

# SmartMilling SM Series

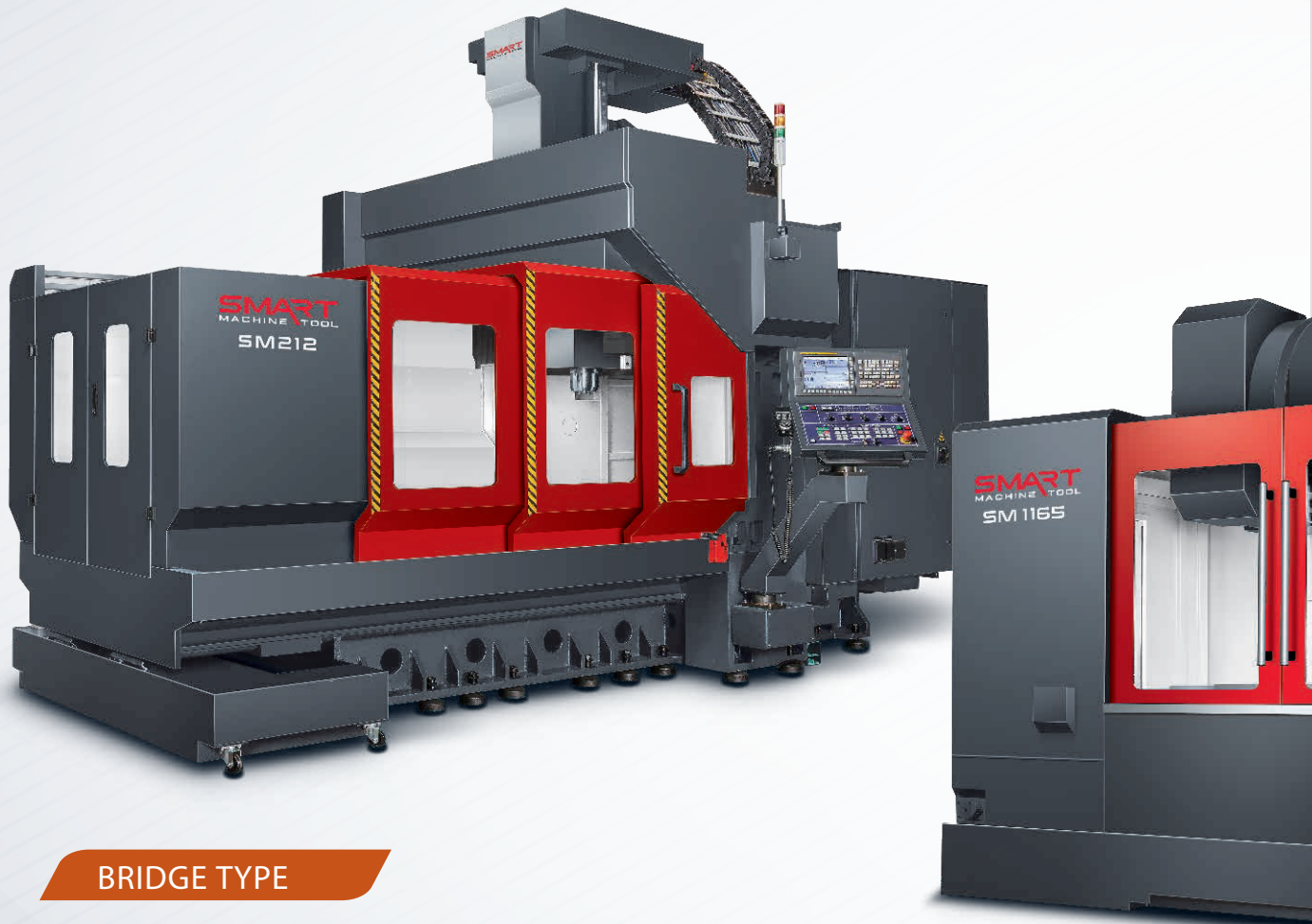
High Performance Machining Centers



**SMART**  
MACHINE TOOL

# SUPER RIGIDITY

Providing Ultimate Cutting Performance



BRIDGE TYPE

**SM 212 / SM 312 / SM 412 / SM 316**

X-axis travel : 78.74" ~ 157.48"

Y-axis travel : 47.24" ~ 62.99"

Z-axis travel : 29.92"



## LINEAR WAYS

### SM 600 / SM 1000

X-axis travel : 23.62" ~ 40.15"

Y-axis travel : 20.07"

Z-axis travel : 20.07"

## BOX WAYS

### SM 965 / SM 1165 / SM 1365 / SM 1565 / SM 1575

X-axis travel : 35.43" ~ 59.05"

Y-axis travel : 25.59" ~ 29.13"

Z-axis travel : 24.01"

# SM **BOX WAYS** Series 965 / 1165 / 1365 / 1565 / 1575

## SUPER RIGIDITY VERTICAL MACHINING CENTERS

SM series offers excellent performance with reasonable and affordable price.

Utilizing advanced R&D technology and strict quality control, the box way design in SM Series is specially made for heavy cutting.

- > To fit all machining requirements, various spindle configurations are available to achieve optimal cutting performance.
- > All axes are equipped with box ways which are precision ground and thoroughly heat treated, making them suitable for heavy cutting.
- > Highly efficient Twin-Arm tool changer provides fast and reliable tool changing system.
- > To meet your various machining requirements, the wide range of the SM Series features X travel start from 35.43" to 59.05"; Y travel start from 25.59" to 29.13"; and Z travel is 24.01".





