



A World Leader of Horizontal Machining Centers



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# BOX in BOX<sup>®</sup> SPN

SPN503/SPN701/SPN901

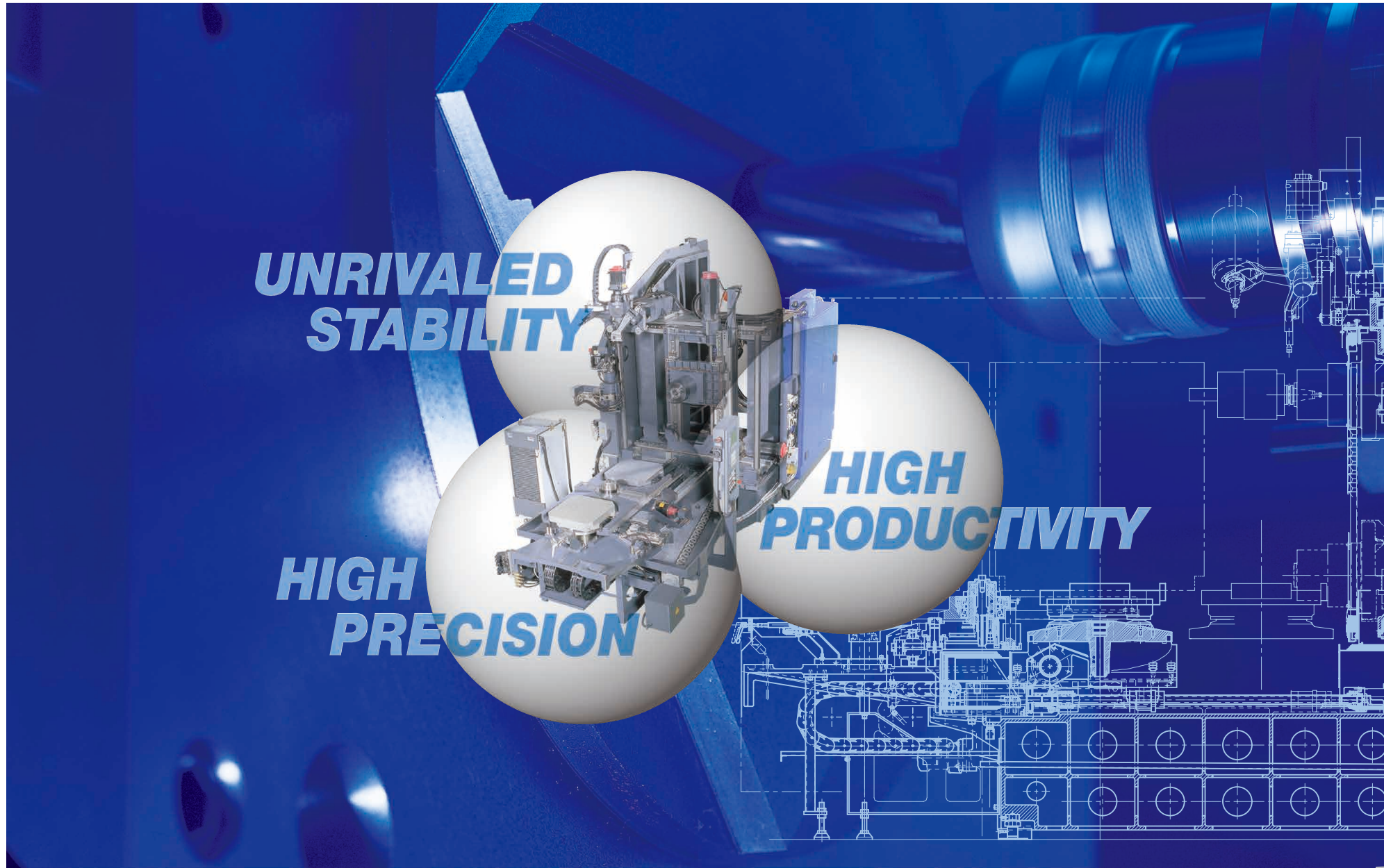
**UNRIVALED PERFORMANCE** — HIGH PRODUCTION  
HORIZONTAL MACHINING CENTER



**NIIGATA MACHINE TECHNO CO., LTD.**

Niigata, Japan

**NIIGATA, THE ORIGINATOR OF THE "BOX in BOX" DESIGN,  
INTRODUCES THE 3rd/4th GENERATION SPN SERIES —  
THE HIGH PERFORMANCE **SPN503/SPN701/SPN901** HORIZONTAL MACHINING CENTERS**



Building on a century of machine tool design and innovation, Niigata is proud to be recognized as a leader and specialist in horizontal machining centers. Niigata's renowned "BOX in BOX" SPN machines were introduced in 1993 and have earned the global respect as the VALUE leader. As a compliment to Niigata's intelligent design, there are a growing number of imitators. However, those, who try to copy or mimic Niigata, can not match the functionality of the components which work in harmony in the Niigata SPN machines. While others try to "catch-up", Niigata continues to innovate in introducing the 3 model SPN series.

- The casting design, the leading linear roller-guide way system, the unique reliable tool changer, and the spindle cutting capability are designed to allow you to achieve your goal of accurate parts produced in the shortest time.
- Dependable, repeatable, long-term stability is achieved in the stationary column design.
- The innovative casting design yields industry's most rigid "T-shaped" base – enabling the use of a 3-point contact with your floor, and more accurate machining.
- The most reliable tool changer, Niigata's Synchronous Swing Motion (SSM) ATC continues to give you years of fast dependable performance.
- 8000, 10000, 12000, 15000 min<sup>-1</sup>(rpm) spindles give you the choice to fit your application.



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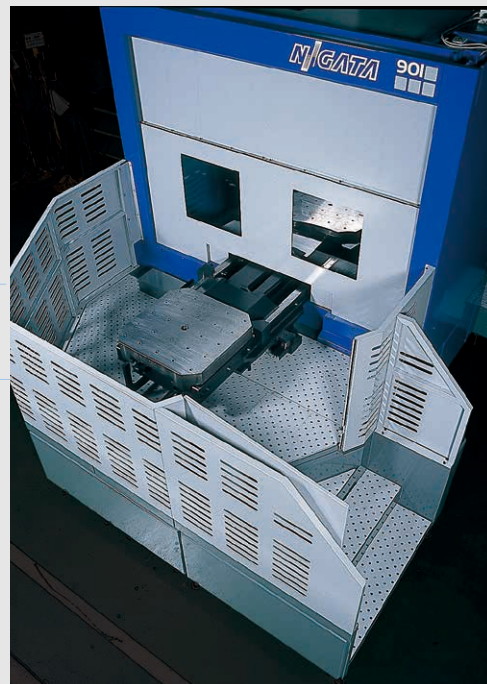
BIG 3 FEATURES..... ●2—●3  
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**NIIGATA'S ORIGINAL THINKING AND CONTINUOUS IMPROVEMENTS  
YIELD THE GREATEST VALUE IN HIGH SPEED HORIZONTAL MACHINING CENTERS  
INTRODUCING THE LATEST "SPN" FAMILY**



SPN901



SPN701

- EXCELLENT CHIP EVACUATION
- HUGE WORK ENCLOSURES
- CONVENIENT WORK PLATFORM

	<b>SPN503</b>	<b>SPN701</b>	<b>SPN901</b>
<b>TRAVEL</b> X axis:	800 mm (31.5")	1000 mm (39.4")	1500 mm (59.1")
Y axis:	750 mm (29.5")	950 mm (37.4")	1300 mm (51.2")
Z axis:	750 mm (29.5")	850 mm (33.5")	1150 mm (45.3")
<b>PALLET SIZE</b>	500 × 500 mm (19.7" × 19.7")	630 × 630 mm (24.8" × 24.8")	800 × 800 mm (31.5" × 31.5")
<b>Maximum Work Piece</b>			
Swing diameter:	800 mm (31.5")	1100 mm (43.3")	1750 mm (68.9")
Height:	1000 mm (39.4")	1200 mm (47.2")	1400 mm (55.1")
<b>Spindle Speed</b>	8000 min <sup>-1</sup> (rpm) ~ 15000 min <sup>-1</sup> (rpm)		
<b>Spindle Power</b>	AC30 kW (40 HP) ~ AC45 kW (60 HP)		
		High Torque Spec. and High Power Spec. Spindle are available — See page 12.	
<b>Rapid Traverse</b> (X, Y, Z axis)	50 m/min (1968 ipm) OP: 61 m/min (2400 ipm)	60 m/min (2362 ipm)	50 m/min (1968 ipm)



↑SPN503



↑SPN701



↑SPN901

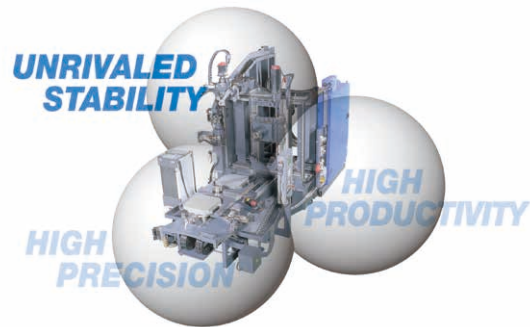


**NIIGATA ORIGINATED THE "BOX in BOX" MACHINE DESIGN to PROVIDE HIGH-SPEED, OPTIMUM CUTTING PERFORMANCE AND LONG-TERM STABILITY. INTRODUCING THE SPN SERIES — the INNOVATION CONTINUES —**



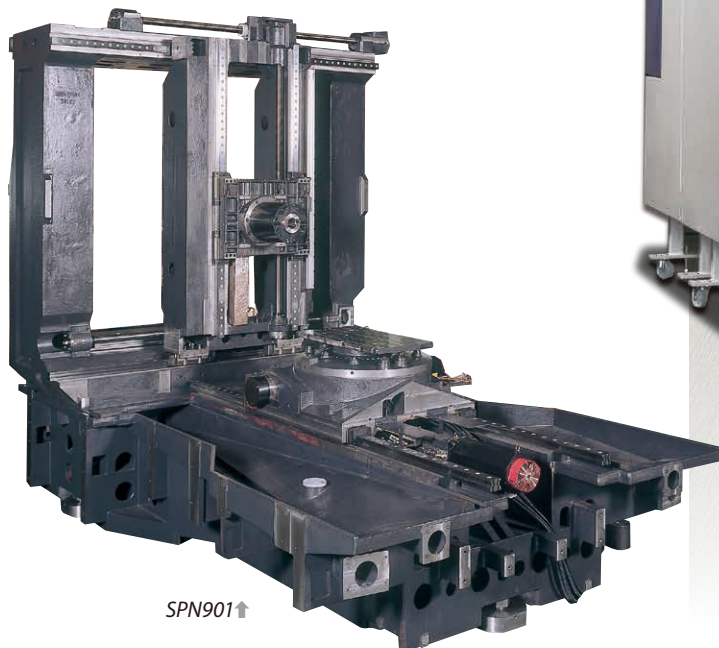
**SPN503/701/901**

**UNRIVALED STABILITY**



**THE INNOVATIVE "SPN" DESIGN BEGINS WITH THE "BOX in BOX" STRUCTURE, ORIGINATED BY NIIGATA.**

The stationary "one-piece" column is mounted on a rigid T-shaped "mono-cast" base. This is the heart of machine squareness, which is so critical in achieving accurate machining. Mount the spindle carrying saddle to the column and the goal of practical long-term high speed movement is realized.



