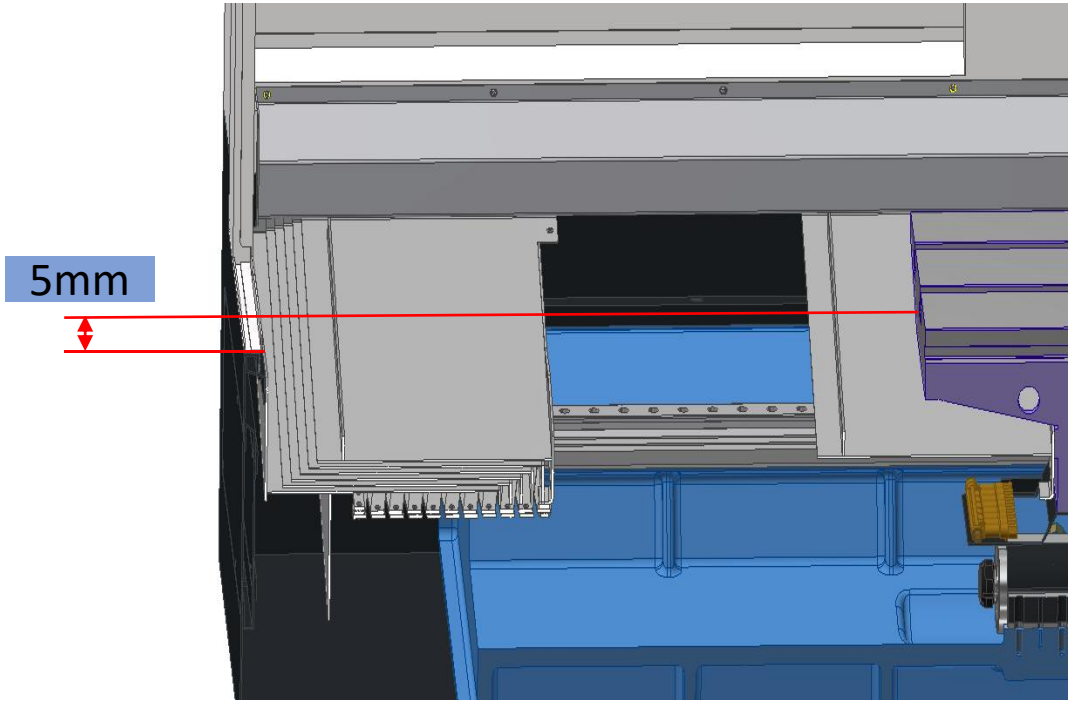
A Height of table top surface: 810mm (31.89”)
B Height of the lower end of the front door: 678mm (26.69”)
C Distance from the table center: 635mm (25”)
D Door opening: 1,310mm (51.57”)
E Distance from spindle center: 350mm (13.78”)





Wide Opening Top Cover
The wide-opening top cover allows easy crane access for efficient loading and unloading of workpieces.

Lower Side Window Position
The side windows are positioned lower than the table top for convenient handling of long workpieces.

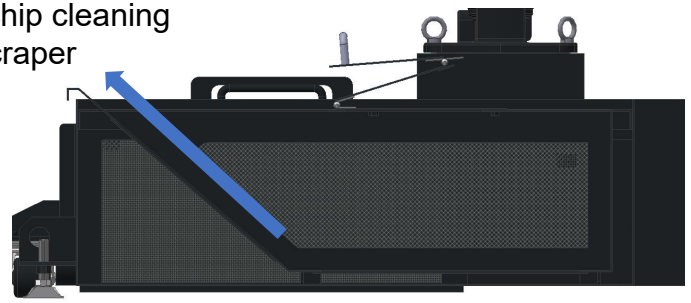


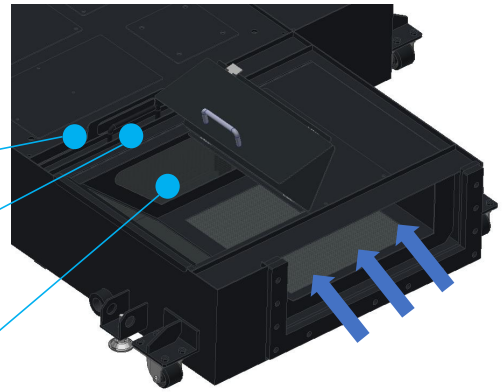
Coolant System

- High pressure coolant pump sufficiently cools off the heat generated while cutting, ensuring precision machining and extended tool life.
- Chip bucket filters chip, coming from the front part of coolant tank, from entering the rear tank part where pumps are installed.
- 20 micron cyclone filter is installed when purchase TSC option.
- 370L large coolant tank capacity.