**SMART**  
MACHINE TOOL

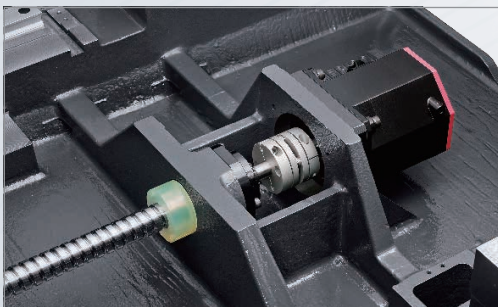
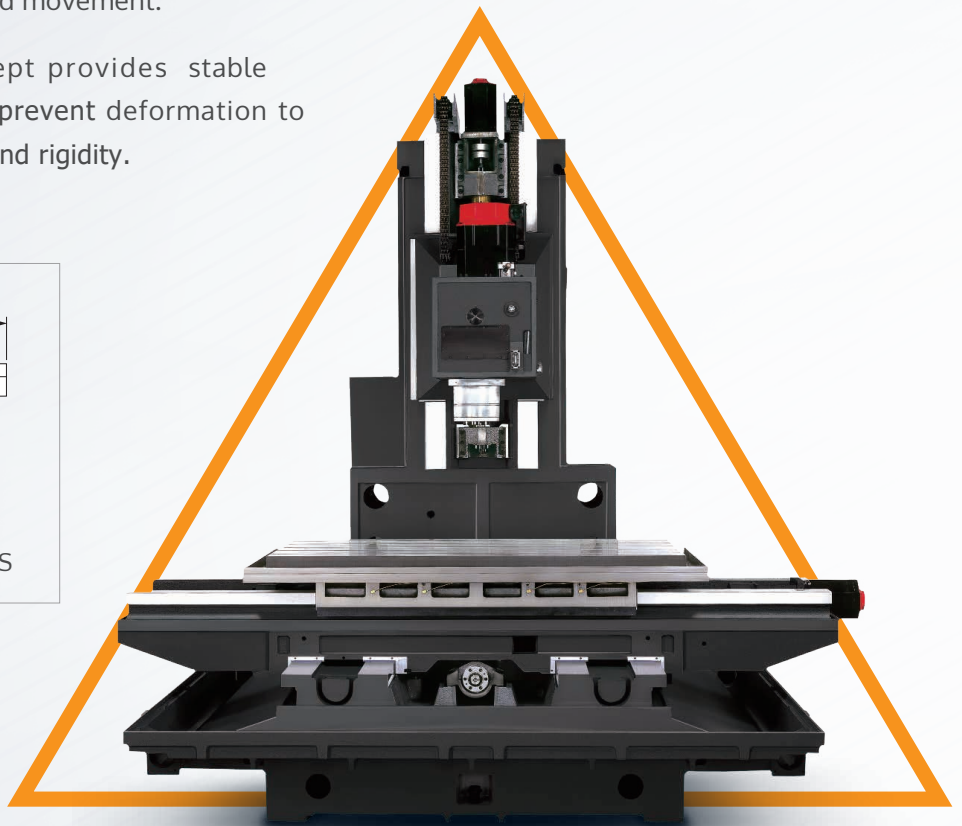
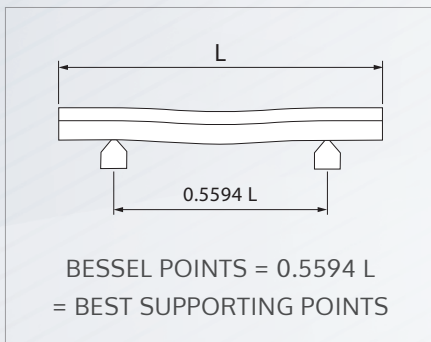
# SM

BOX WAYS

Series 965 / 1165 / 1365 / 1565 / 1575

## SUPER RIGIDITY VERTICAL MACHINING CENTERS

- > The Finite Element Analysis ( FEA ) provides optimal machine design and light-weight structural advantages while ensuring super rigidity of machine.
- >  $\Delta$  ( Delta ) Wide span column construction provides superior cutting stability. The headstock retains stability even under high speed movement.
- > The BESSEL POINTS concept provides stable support on Y-axis saddle to prevent deformation to enhance the table accuracy and rigidity.