SPN901↑

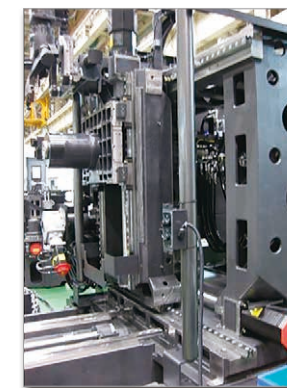


↑SPN503

**ULTRA RIGID CONSTRUCTION**

**BOX in BOX®**

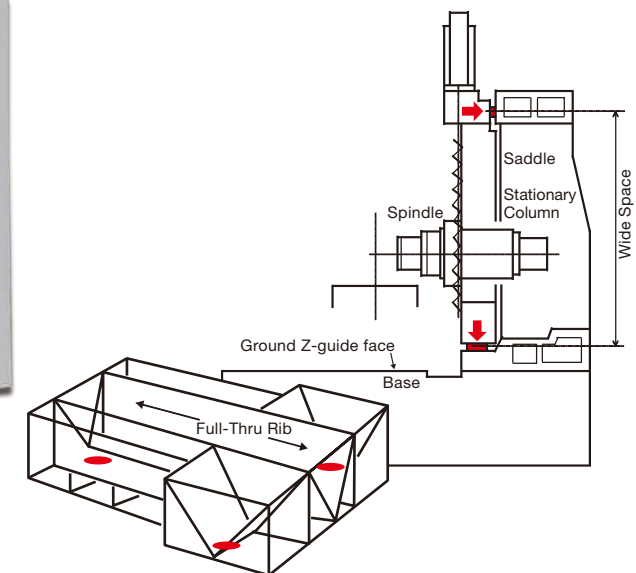
- Stationary column fixed directly to machine base yields increased cutting capability at top of Y-axis stroke.
- Way mounting surfaces are machined and ground flat to assure optional alignment and accuracy.
- Lower rail mounted perpendicular to upper rail allows mass of spindle saddle to be supported fully thereby increasing rigidity and accuracy.
- Reduced mass of spindle headstock assembly contributes to lower maintenance and a longer service life.



- Mass of Moving Body (Spindle Saddle) is as Light as 1/3.
- Absolute Wide Guide Span
- Rigid Saddle
- High Output Spindle is Vertically Guided at Center of Gravity.
- Fixed Column and Z-guide Face is Ground Finished by Gantry Bed Grinder.

**THREE POINT BASE CASTING**

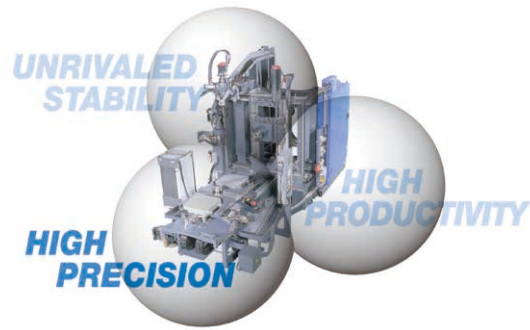
- Honeycomb design improves structural rigidity.
- Solid base structure allows for simple 3-Point leveling.





## SPN503/701/901

# NIIGATA PRECISION



### NIIGATA'S "BOX in BOX" DESIGN ENSURES LONG-TERM STABILITY OF MACHINE ACCURACY

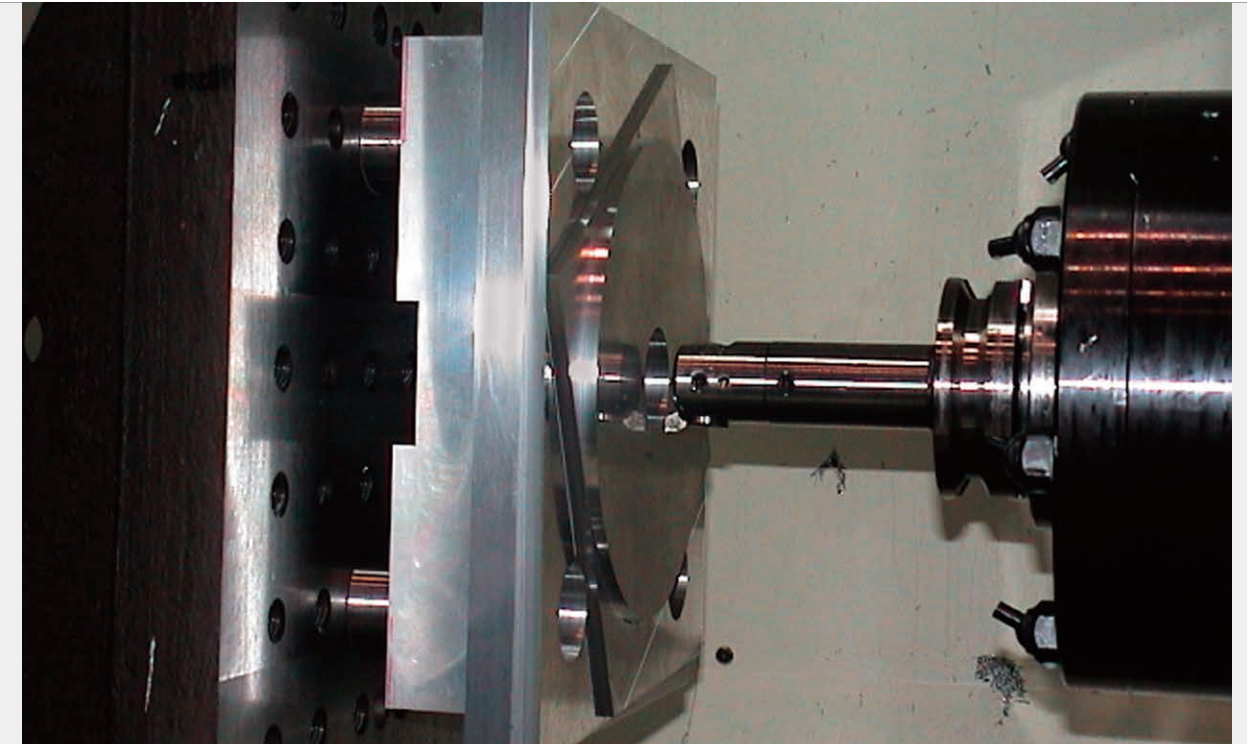
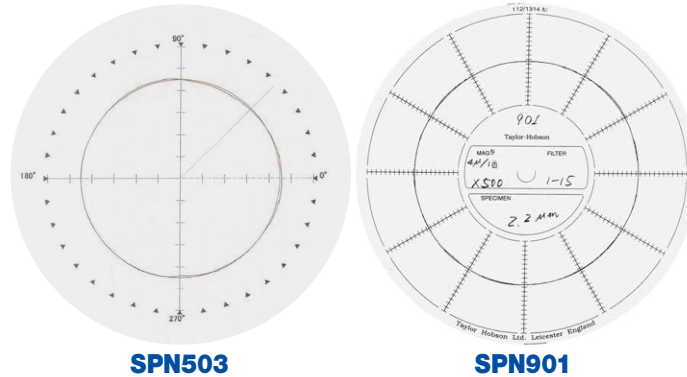
Here is the data to proof unrivalled stability of machine accuracy. It is basically no change of the machine accuracy after 3 years of the machine installation.

### EXACTING ACCURACY (ACCURACY OF CIRCULAR INTERPOLATION)

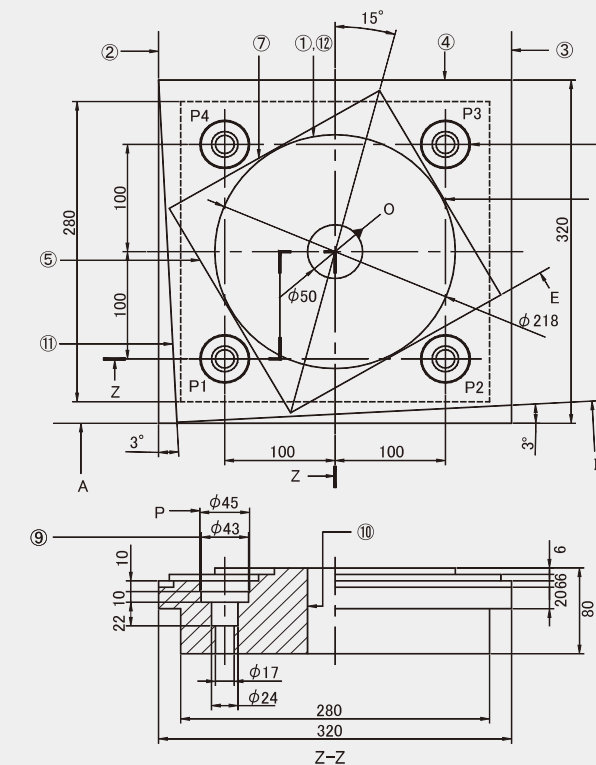
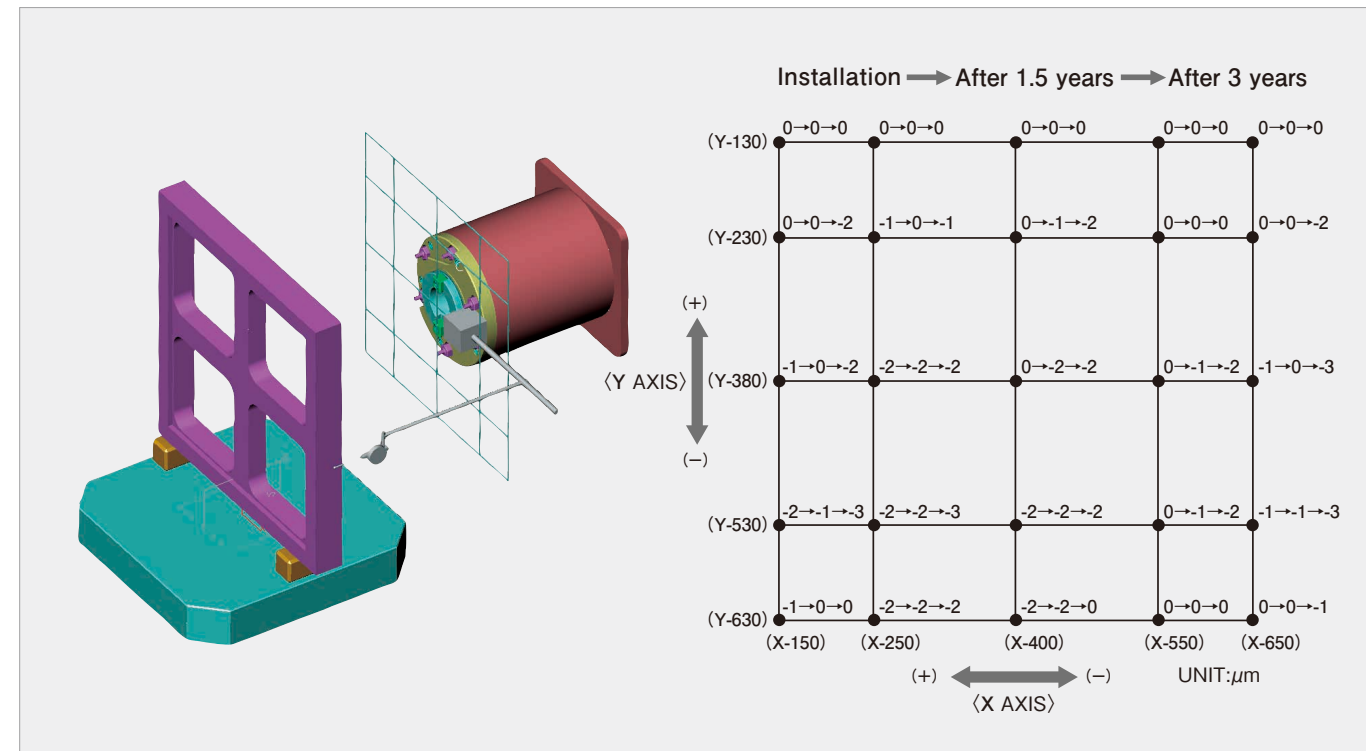
	SPN503	SPN901
Roundness..... (Tolerance)	10 μm (0.0004")	10 μm (0.0004")
Roundness..... (Actual record)	2.8 μm (0.00011")	2.2 μm (0.00009")