Chip Processing

Easy chip cleaning with scraper

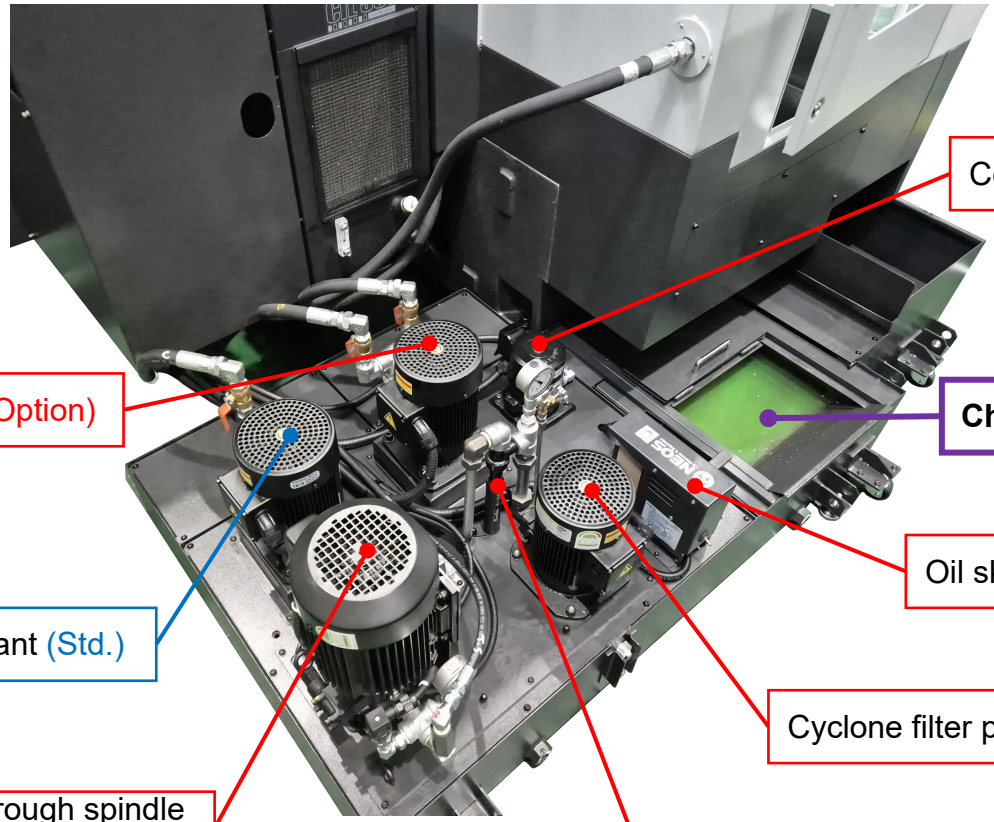




FILTER (20 mesh)

BUCKET FILTER (3mm)

MAIN BUCKET FILTER (3mm)



Coolant gun (Option)

Bed flushing (Option)

Chip Processing

Oil skimmer (Option)

Head coolant (Std.)

Cyclone filter pump (Option)

[TSC] Through spindle coolant (Option)

Cyclone filter 20μm (Option)

SMART Operation

Automatic Grease Lubrication Advantage

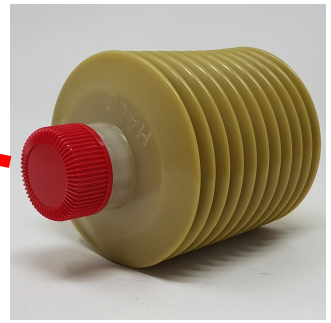
- Coolant last longer as no lubrication oil mixing in the coolant.
- Oil skimmer is not needed.
- Less maintenance costs and time compare to oil lubrication.
- Easy and fast grease cartridge replacement.