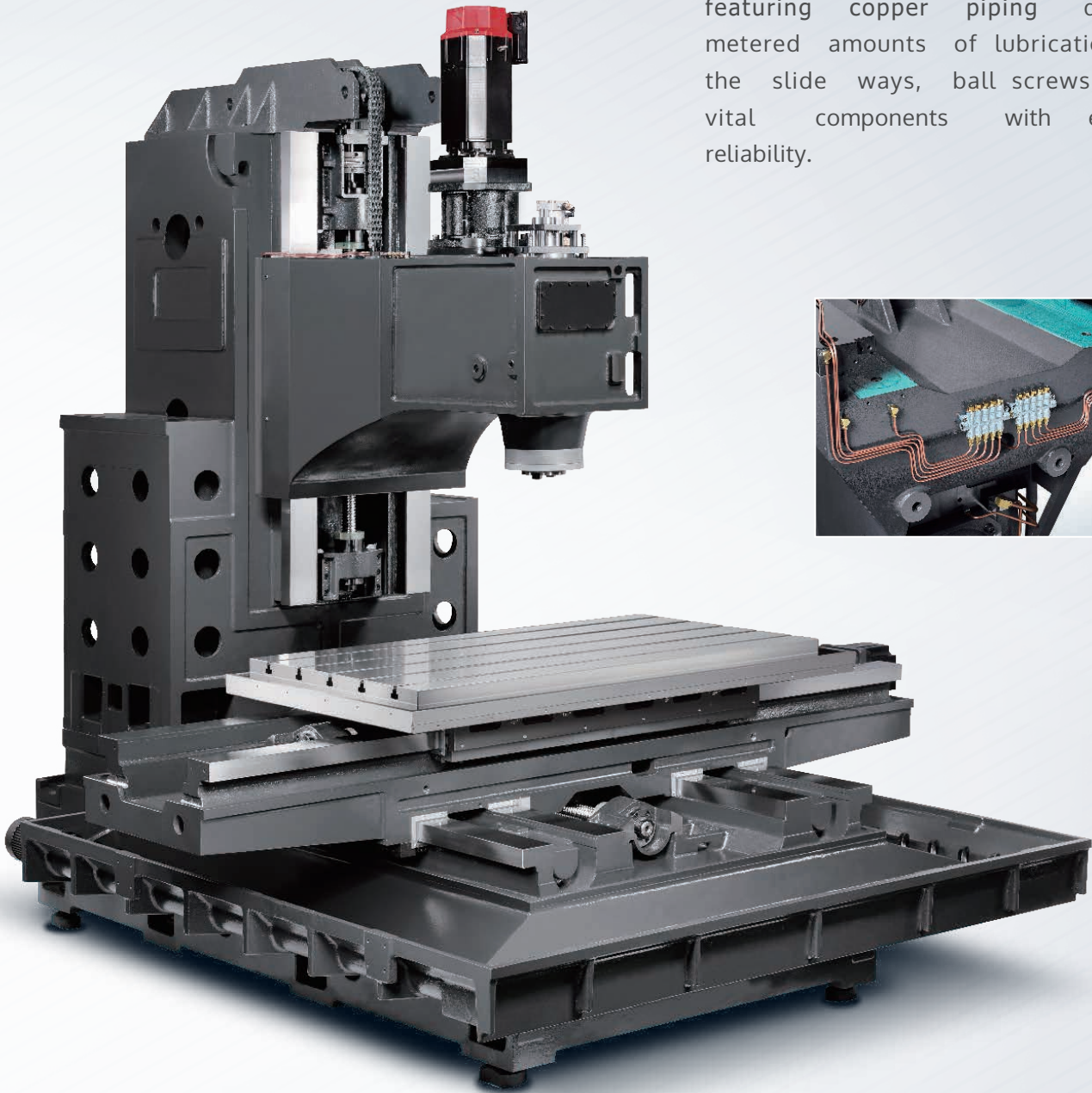
Integrated ball screw servo motor base



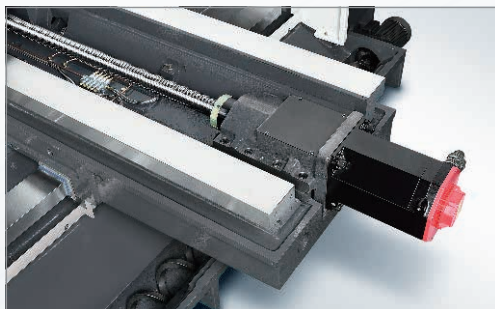
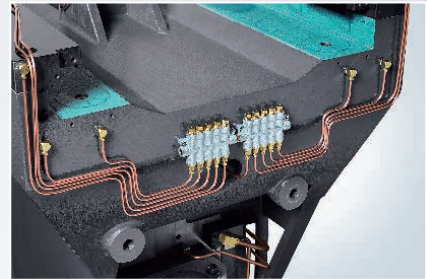
Integrated ball screw bearing base



Dual-nuts secured ball screw



- > The auto lubrication system featuring copper piping delivers metered amounts of lubrication to the slide ways, ball screws, and vital components with ensured reliability.



Direct-drive servo motor

- > All three axes systems are coupled with FANUC AC Direct Drive servo motors to provide great thrust and fast acceleration and deceleration movement. It decreases motor load and reduces heat while maintaining ultimate performance and accuracy.
- > Ball screws are precision ground, dual anchored, and pretensioned to ensure high accuracy with long lasting durability.

# SM **BOX WAYS** Series 1688 / 2600

## SUPER RIGIDITY VERTICAL MACHINING CENTERS



- > Sturdy box way construction for heavy duty machining.
- > 6,000 rpm gear box spindle with oil chiller.
- > 40 Tool magazine with double arm ATC.
- > Renishaw probe ready with receiver and GUI.
- > Standard chip auger with coolant bed flush.