#### ● Cutting Data (SPN503 / 901)

Material..... A5052  
 Diameter..... φ218 mm {8.58"}  
 Cutting tool..... φ16 mm {0.62"} end mill 4T Carbide



EXACTING ACCURACY (Cutting data by SPN503/SPN901 with scale feedback system)



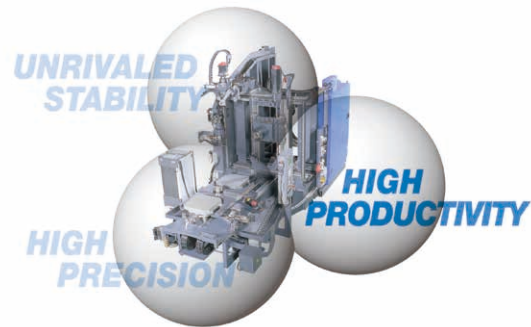
Cutting accuracy (μm)			
Items	SPN503	SPN901	
① Roundness	3.8	2.2	
② Squareness (A)	3	3	
③ Squareness (A)	6	2	
④ Parallelism (A)	1	1	
⑤ Squareness (E)	1	6	
⑥ Squareness (E)	1	1	
⑦ Parallelism (E)	1	7	
⑧-P1 Position error (O)	7	8	
⑧-P2 Position error (O)	8	6	
⑧-P3 Position error (O)	2	4	
⑧-P4 Position error (O)	8	0	
⑨-P1 Concentricity (8-P1)	1	4	
⑨-P2 Concentricity (8-P2)	6	1	
⑨-P3 Concentricity (8-P3)	2	2	
⑨-P4 Concentricity (8-P4)	3	2	
⑩ Cylindricity	7	3	
⑪ Squareness (I)	2	0	
⑫ Concentricity (O)	8	5	



# NIIGATA'S INNOVATION LEADS TO HIGH SPEED, HIGH PRODUCTIVITY



## SPN503/701/901 HIGH PRODUCTIVITY



### NIIGATA'S UNIQUE SYNCHRONOUS SWING MOTION (SSM) AUTO TOOL CHANGING SYSTEM.....①

For high speed and weight the SSM has proven to be the most reliable tool exchange mechanism. It employs Fanuc servo technology to achieve ease of maintenance and operator friendliness.

**ATC Time** (Exclude ATC shutter open/close time)

**SPN503** (Tool weight 20 kg {40 lbs})

**T to T...1.4 s C to C...3.8 s**

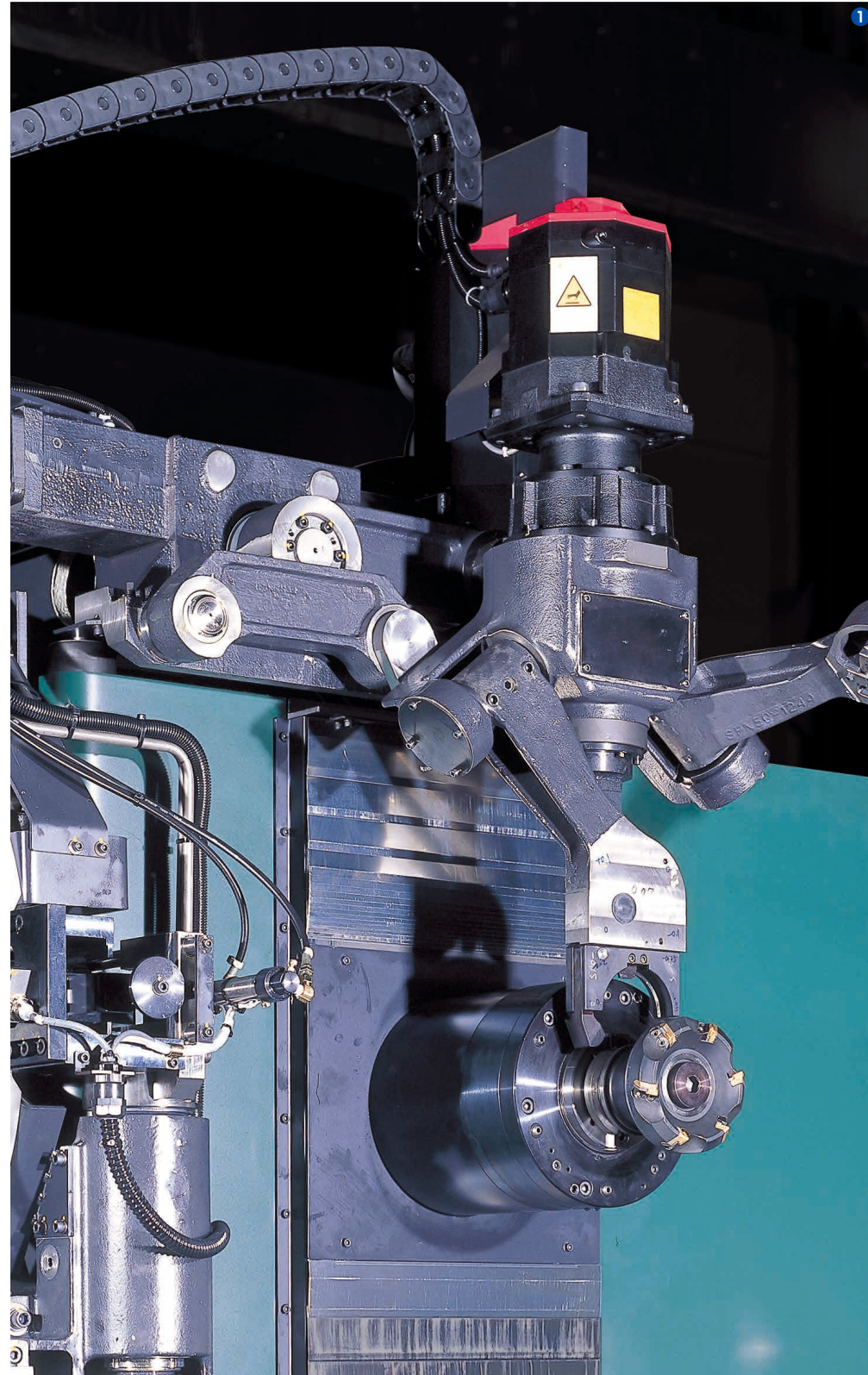
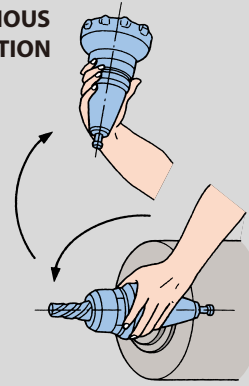
**SPN701** (Tool weight 20 kg {40 lbs})

**T to T...1.4 s C to C...3.8 s**

**SPN901** (Tool weight 30 kg {66 lbs})

**T to T...2.7 s C to C...5.8 s**

SYNCHRONOUS SWING MOTION (SSM) ATC



### SHORTER CYCLE TIME DELIVERS HIGH PRODUCTIVITY

#### SPN503

• Rapid traverse

**50 m/min  
(1968 ipm)**

• Option

**61 m/min  
(2400 ipm)**

#### SPN701

• Rapid traverse

**60 m/min  
(2362 ipm)**

#### SPN901

• Rapid traverse

**50 m/min  
(1968 ipm)**

### SELF LUBRICATION FUNCTION ②

Long duration lubrication designed into the ball nut and linear roller truck means lower operating cost and responsibility to the environment.

### ULTRA RIGID AND HIGH LOAD TYPE OF ROLLER GUIDE WAY SYSTEM.....③

To maximize rigidity and dampening, roller bearing guides are adopted on the X, Y and Z axes.

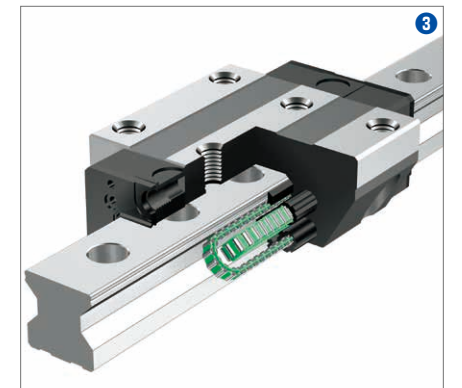
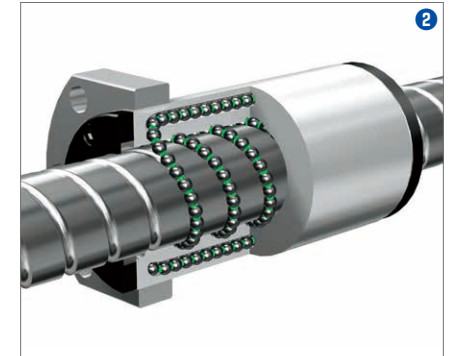
The combined engineering features, such as enhanced rigidity of the machine construction, wider span of the X and Y axes guide ways, and the roller guide way system meet rigorous production needs.

The roller bearings are guided with roller retainers resulting in no roller-to-roller contact and less friction.

### DESIGN DETAILS FOCUSES ON OPERATOR FRIENDLINESS.....④

The operator panel is positioned to the left side of operator door giving excellent accessibility and ease of operation.

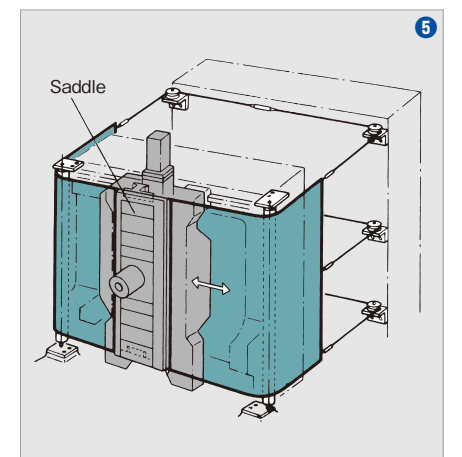
The manual pulse generator has XYZ axis coordinate display by LCD as an option.