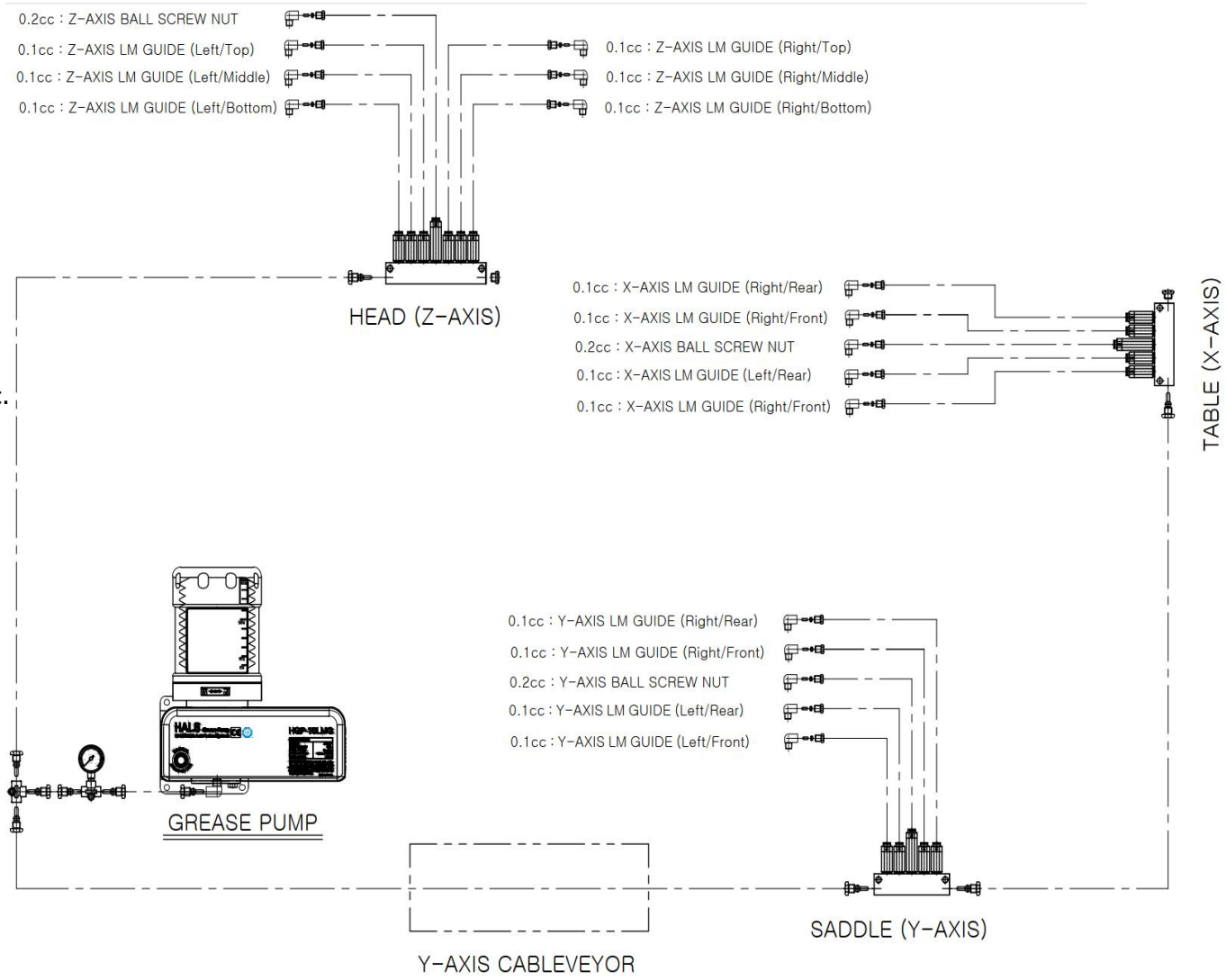
Usage cycle

1) Discharge interval: 8 hours.
2) Equipment operation time: 10 hours/day.
3) Discharge amount per time: 0.1cc x 14EA + 0.2cc x3EA = 2.0cc/time.
4) Discharge amount per time: 2.0cc/time x 1 time/8 hours x 10 hours/day = 2.5cc.
5) **Cartridge replacement cycle**: 700cc /2.5cc/day **= 280 days = 9.3 months.**
6) Lubrication pipes should be main pipe ⌀ 6 and branch pipe ⌀ 4.