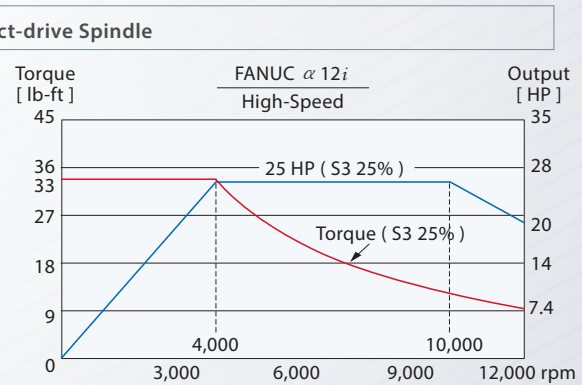
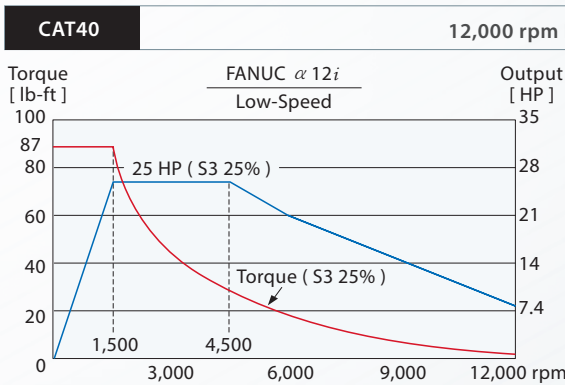
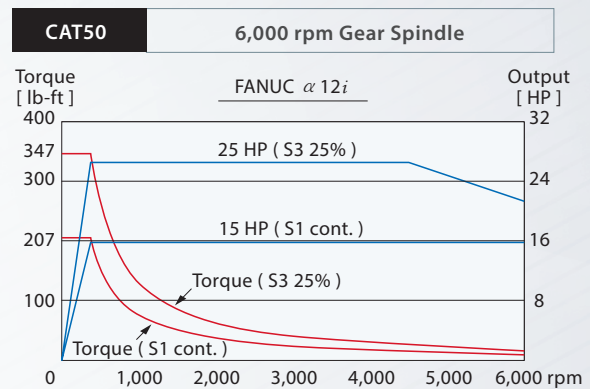
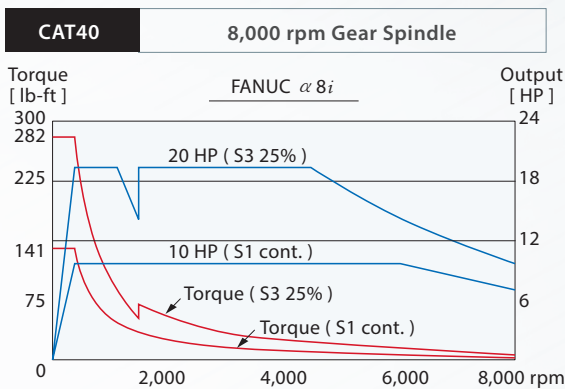
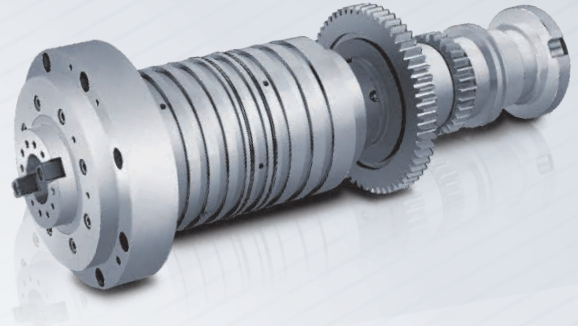
Models	SM1688	SM2600
X-axis travel	62.99"	103.36"
Y-axis travel	34.65"	40.16"
Z-axis travel	27.56"	35.43"
Table size	70.87" x 37.40"	102.36" x 39.37"
Table load capacity	5,512 lbs	6,614 lbs
Spindle speed	6,000 rpm	6,000 rpm
Spindle motor	25 hp	25 hp
Spindle taper	CAT 50 BIG PLUS	CAT 50 BIG PLUS
ATC	40	40

Specifications are subject to change without notice.



# High Performance Spindle System

- > 2-speed geared headstock design provides an optimal range of torque.
- > High hardness nickel-molybdenum-chromium alloy gear mechanism with auto lubrication and cooling system ensures the performance and lifetime of gear transmission box.
- > 12,000 rpm direct-drive spindle is also available, which provides maximum 87 ft-lb. torque output at 1,500 rpm to meet with various high speed working conditions.