### DURABLE WAY COVERS FOR HIGH SPEED POSITIONING.....⑤

It is simple, yet effective. The heat-resistant durable covers are interconnected providing uniform movement with spindle-saddle.

- No collision parts. Fast and silent
- Durable and smooth movement
- Cover is one sheet, Minimizes coolant and/or swarf escape.





# SPN503/701/901

## HIGH PRODUCTIVITY



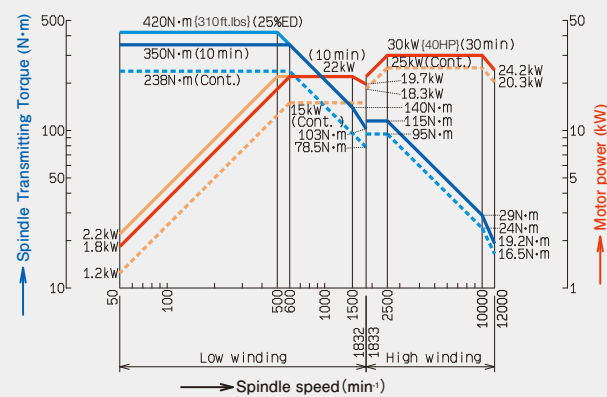
### VARIETY OF HIGH PERFORMANCE SPINDLES

The spindle of performance is one of key evidence of the capability of the machine. The spindles provide Speed, Power, and Accuracy for full range of cutting conditions. 8000 min<sup>-1</sup> (rpm), 10000 min<sup>-1</sup> (rpm), 12000 min<sup>-1</sup> (rpm), 15000 min<sup>-1</sup> (rpm) / High Power Spec., and 8000 min<sup>-1</sup> (rpm) / High Torque Spec. are also available.

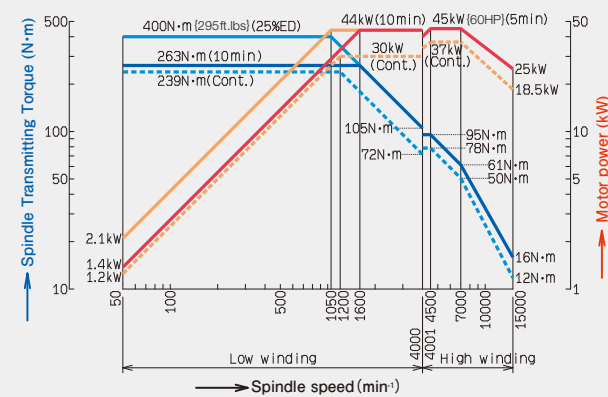
	①10000min <sup>-1</sup> (rpm)	②12000min <sup>-1</sup> (rpm)	③8000min <sup>-1</sup> (rpm)	④15000min <sup>-1</sup> (rpm) High Power Spec.	⑤8000min <sup>-1</sup> (rpm) High Torque Spec.
	•Spindle Power 30kW {40HP} •Max.Torque 420N·m{310ft·lbs}	•Spindle Power 30kW {40HP} •Max.Torque 420N·m{310ft·lbs}	•Spindle Power 30kW {40HP} •Max. Torque 600N·m{442ft·lbs}	•Spindle Power 45kW {60HP} •Max. Torque 400N·m{295ft·lbs}	•Spindle Power 37kW {50HP} •Max. Torque 1009N·m{744ft·lbs}
SPN503	Standard	Option	Option	Option	N/A
SPN701	N/A	Standard	Option	Option	Option
SPN901	N/A	N/A	Standard	Option	Option

### SPINDLE SPEED AND TORQUE DIAGRAM

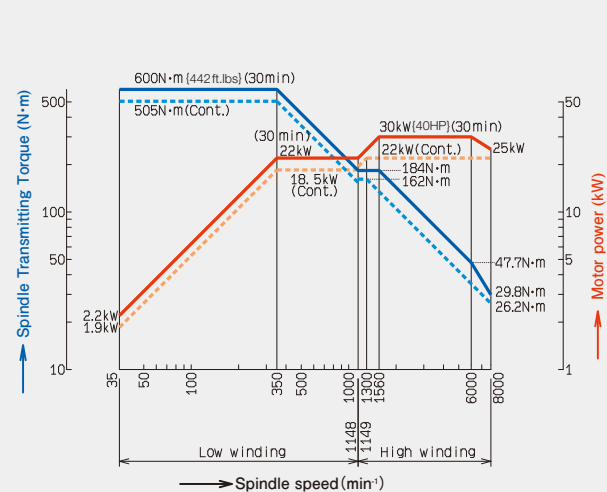
#### ①② 10000/12000 min<sup>-1</sup> SPINDLE (503, 701)



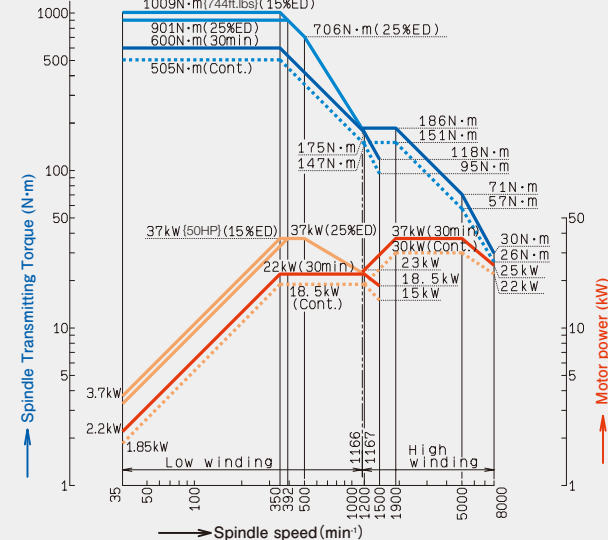
#### ④ 15000 min<sup>-1</sup> SPINDLE High Power Spec. (503, 701, 901)



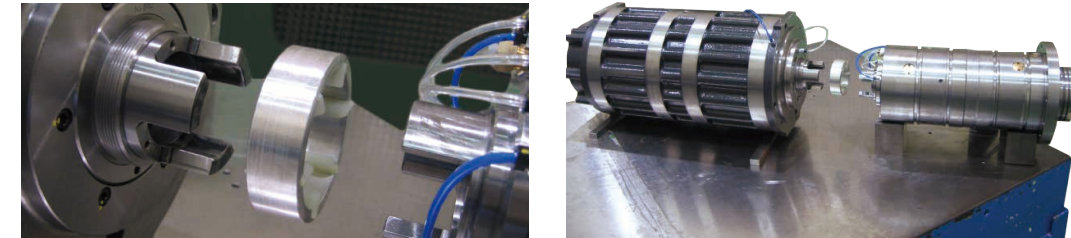
#### ③ 8000 min<sup>-1</sup> SPINDLE (503, 701, 901)



#### ⑤ 8000 min<sup>-1</sup> SPINDLE High Torque Spec. (701, 901)



### SPINDLE CONSTRUCTION



### EXAMPLE SPN'S MACHINING PERFORMANCE

#### •Milling Cutter—SPN503 Spindle 10000 min<sup>-1</sup> (rpm)

- Material: S48C •Tool: φ125×6T
- Cutting volume: 458 cm<sup>3</sup>/min (27.9 in<sup>3</sup>/min)
- Cutting depth: 4 mm (0.157")
- Cutting width: 100 mm (3.93")
- Feedrate: 1146 mm/min (45.1 ipm)
- Spindle Speed: 637 min<sup>-1</sup> (637 rpm)
- Surface Speed: 250 m/min (820 SFM)

#### •Milling Cutter—SPN701 Spindle 12000 min<sup>-1</sup> (rpm)

- Material: S45C •Tool: φ160×8T
- Cutting volume: 493 cm<sup>3</sup>/min (29.9 in<sup>3</sup>/min)
- Cutting depth: 6 mm (0.24")
- Cutting width: 120 mm (4.72")
- Feedrate: 686 mm/min (27.0 ipm)
- Spindle speed: 400 min<sup>-1</sup> (400 rpm)
- Surface Speed: 200 m/min (656 SFM)

#### •Drilling—SPN701 Spindle 12000 min<sup>-1</sup> (rpm)

- Material: S45C
- Tool: φ60 insert style drill
- Spindle load: 66%
- Zaxis load: 77%
- Spindle speed: 795 min<sup>-1</sup> (795 rpm)
- Feedrate: 95 mm/min (3.7 ipm)
- Surface Speed: 150 m/min (492 SFM)

#### •Milling Cutter—SPN901 Spindle 8000 min<sup>-1</sup> (rpm)

- Material: S45C •Tool: φ160×8T
- Cutting volume: 700 cm<sup>3</sup>/min (42.7 in<sup>3</sup>/min)
- Cutting depth: 6 mm (0.24")
- Cutting width: 120 mm (4.72")
- Feedrate: 980 mm/min (38.6 ipm)
- Spindle speed: 350 min<sup>-1</sup> (350 rpm)
- Surface Speed: 176 m/min (577 SFM)

#### •Drilling—SPN901 Spindle 8000 min<sup>-1</sup> (rpm)

- Material: S45C
- Tool: φ60 insert style drill
- Spindle load: 60%
- Zaxis load: 30%
- Spindle speed: 795 min<sup>-1</sup> (795 rpm)
- Feedrate: 95 mm/min (3.7 ipm)
- Surface Speed: 150 m/min (492 SFM)



# WIDE RANGE OF OPTIONS TO ANSWER YOUR INDIVIDUAL MACHINING REQUIREMENTS



## STANDARD EQUIPMENT

- Automatic Tool Changer With 62 ATC Tool Capacity (SPN503) 60 ATC Tool Capacity (SPN701/901)
- Direct Drive Spindle 50 -10000 min<sup>-1</sup> (rpm) (SPN503) 50 -12000 min<sup>-1</sup> (rpm) (SPN701) 35 -8000 min<sup>-1</sup> (rpm) (SPN901)
- Spindle Cooling Unit
- One Degree Indexing Table
- Direct Turn Type Twin Pallet Change System With Idle Self Rotation (SPN503 / SPN701)
- Rotary Shuttle Type Pallet Change System With Walk Around Platform (SPN901)
- Chip Augers Built into the Bed
- Flood Coolant System
- Full Enclosure-Type Splash and Chip Guarding System
- Work Completion and Emergency Lamp
- Fanuc CNC System
- 10.4" Color LCD
- Rigid Tapping
- Spindle Load/Speed Meter display on CNC Screen
- Self Diagnostics Function

## OPTIONAL FEATURES

### AXIS FEEDBACK SYSTEM

- Scale Feed back System on XYZ Axes (Optical Scale Type)
- Scale Feed back System on B axis (NC table)

### ATC MAGAZINE(Field Expandable)

- 88/128 Tool Magazine (SPN503 only)
- Matrix Style ATC System (126 / 178 / 230/308)

### TABLES

- 0.001° (NC Table) /4th Axis Continuous
- 5 Axis Application (Table on Table)

### PALLET and PALLET CHANGER SYSTEM

- Carousel Type Multiple Pallet Changer 6/8/10/12 APC (only 6 and 8 APC for SPN901)
- Linear Pallet Magazine System with Niigata ICC System Controller
- Additional Pallet
- T-slotted pallet (Tapped Hole pattern with edge locator is Standard / Restriction of Max Load on Pallet may apply)