Grease pump

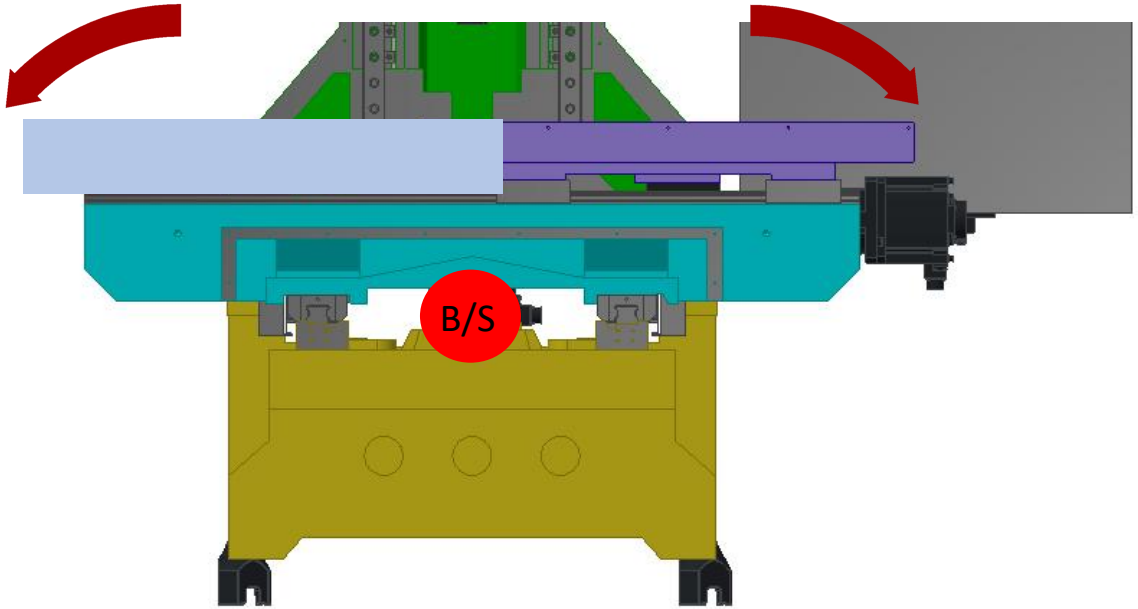
700cc grease cartridge



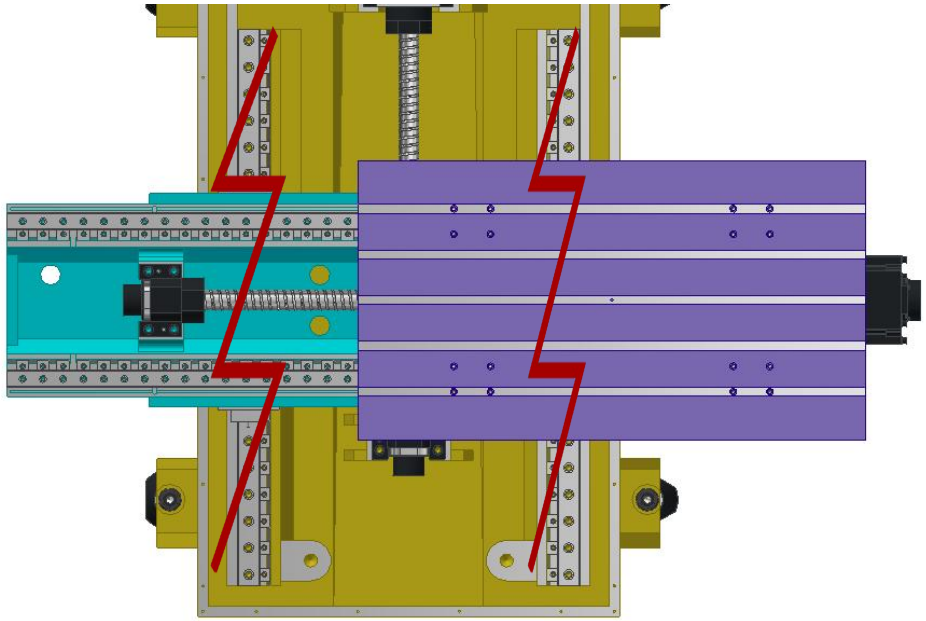


C-Frame Structure Common Issue

C-Frame Issue

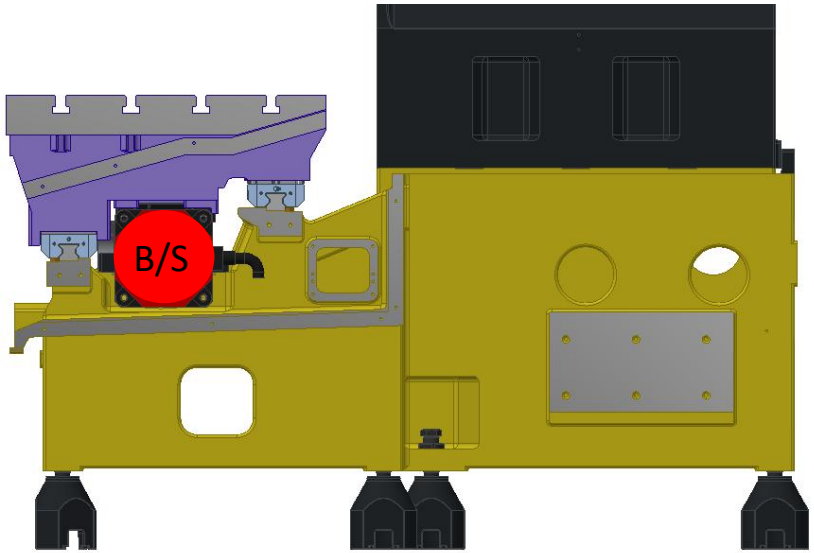


Deflection occurs due to overhang during table movement along the Y-axis guide. Result in concave shape processing.