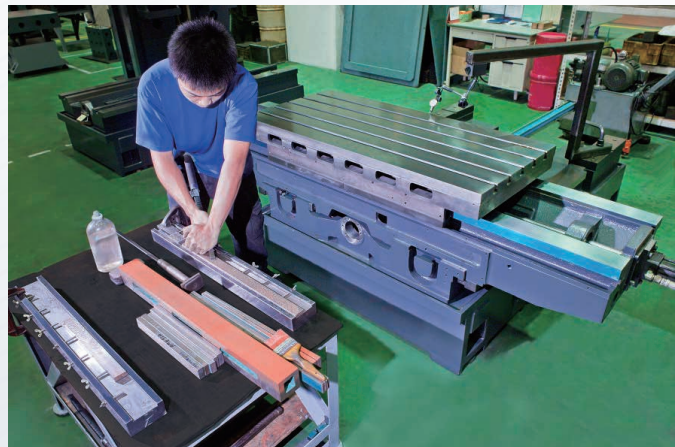


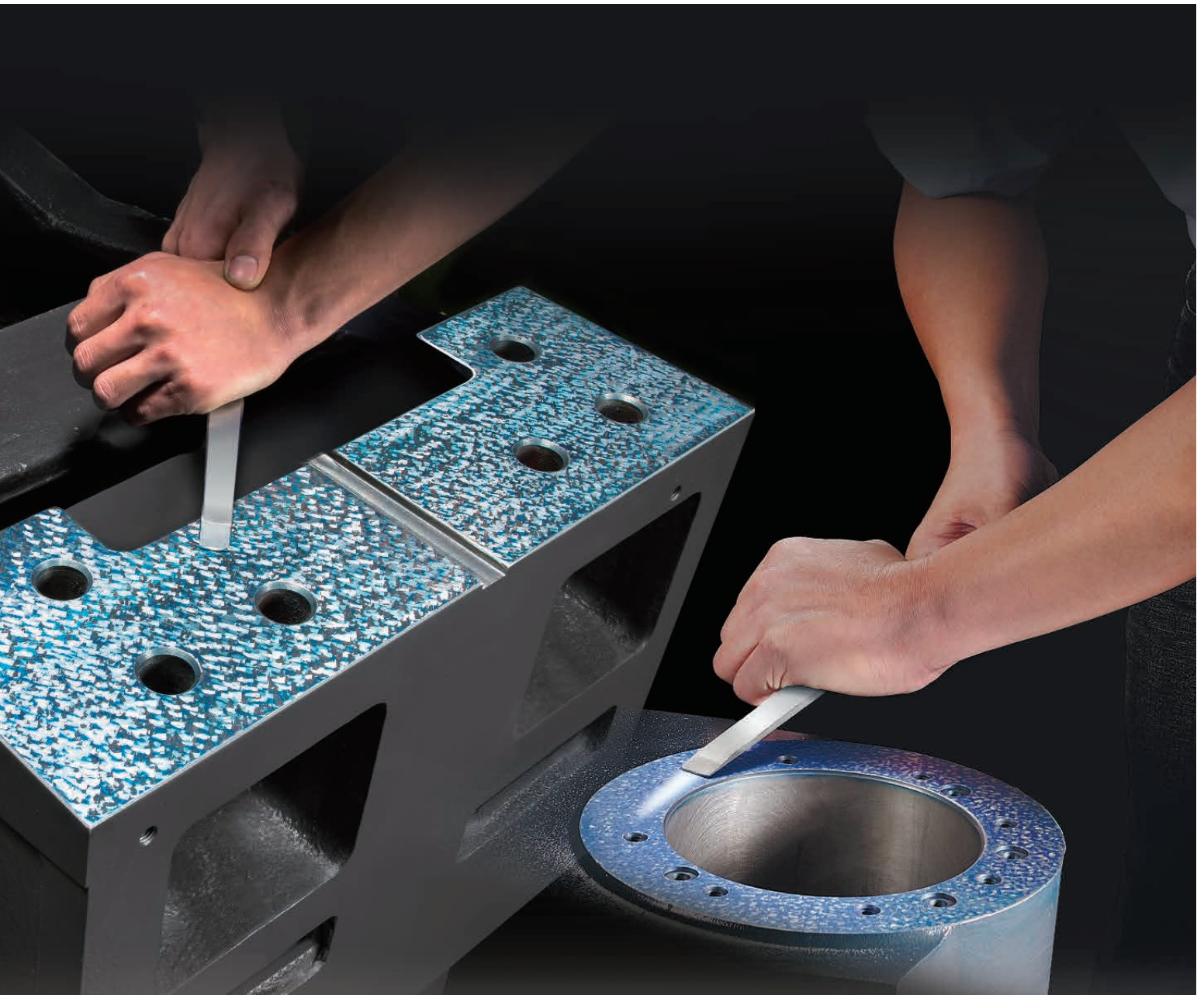
- > Spindles and components all pass through rigorous running tests.