### COOLANT SYSTEM

- Spindle Center Through Coolant
- Spindle Flange Through Coolant
- Overhead Shower Coolant System

- Shower Coolant and Airblow Function
- Work piece Washing Gun
- Coolant Low Level Sensing Device

### CHIP REMOVAL

- Hinge Type Lift-Up Conveyor
- Lift-Up External Conveyor with Filtration System

- Chip Bucket with Caster and Handles

### MONITORING FUNCTION

- Advanced Unmanned Monitoring System / NIIGATA MONITOR ACE
- Spindle Probe
- Table Probe
- Tool Breakage Detector NSP/LSZ Type
- 4 Face Part Program Control Function

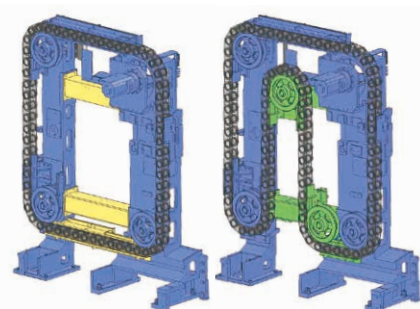
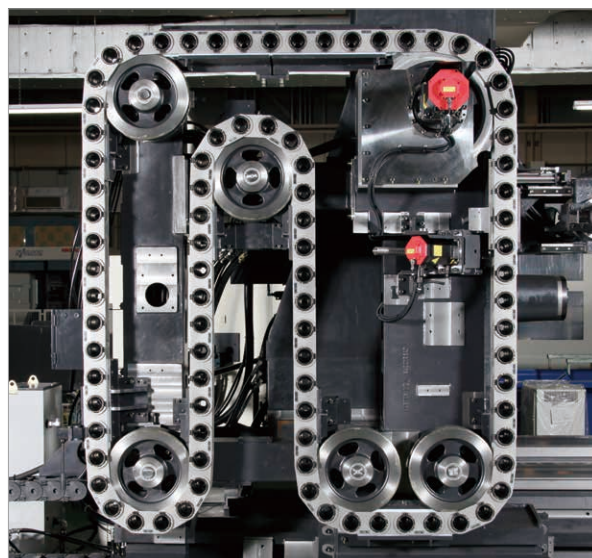
### SPINDLE

- BIG PLUS Spindle (only for 12000 rpm and 8000 rpm)
- 15000 min<sup>-1</sup> (rpm) 45 kW (60 HP) Spindle
- 8000 min<sup>-1</sup> (rpm) 30 kW (40 HP) High Torque Spindle (SPN503 and SPN701 only)
- OP: 15" LCD new HMI Main operation panel

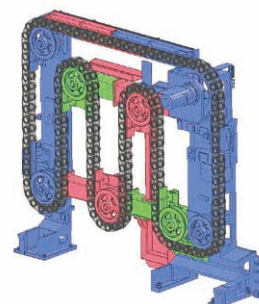
## OPTIONAL FEATURES

### FIELD EXPANDABLE ATC MAGAZINE (SPN503)

Niigata's expandable ATC magazine was designed to comply with requirements to increase tool storage capacity on existing equipment at the field.



62 Tools *Standard* 88 Tools *Optional*

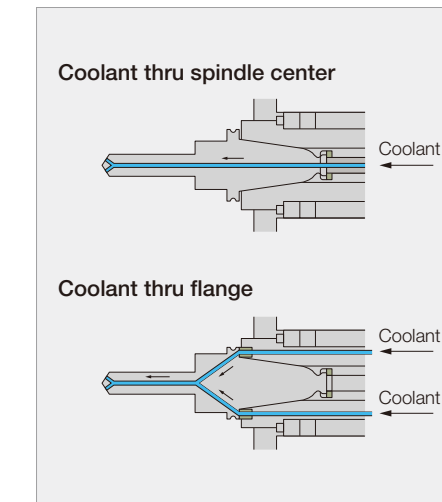


128 Tools *Optional*

## MATRIX TYPE AUTOMATIC TOOL CHANGE SYSTEM



## HIGH PRESSURE TYPE COOLANT THROUGH SPINDLE SYSTEM



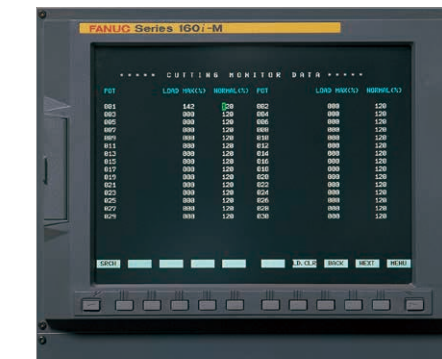
## LIFT-UP EXTERNAL CONVEYOR WITH FILTRATION SYSTEM (SPN901)



## CHIP CONVEYOR REAR/SIDE BOTH OPTIONS ARE AVAILABLE



## ADVANCED UNMANNED MONITORING SYSTEM NIIGATA MONITOR ACE (NM24 Generation II)



### KEY FEATURES

- Display on machine operational screen: All main features shown on machine operational screen (Fanuc CNC control)
- Cutting monitor–Max Spindle load monitor / Adaptive Control / Axis load monitor / Feed rate monitor: Set the reference data of spindle load / Axis load and monitor the actual data during the machine run to minimize cutting Issues as well as machining of defective parts.
- Tool Life Monitor / Spare Tool Function: Set life time value on each tool and monitor the actual time used. The alarm occurs when the time of use

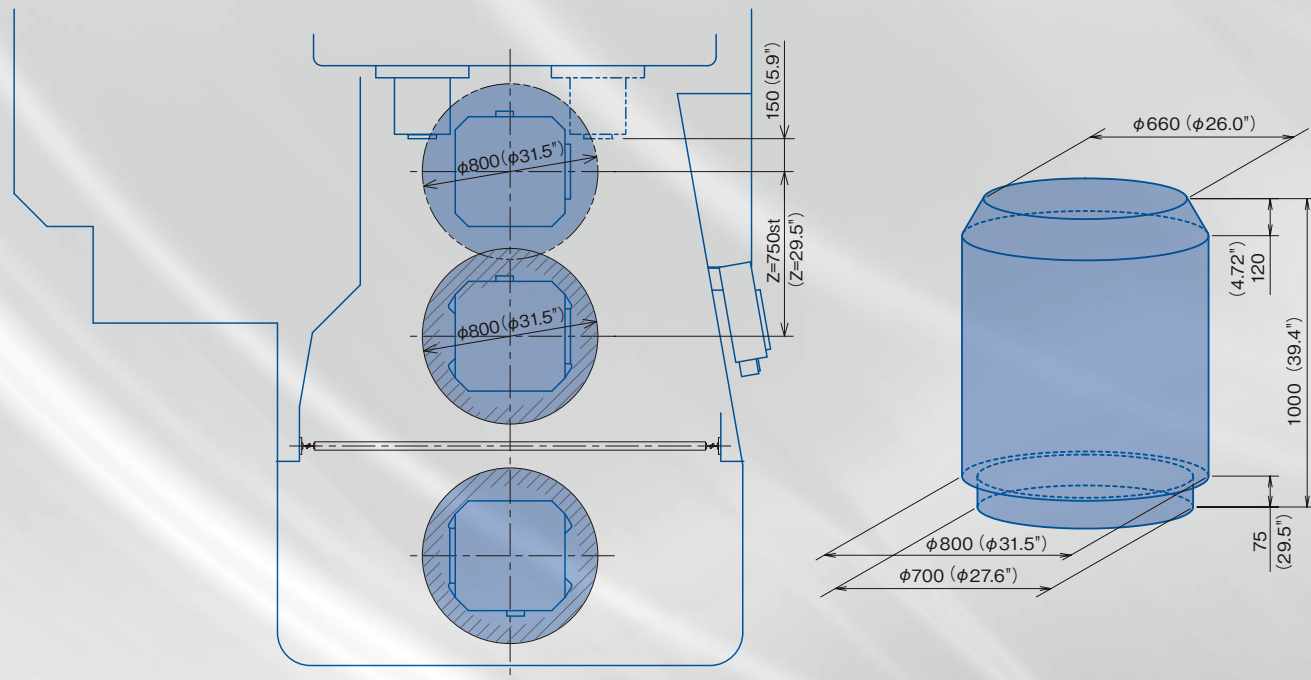
- reaches the set value. Automatic change of the tool to alternative tool is available when spare tool is ready.
- Automatic Continuous Machine Run: Automatically proceed to the next work piece after the monitoring system detects some alarm condition on current process.
- Tool Number Conversion: Eight (8) digits tool number is available as a standard function.