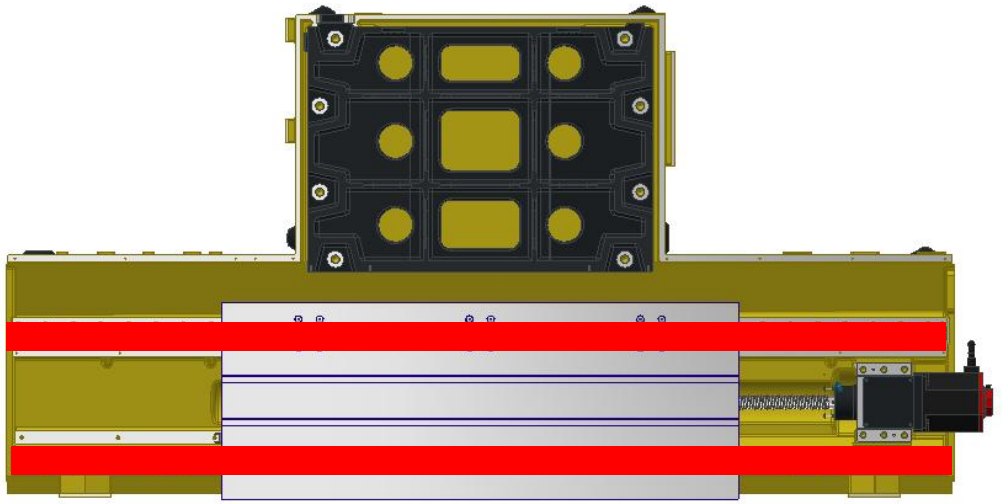


If the table is at the left or right end of X-axis during Y-axis travel, a stick-slip phenomenon occur due to excessive positional deviation (Center drive is not possible).

NV5500 Structure Advantage



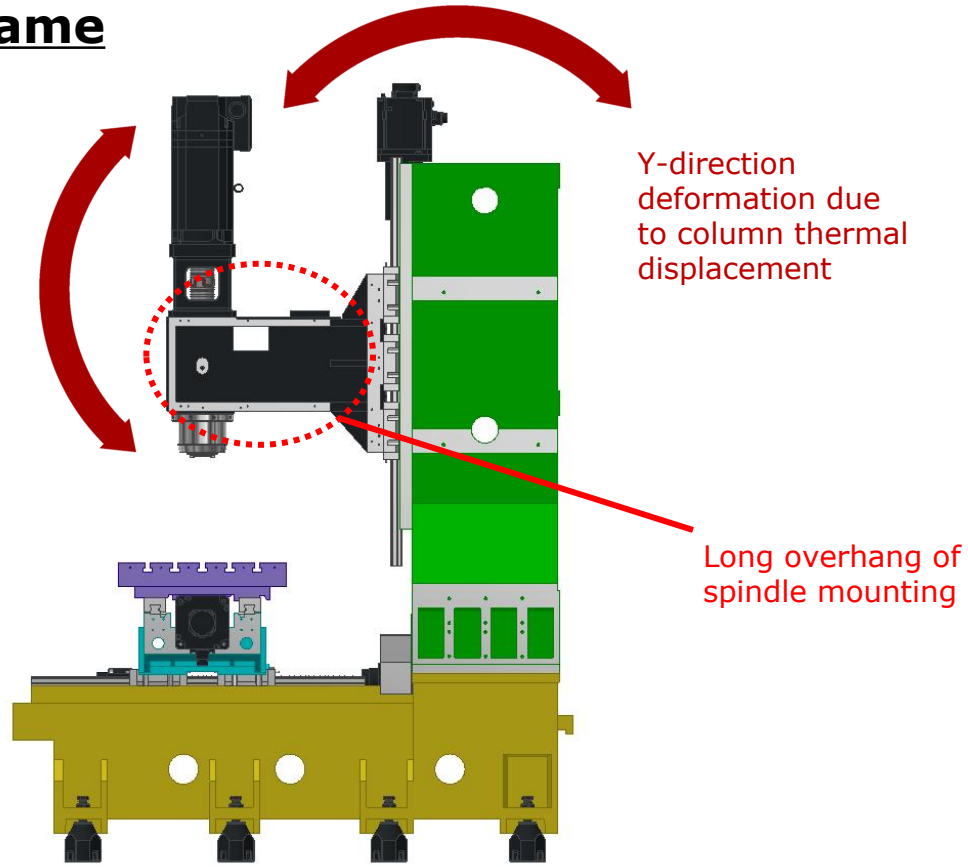
Suppression of stick-slip phenomenon by ball screw-centered driving



No table overhang occurs along the entire GUIDE surface along the X-axis travel distance