## Hand Scraped Craftmanship

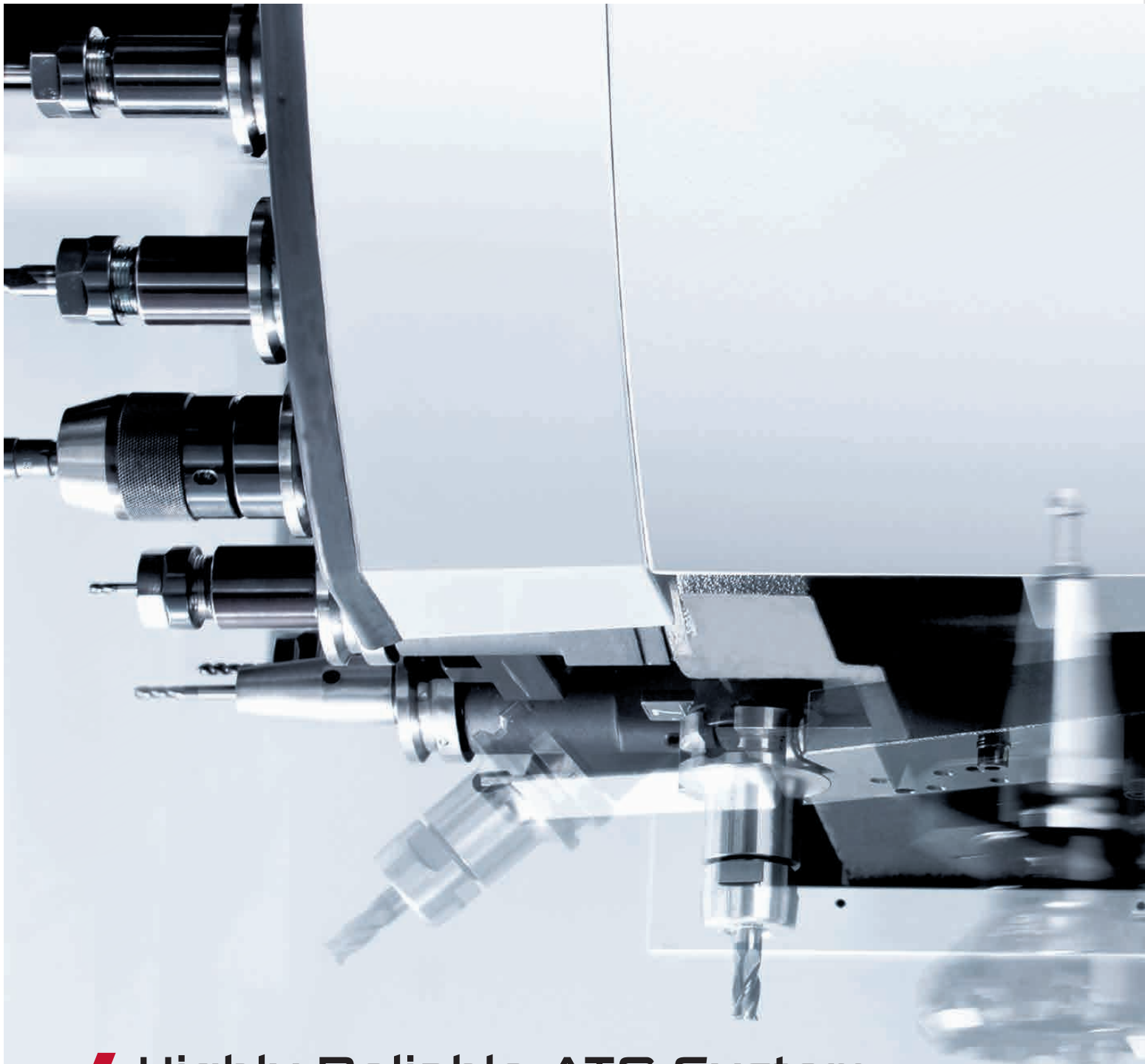




> All the sliding *and* fixed surfaces are hand scraped to provide excellent precision, load distribution, and long term accuracy.

Including:

- Machine bed
- Column
- Saddle
- Headstock
- Ball screw holder



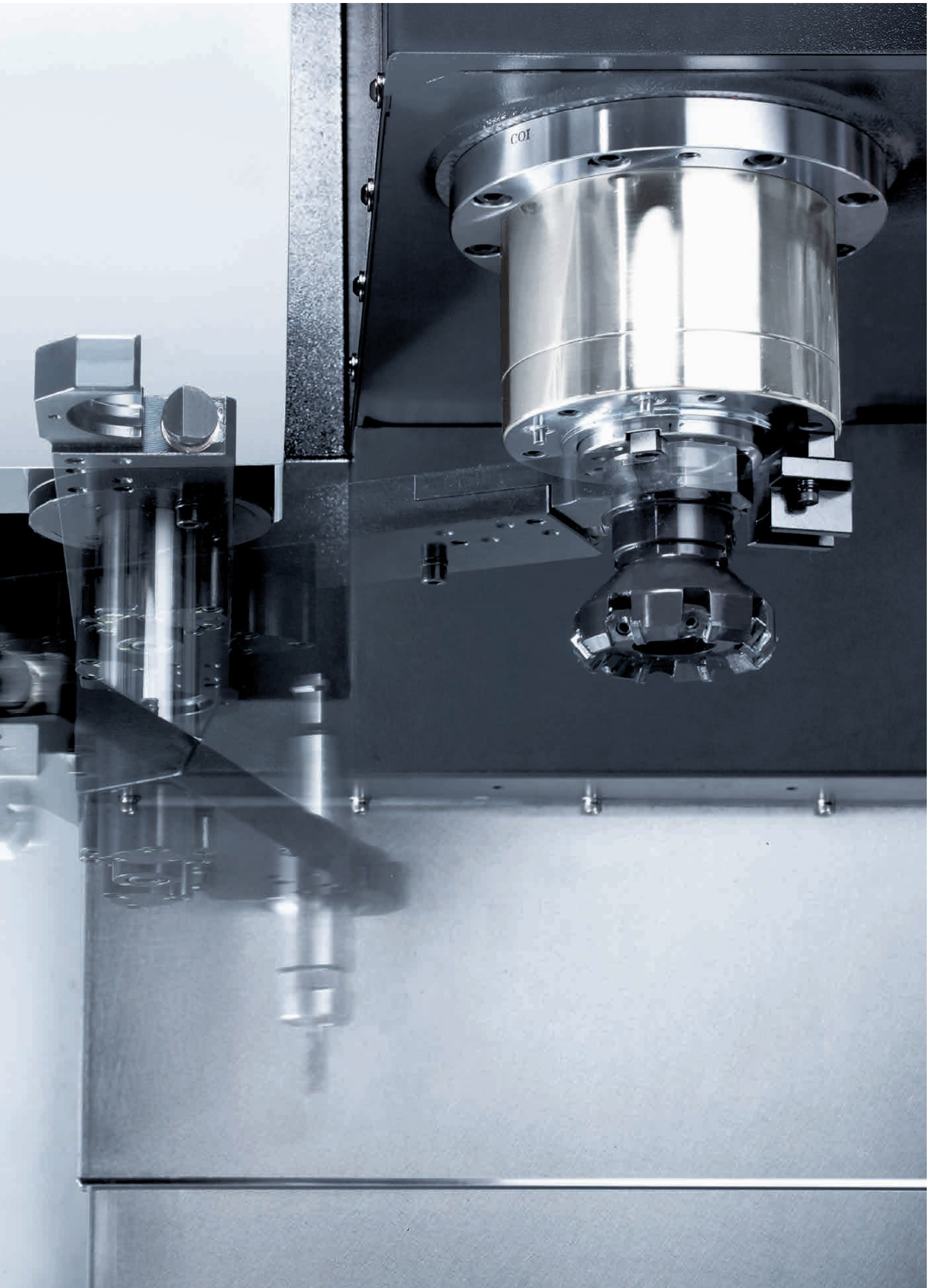
## **/ Highly Reliable ATC System**

- > SM series Twin-Arm ATC system provides a high speed tool exchange solution. We offer 24T / 30T / 36T / 40T tool magazines to fulfill the variety of machining requirements.
- > Standard shortcut tool change function can shorten tool change time and increase working efficiency.
- > Tool magazine capacity :