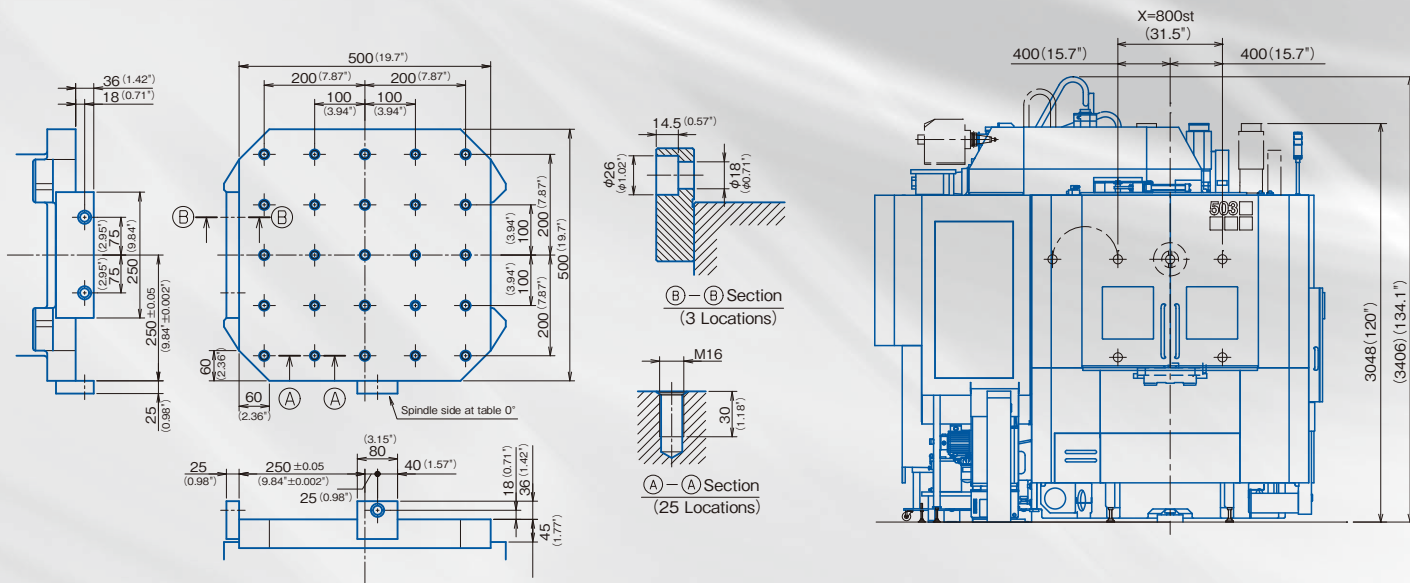
# THE "BOX in BOX" MACHINE LAYOUT

## —SPN503

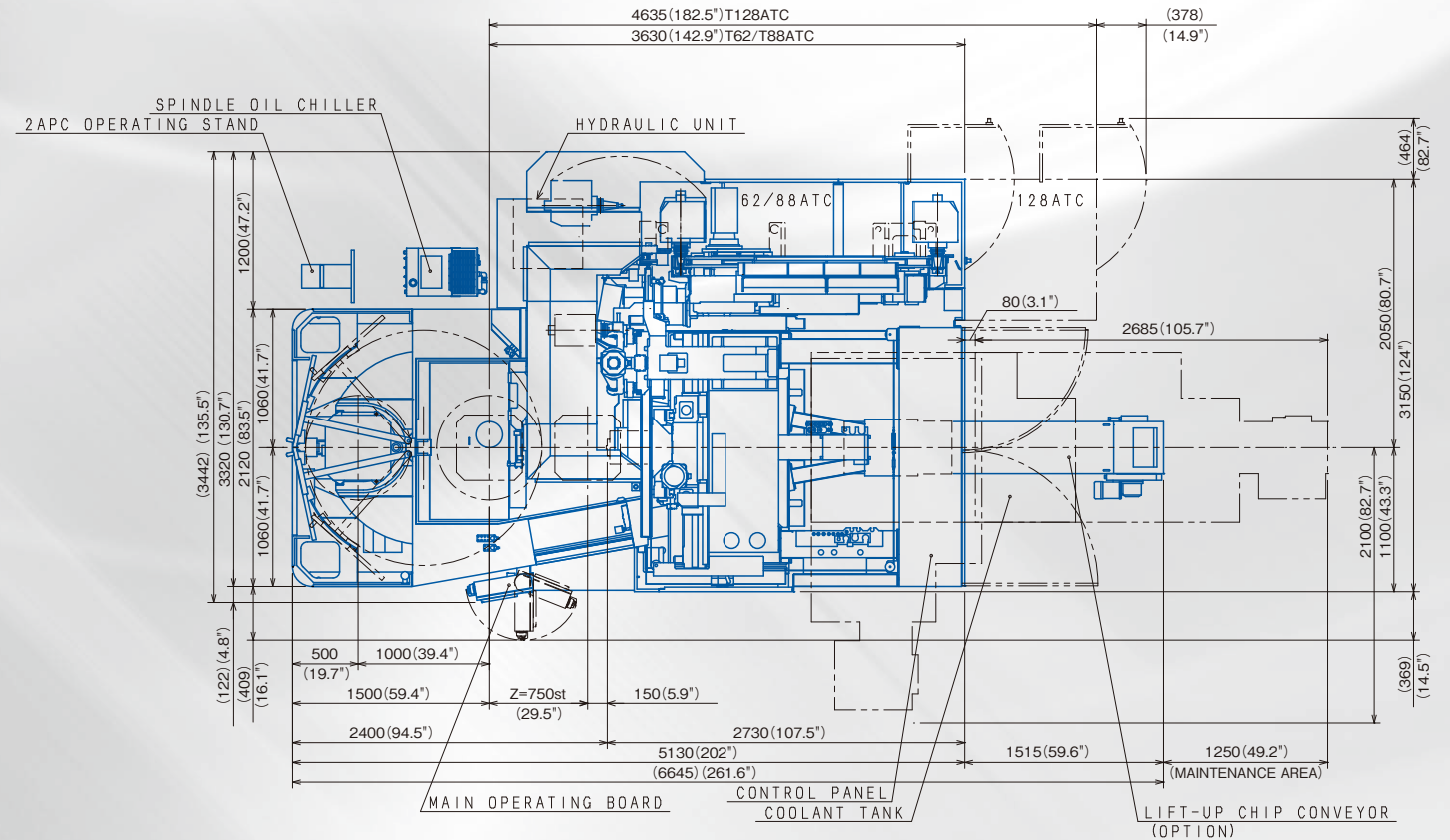
### MAXIMUM WORKPIECE ENVELOPE



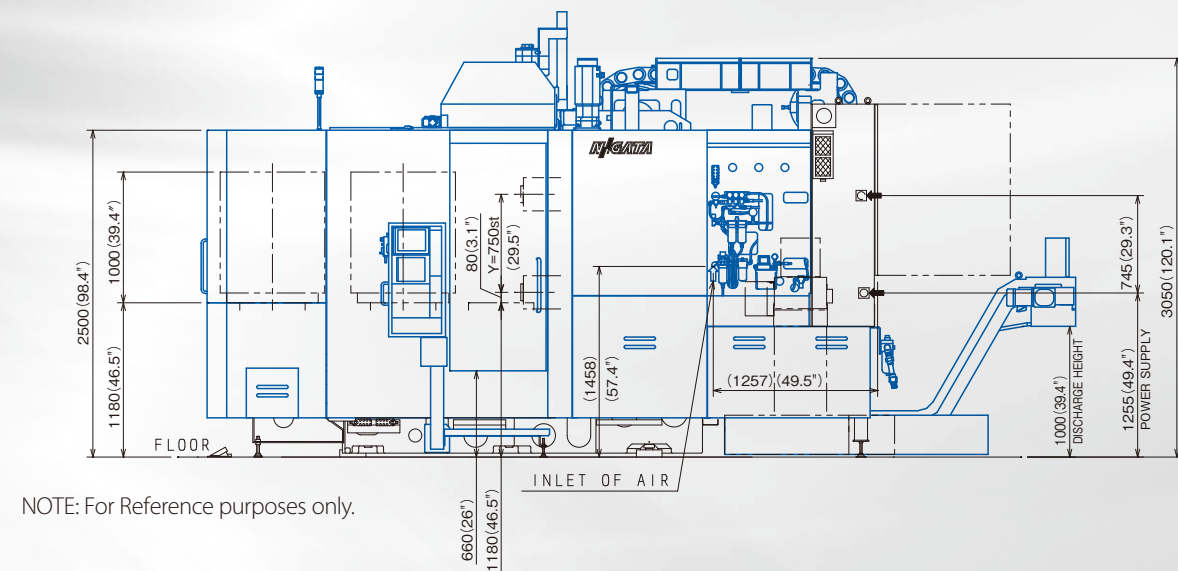
### STANDARD PALLET TOP SURFACE



### SPN503 GENERAL VIEW MM(INCH)



NOTE: Dimensions shown for Rear Discharge only. Side discharge is also available.



NOTE: For Reference purposes only.