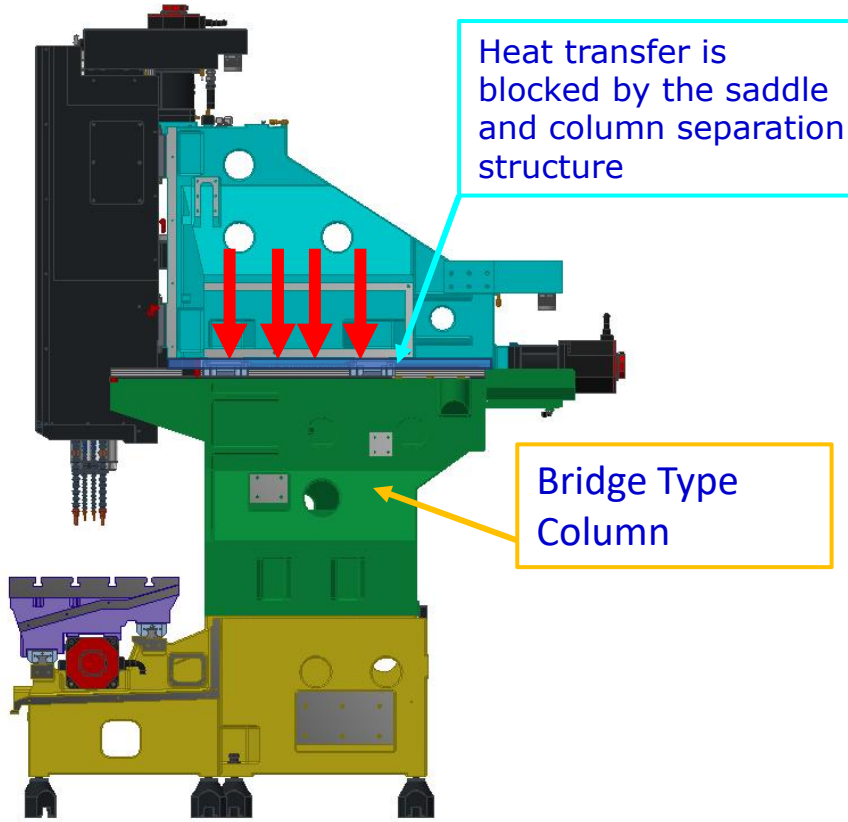
Thermal Displacement Comparison

C-Frame



Displacement of Z-axis and COLUMN due to heat source
- Displacement occurs in Y and Z directions in C-Frame structure equipment.

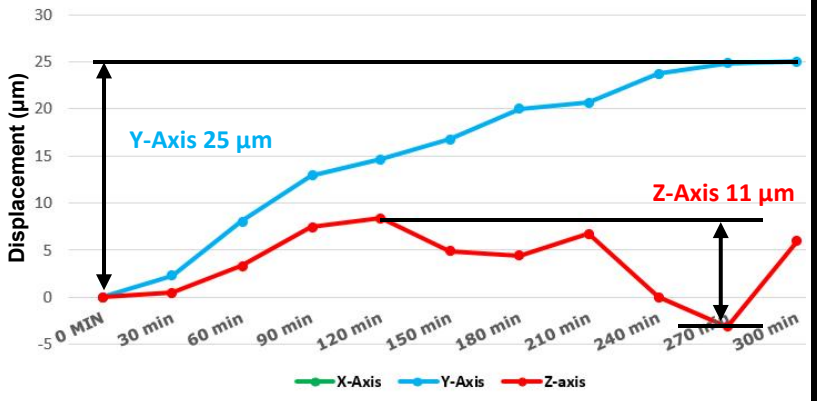
NV5500



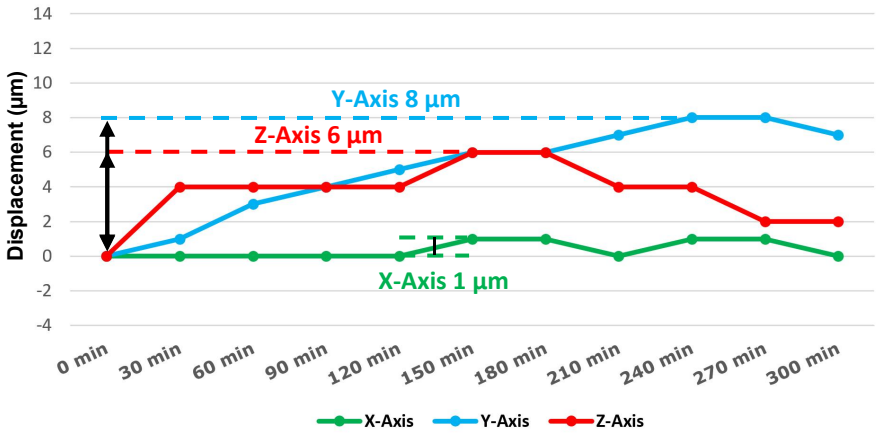
Minimizing Z-axis and COLUMN displacement due to heat source
- Minimizing thermal displacement by applying base cooling (Z-axis, spindle, spindle motor base) to heat conducted from the heat source.

Thermal Displacement Test

H company (Korean Competitor)
C-frame Type



SMART NV5500L
Single Column Bridge Type

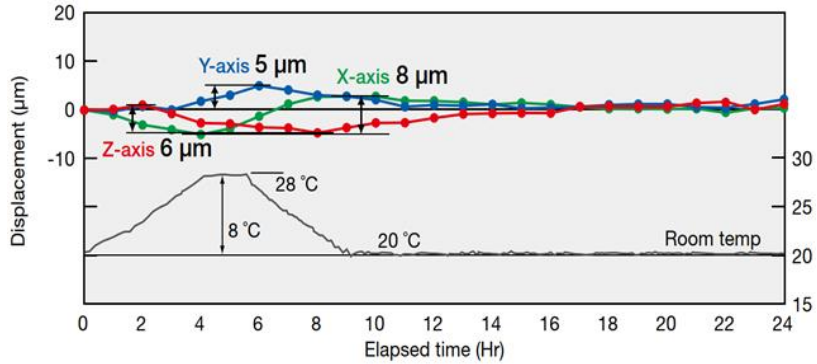


Compared to the typical C-frame MCT, the NV5500L's bridge type structure yields significantly superior results.