	SM 965	SM 1165	SM 1365	SM 1565	SM 1575
CAT40	24T / 36T			36T	
CAT50	30T				--



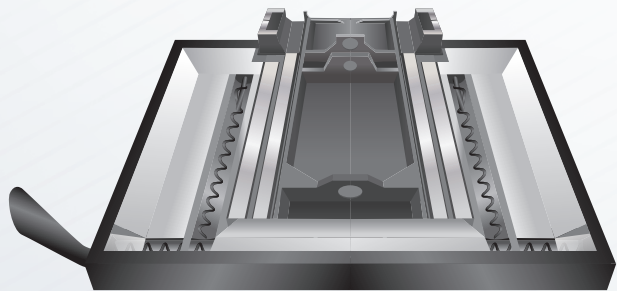
24T Disc type tool magazine





## **/ Chip Disposal System** **BOX WAYS**

- > All series are equipped with screw type chip auger to provide high chip removal efficiency.

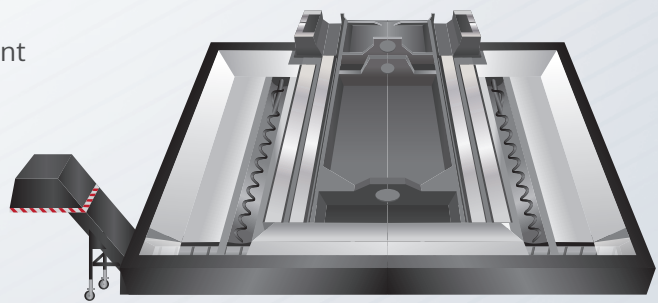


**Screw chip augers x 3**

( SM 965 / SM 1165 )



- > The optional high pressure chips flush coolant system is also available.



Chain type chip conveyor ( Opt. )

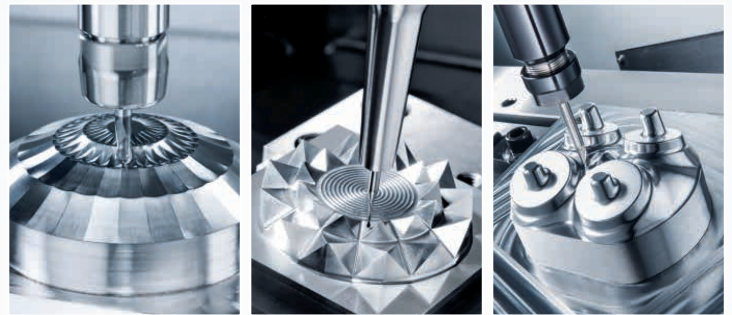
( SM 965 / SM 1165 / SM 1365 / SM 1565 / SM 1575 )

# SM **LINEAR WAYS** Series 600 / 1000

## HIGH SPEED VERTICAL MACHINING CENTERS

Based on SMART innovative technology, the cross roller design of SM 600/1000 is specialized on high precision machining at a very reasonable cost.

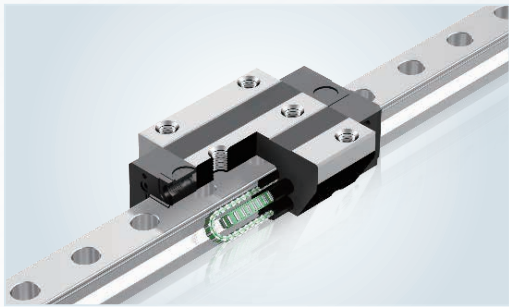
- > Rigid cross roller type guideways.
- > 12,000 rpm direct-drive spindle with oil chiller.
- > 24 Tool magazine with double arm ATC.
- > Renishaw probe ready with receiver and GUI.
- > Chip auger is standard.





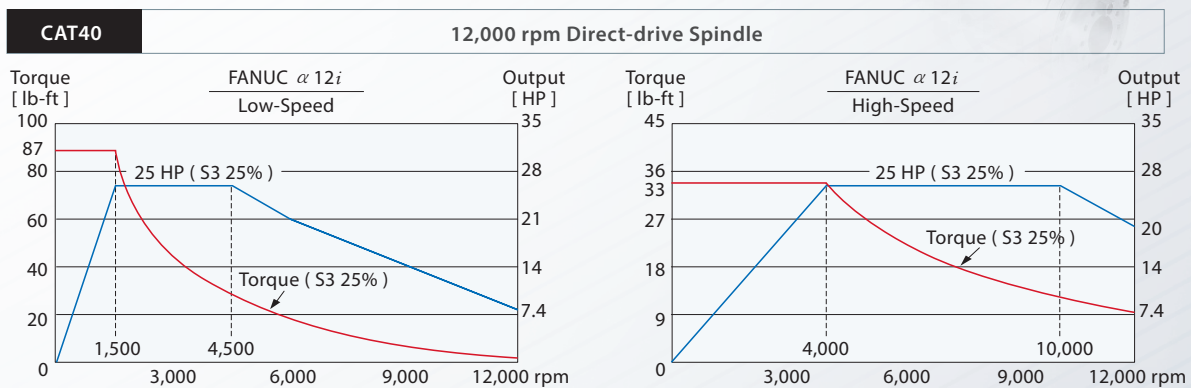
## Cross Roller Guideways

- > High rigidity cross roller guideways combines heavy cutting ability and fast movement with low abrasion ability from cross roller guideways to improve rigidity and accuracy of the machine.