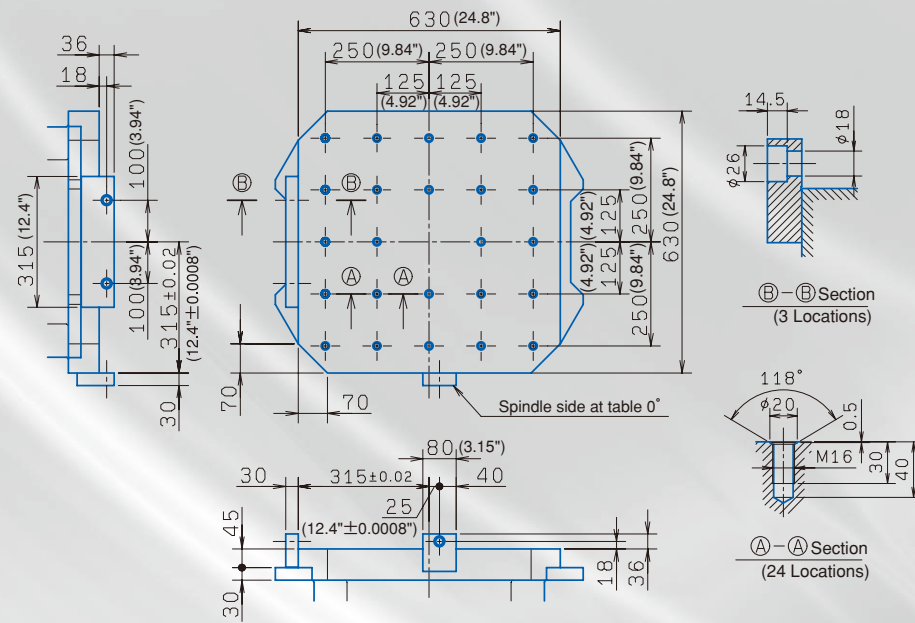
# THE "BOX in BOX." MACHINE LAYOUT

—SPN701

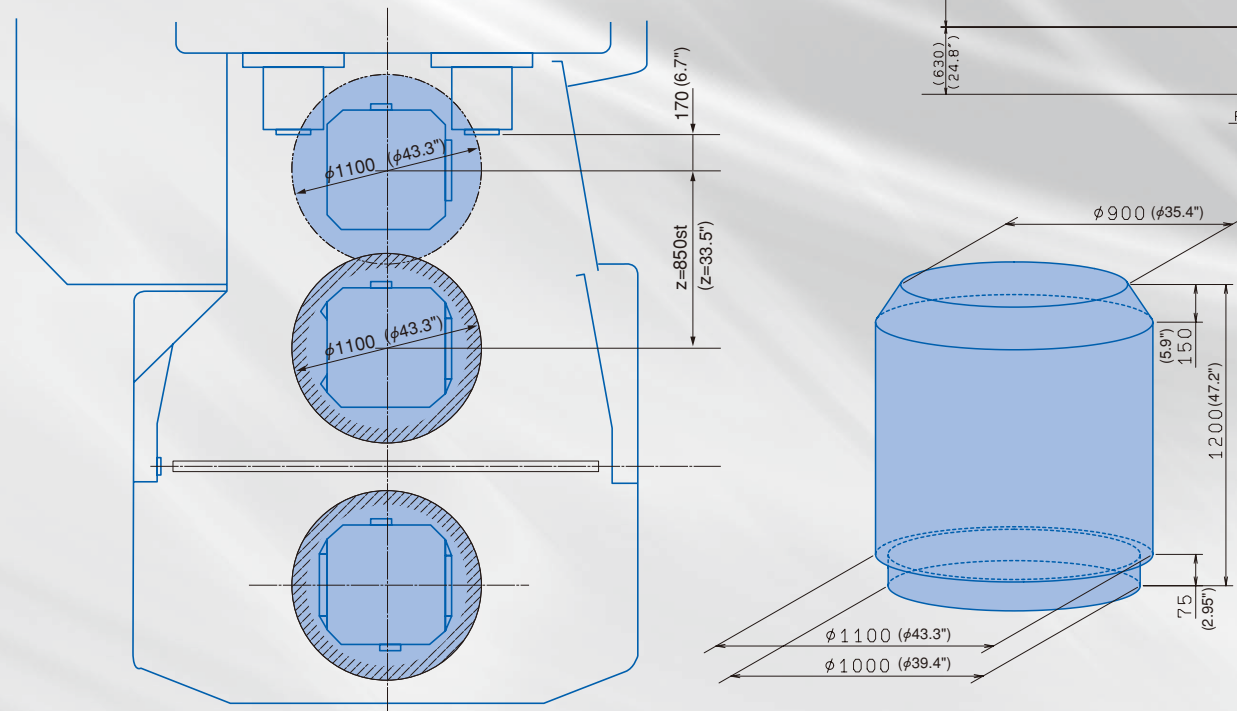
N/GATA

SPN SERIES

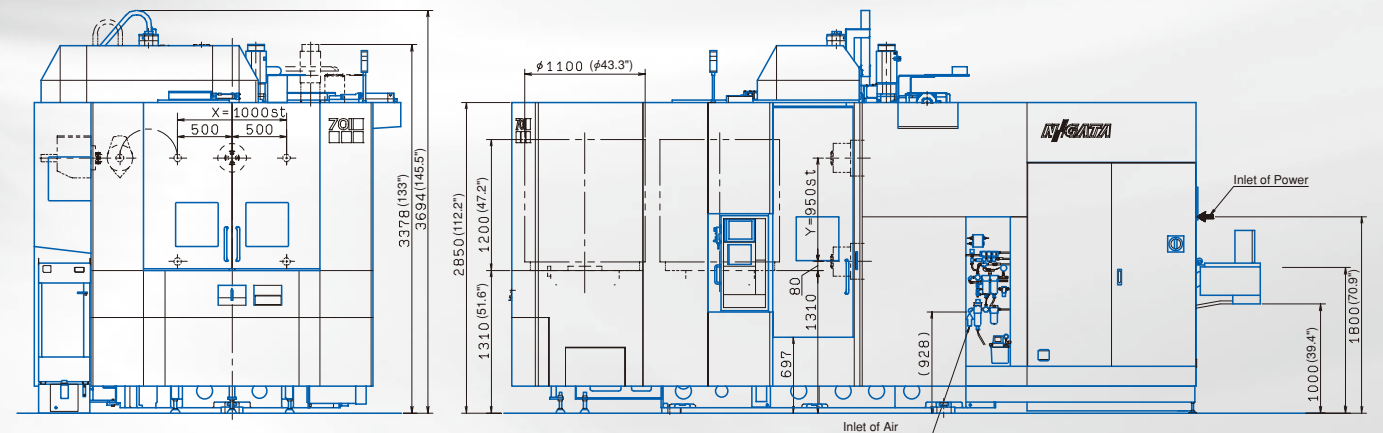
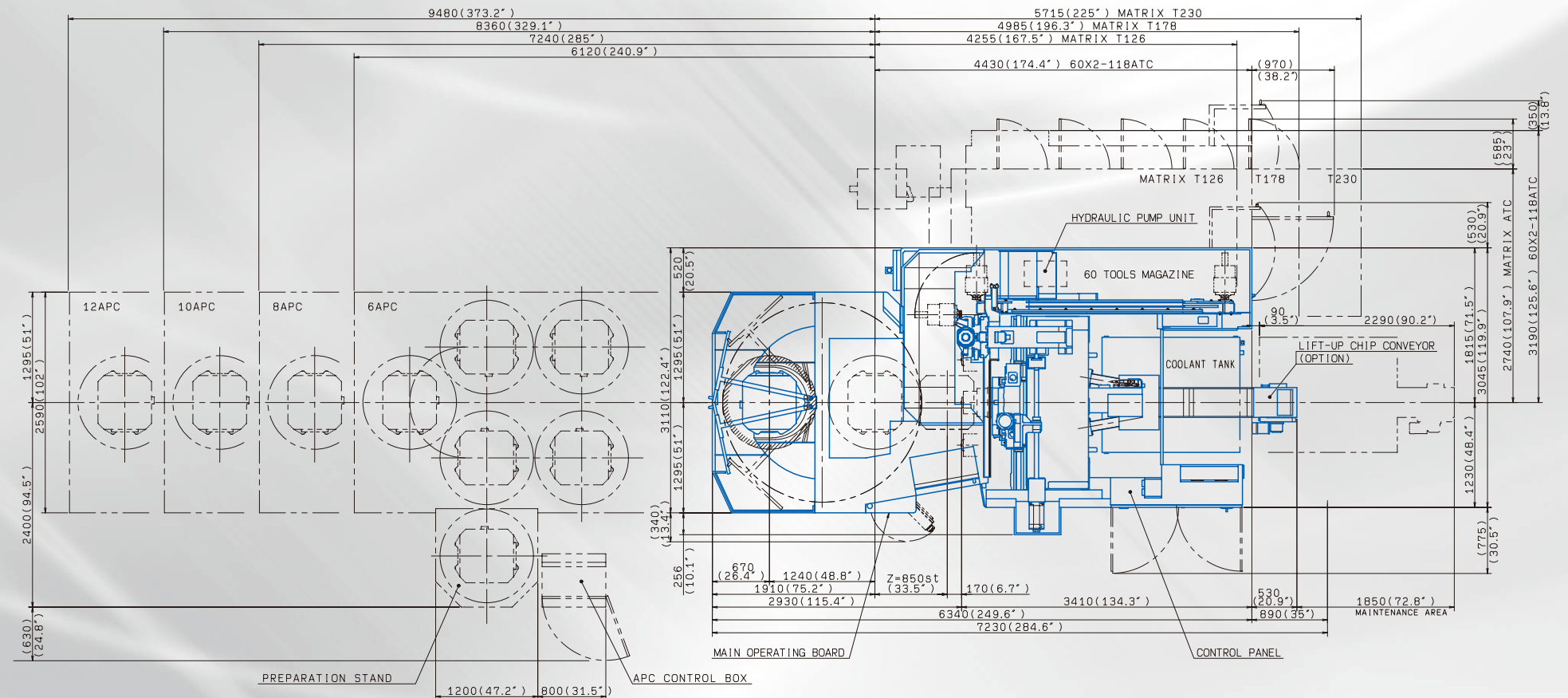
## STANDARD PALLET TOP SURFACE