- Shorter warm-up time
- Better thermal stability over long operation time.

The result of NV5500L achieve close to the double column bridge type MCT while still able to maintain relatively lower cost and less required floor space.

O company (Japanese Competitor)
Double Column Bridge type



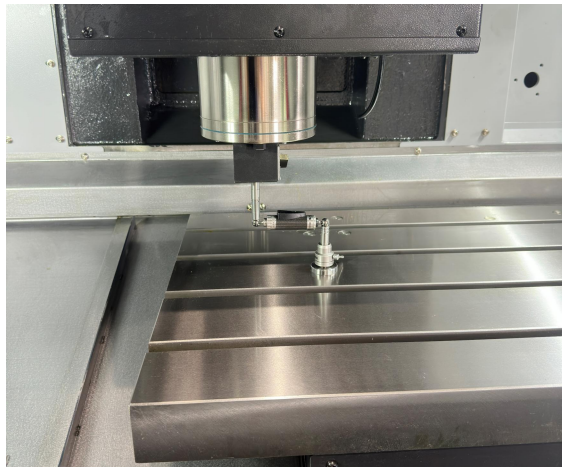
Note:

- Machine warm up 30 minutes.
- Test at spindle speed: 8,000 rpm (Max. spindle speed 12,000 rpm).
- Room temperature 20~24 degree Celsius.

Ballbar Test (Circularity)

- SMART NV5500 series machines can achieve excellence circularity result on the entire table surface.
- Deviation of the entire table stroke not more than 2 micron.

Left

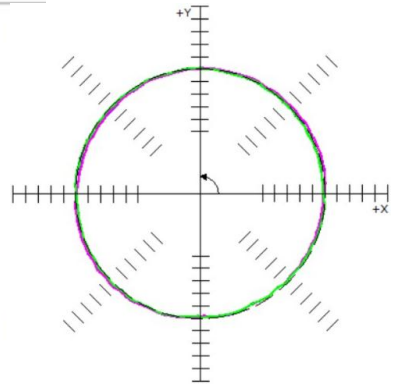


XY 360각도 100mm NV5500L 좌측

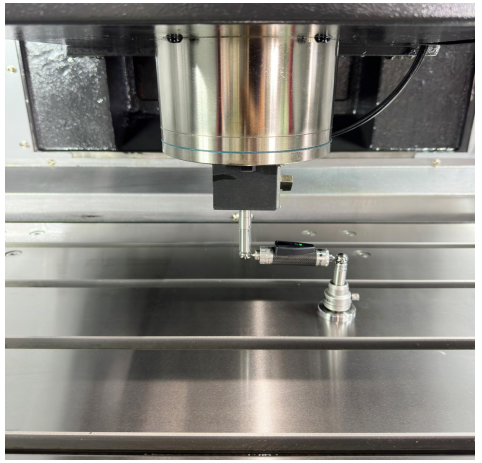
작업자: 20220212

날짜: 2024-5-21 19:04:11

19% 직각도	
	-21.4μm/m
15% 백래쉬 X	
	▸1.7μm
	◂1.4μm
12% 주기적 오차 Y	
	↑1.4μm
	↓1.4μm
12% 가역 스파이크 Y	
	▴-0.7μm
	▾-1.3μm
9% 백래쉬 Y	
	▴-1.0μm
	▾-0.2μm
원형도	5.4μm



Center

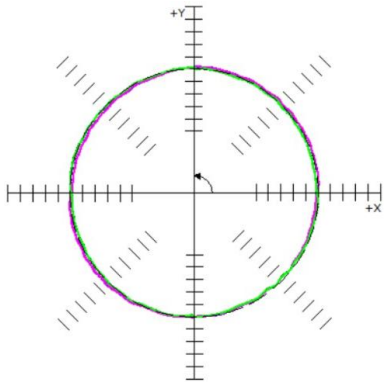


XY 360각도 100mm NV5500L 테이블중앙

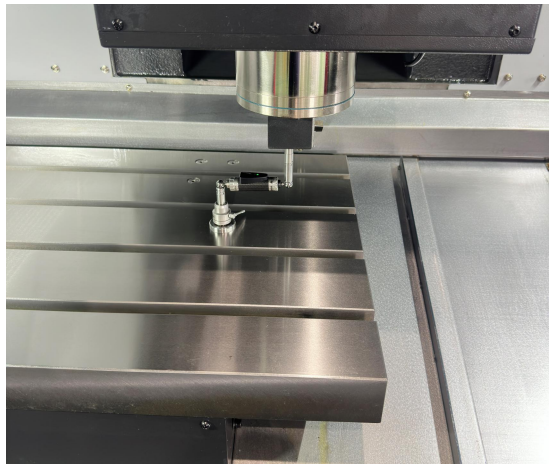
작업자: 20220212

날짜: 2024-5-21 18:33:47

17% 직각도	
	-18.2μm/m
17% 백래쉬 X	
	▸1.8μm
	◂1.8μm
13% 주기적 오차 Y	
	↑1.3μm
	↓1.4μm
11% 백래쉬 Y	
	▴-1.2μm
	▾-0.2μm
10% 가역 스파이크 Y	
	▴0.0μm
	▾-1.1μm
원형도	5.2μm