## MAXIMUM WORKPIECE ENVELOPE



## SPN701 GENERAL VIEW MM(INCH)

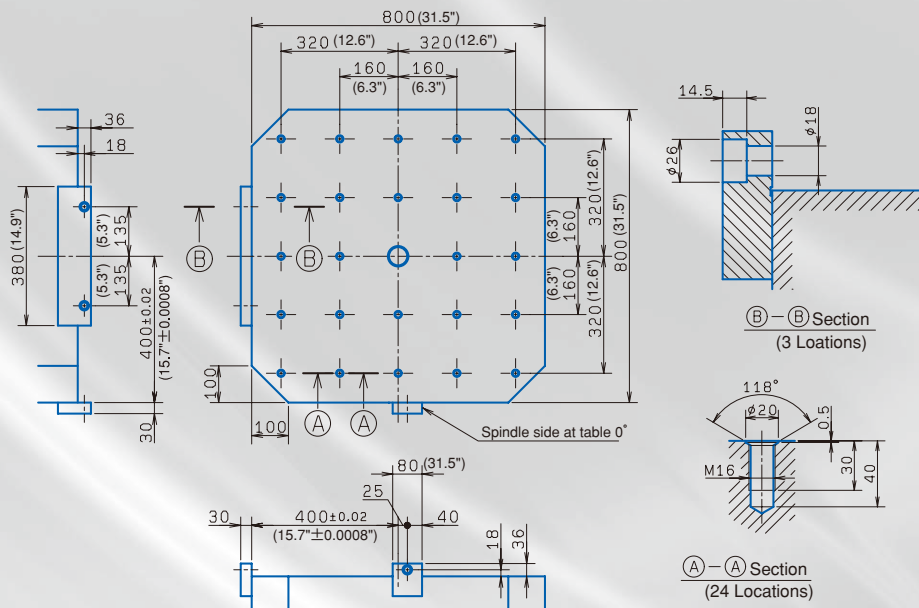




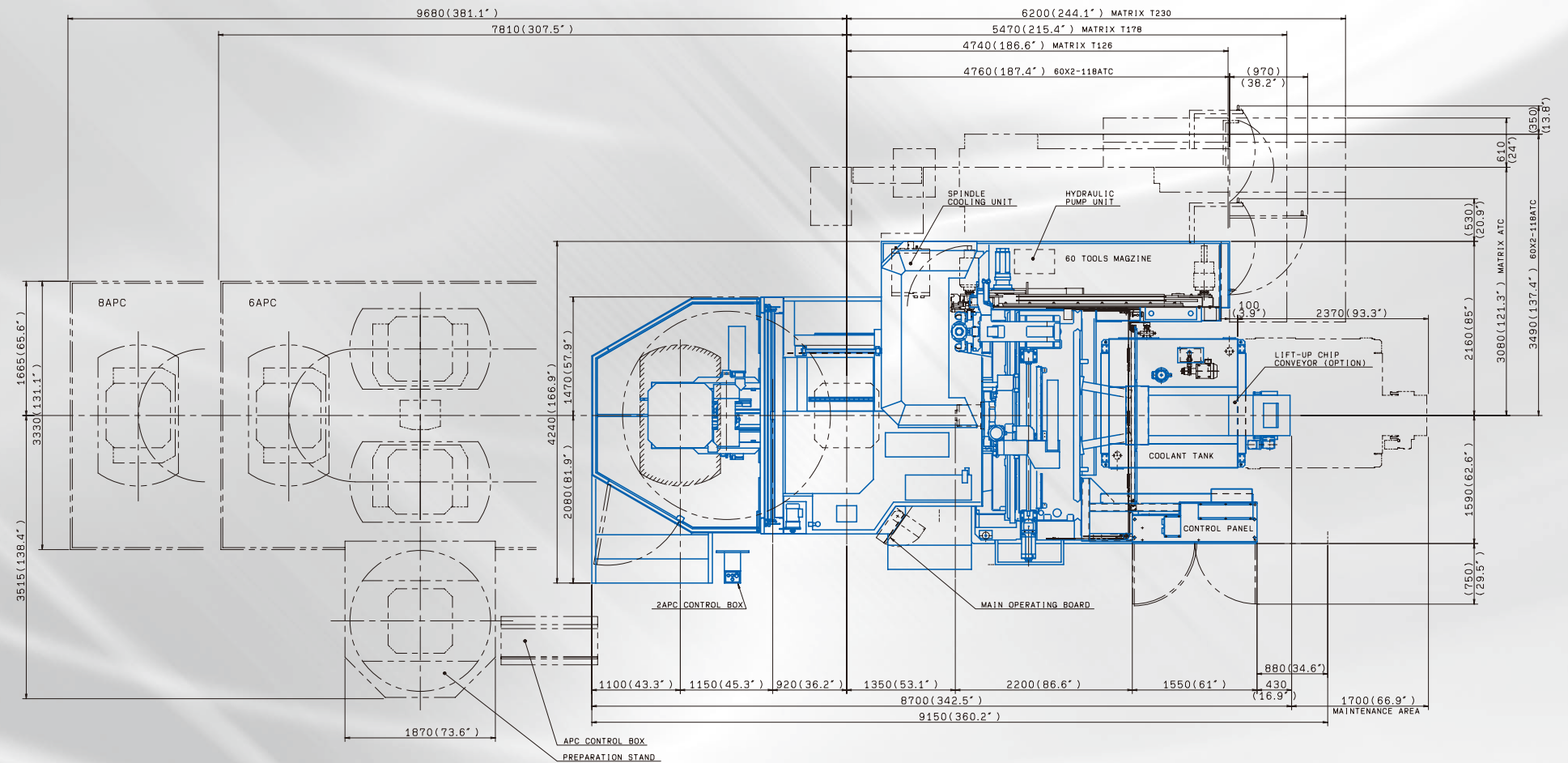
# THE "BOX in BOX" MACHINE LAYOUT

—SPN901

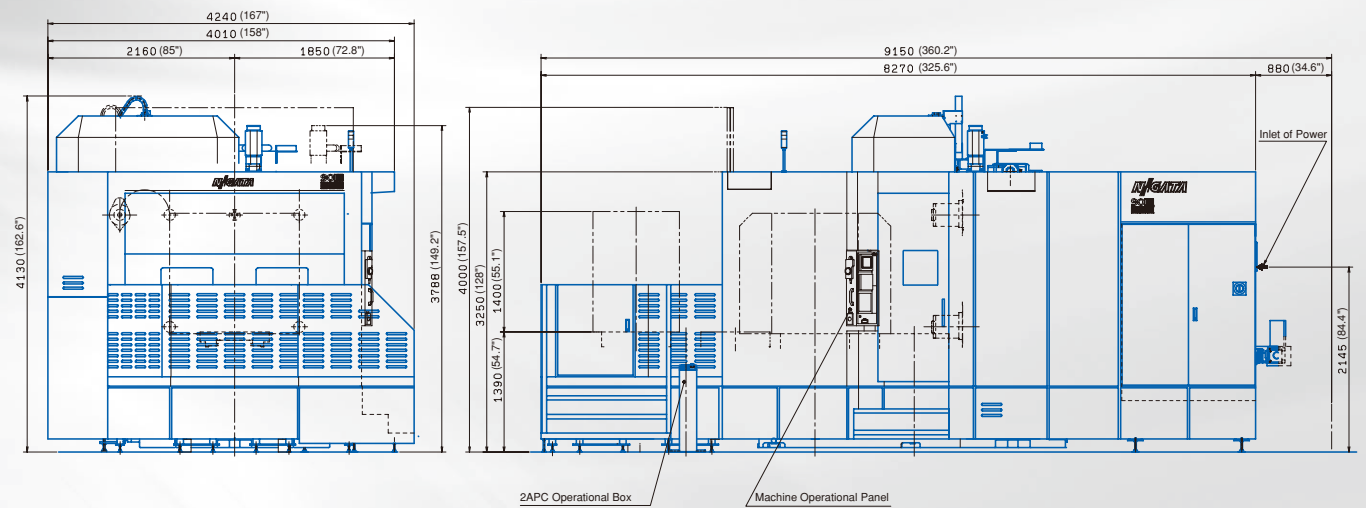
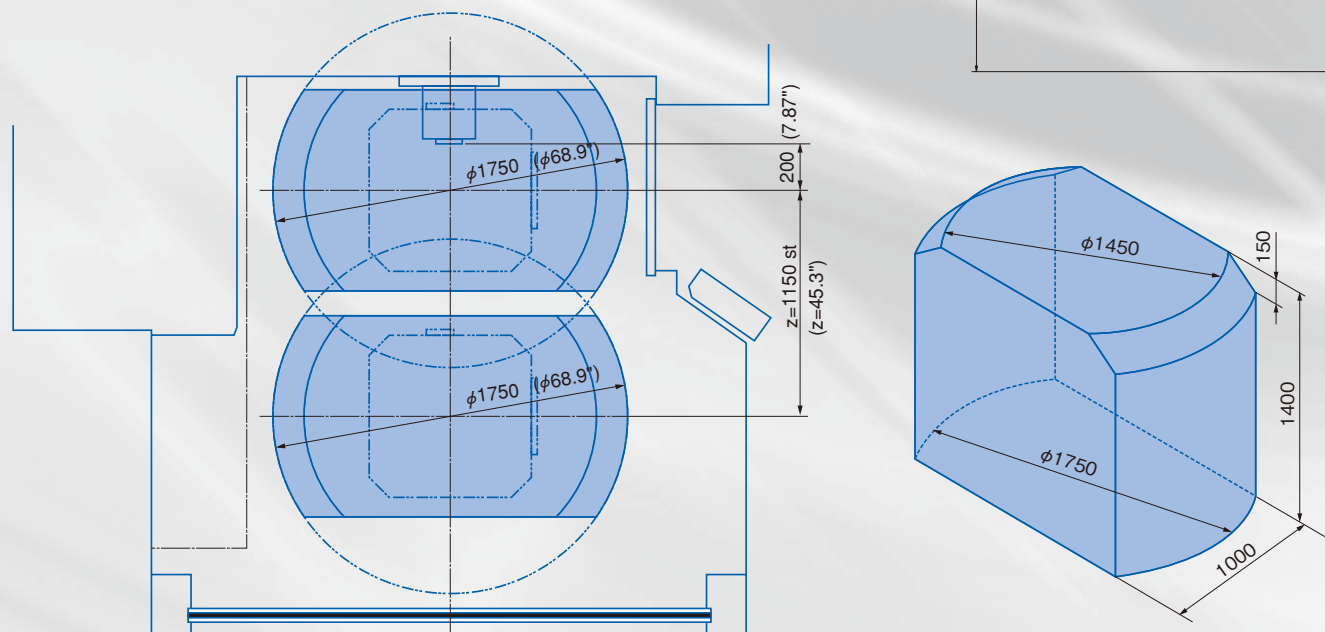
## STANDARD PALLET TOP SURFACE



## SPN901 GENERAL VIEW MM(INCH)



## MAXIMUM WORKPIECE ENVELOPE





# MACHINE SPECIFICATIONS



ITEM	SPN503		SPN701		SPN901		
	Metric	Inch	Metric	Inch	Metric	Inch	
<b>TRAVEL &amp; WORK CAPACITY</b>	X axis travel (saddle side to side)	800 mm	31.5 "	1000 mm	39.4 "	1500 mm	59.1 "
	Y axis travel (spindle head up and down)	750 mm	29.5 "	950 mm	37.4 "	1300 mm	51.2 "
	Z axis travel (table front and rear)	750 mm	29.5 "	850 mm	33.5 "	1150 mm	45.3 "
	Spindle center line to pallet surface	80 ~ 830	3.15 ~ 32.7 "	80 ~ 1030 mm	3.15 ~ 40.6 "	80 ~ 1380 mm	3.15 ~ 54.3 "
	Spindle nose to table center line	150 ~ 900	5.9 ~ 35.4 "	170 ~ 1020 mm	6.7 ~ 40.2 "	200 ~ 1350 mm	7.87 ~ 53.15 "
<b>TABLE</b>	Table working surface	500 × 500 mm	19.7 × 19.7 "	630 × 630 mm	24.8 × 24.8 "	800 × 800 mm	31.5 × 31.5 "
	Table increments	1° [0.001°]	1° [0.001°]	1° [0.001°]	1° [0.001°]	1° [0.001°]	1° [0.001°]
	Maximum mass on pallet	600 kg	1320 lbs	1200 kg	2640 lbs	2000 kg [2500 kg]	4400 lbs [5500 lbs]
<b>SPINDLE</b>	Spindle drive motor	AC 30 / 25 kW	AC 40 / 34 HP	AC 30 / 25 kW	AC 40 / 34 HP	AC 30 / 22 kW	AC 40 / 29.5 HP
	Spindle speeds	10000 min <sup>-1</sup>	10000 rpm	12000 min <sup>-1</sup>	12000 rpm	8000 min <sup>-1</sup>	8000 rpm
	Spindle max. torque	420 N·m	310 ft·lbs	420 N·m	310 ft·lbs	600 N·m	443 ft·lbs
	Spindle taper	No.50	No.50	No.50	No.50	No.50	No.50
<b>FEEDRATE</b>	Rapid traverse X axis	50 [61] m/min	1968 [2400] ipm	60 m/min	2362 ipm	50 m/min	1968 ipm
	Y axis	50 [61] m/min	1968 [2400] ipm	60 m/min	2362 ipm	50 m/min	1968 ipm
	Z axis	50 [61] m/min	1968 [2400] ipm	60 m/min	2362 ipm	50 m/min	1968 ipm
	Cutting X - Y - Z	1 ~ 40000 mm/min	0.04 ~ 1575 ipm	1 ~ 40000 mm/min	0.04 ~ 1575 ipm	1 ~ 40000 mm/min	0.04 ~ 1575 ipm
	Table index speed / 1° table	25 min <sup>-1</sup>	25 rpm	20 min <sup>-1</sup>	20 rpm	12 min <sup>-1</sup>	12 rpm
	NC table	25 min <sup>-1</sup>	25 rpm	20 min <sup>-1</sup>	20 rpm	11.1 min <sup>-1</sup>	11.1 rpm
<b>AUTOMATIC TOOL CHANGER (ATC)</b>	Tool magazine capacity, Chain	62 [88/128]	62 [88/128]	60	60	60	60
	Matrix	[126/178/230/308]	[126/178/230/308]	[126/178/230/308]	[126/178/230/308]	[126/178/230/308]	[126/178/230/308]
	Tool selection	Short cut random	Short cut random	Short cut random	Short cut random	Short cut random	Short cut random
	Tool shank	BT50	CT50	BT50	CT50	BT50	CT50
	Maximum tool length	450 mm	17.7 "	550 mm	21.6 "	600 mm	23.6 "
	Maximum milling cutter dia.	120 mm	4.72 "	130 mm	5.1 "	130 mm	5.1 "
	Ditto adjacent pockets empty	230 mm	9.05 "	260 mm	10.2 "	260 mm	10.2 "
	Maximum tool mass (weight)	20 kg [30 kg]	44 lbs [66 lbs]	20 kg [30 kg]	44 lbs [66 lbs]	30 kg	66 lbs
	Tool change time (tool to tool)	1.4 s	1.4 sec.	1.4 s	1.4 sec.	2.7 s	2.7 sec.
<b>AUTOMATIC PALLET CHANGER (APC) ACCURACY</b>	Type	Direct Turn	Direct Turn	Direct Turn	Direct Turn	Rotary shuttle	Rotary shuttle
	Number of pallets	2	2	2	2	2	2
	Positioning / full stroke X - Y - Z	± 0.0025 mm	± 0.00010 "	± 0.0025 mm	± 0.00010 "	± 0.004 mm	± 0.00016 "
	Ditto with scales X - Y - Z	± 0.0020 mm	± 0.00008 "	± 0.0020 mm	± 0.00008 "	± 0.003 mm	± 0.00012 "
	Repeatability X - Y - Z	± 0.0015 mm	± 0.00006 "	± 0.0015 mm	± 0.00006 "	± 0.0015 mm	± 0.00006 "
	Ditto with scales X - Y - Z	± 0.0010 mm	± 0.00004 "	± 0.0010 mm	± 0.00004 "	± 0.0010 mm	± 0.00004 "
<b>GENERAL</b>	Machine weight approx.	16000 kg	35200 lbs	20500 kg	45100 lbs	28000 kg	61600 lbs
	Machine space W / D	3442 / 5130 mm	135.5 / 201.0 "	3366 / 7210 mm	132.5 / 283.9 "	4240 / 8270 mm	167 / 326 "
	Ditto H	3406 mm	134.1 "	3694 mm	145.4 "	4130 mm	162.6 "
	Floor to table surface	1180 mm	46.5 "	1310 mm	51.6 "	1370 mm	53.9 "
	Power	67 kVA	67 kVA	87 kVA	87 kVA	76 kVA	76 kVA
	Control	Fanuc	Fanuc	Fanuc	Fanuc	Fanuc	Fanuc

NOTE: [ ] means optional specifications