Right

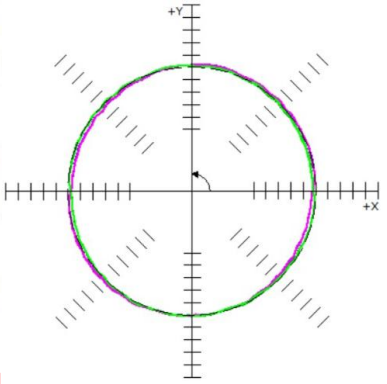


XY 360각도 100mm NV5500L 우측

작업자: 20220212

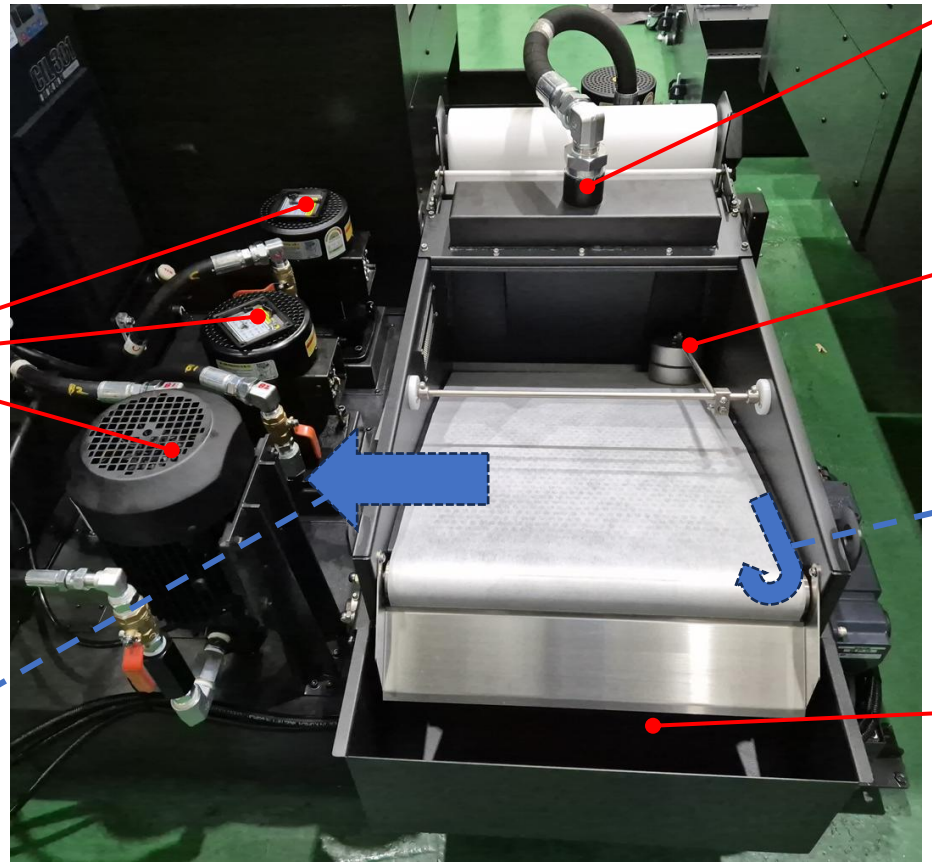
날짜: 2024-5-21 18:41:33

18% 스케일링 불일치	
	-4.8μm
17% 백래쉬 X	
	▸2.2μm
	◂1.9μm
14% 직각도	
	-18.2μm/m
12% 가역 스파이크 Y	
	▴-0.3μm
	▾-1.6μm
10% 주기적 오차 Y	
	↑1.4μm
	↓1.4μm
원형도	6.5μm



Integrated Paper Filtering System (Option)

- Recommended for application which generate fine chips or powder chips such as semiconductor parts processing and grinding.
- Conserve floor space as the paper filtering system is integrated into the coolant tank.
- Low maintenance required and long life time.
- Low cost replacement paper roll filter.
- High filtration efficiency. Filtering particle size: 5~50 μm (depends on filter).
- High filtration capacity. Flow rate: 150 L/min



1. Unfiltered coolant supply from dirty tank to the filtering systems.

3. Coolant pumps supply coolant to machining area.

4. When the filter media is clogged and the coolant can no longer flow through the filter media, the coolant level raise.

5. Once the coolant level reaches a pre-set level, the limit switch is activated and the dirty paper automatically forwarding.

2. The unfiltered coolant is filtered by passing through the paper and flow to the clean tank on the left side. Ready to be suppled for machining.

6. Sludge on the paper drops to sludge tank. The tank can be easily removed for cleaning.