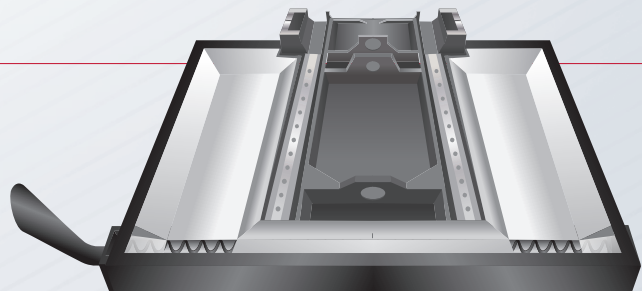
## Direct-drive Spindle

- > The 12K Direct Drive spindle provides improved acceleration/deceleration to improve machining efficiency.



## Chip Disposal System

- > Standard chip auger is capable of removing large amounts from the machine promptly.

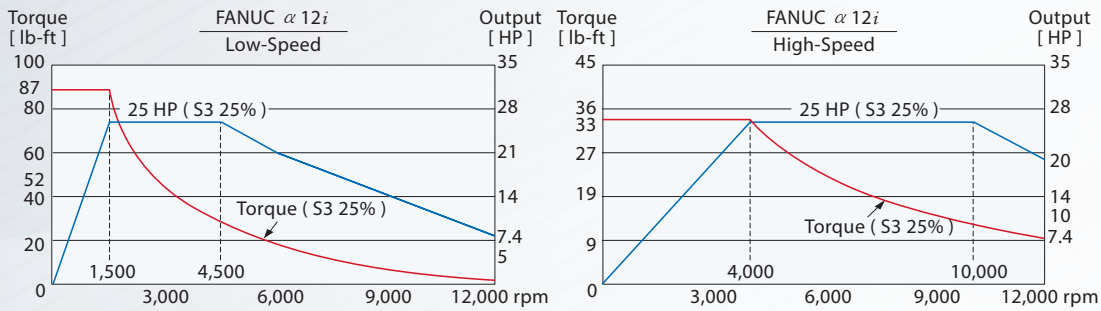


# SM BRIDGE TYPE Series 212 / 312 / 412

## BRIDGE TYPE VERTICAL MACHINING CENTERS

- > One-piece casting high rigidity cross beam.
- > One-piece base with vibration dampening capacity.
- > 12,000 rpm direct-drive spindle with oil chiller.
- > Rigid roller type guideways on X / Y / Z axes.
- > Hand scraping on contact surfaces of base and columns.
- > Fully enclosed splash guard is standard.

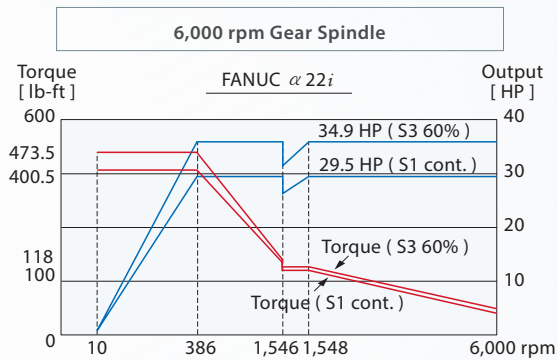
12,000 rpm Direct-drive Spindle



# SM **BRIDGE TYPE** Series 316

## BRIDGE TYPE VERTICAL MACHINING CENTERS

- > One-piece casting high rigidity cross beam.
- > One-piece base with vibration dampening capacity.
- > 6,000 rpm gear box spindle with oil chiller.
- > Rigid roller type guideways on X / Y axes.
- > Sturdy box way construction on Z-axis for heavy duty machining.
- > Hand scraping on contact surfaces of base and columns.
- > Fully enclosed splash guard is standard.



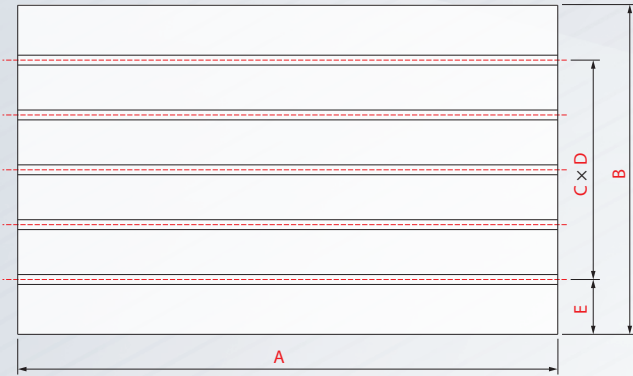
# Dimensions

BOX WAYS

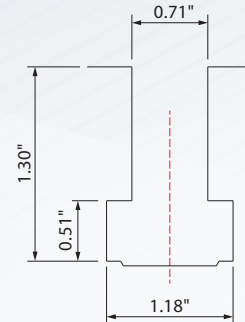
SM 965 / 1165 / 1365 / 1565 / 1575

SM 1688 / 2600

## Table Dimensions



## T-slot Dimensions

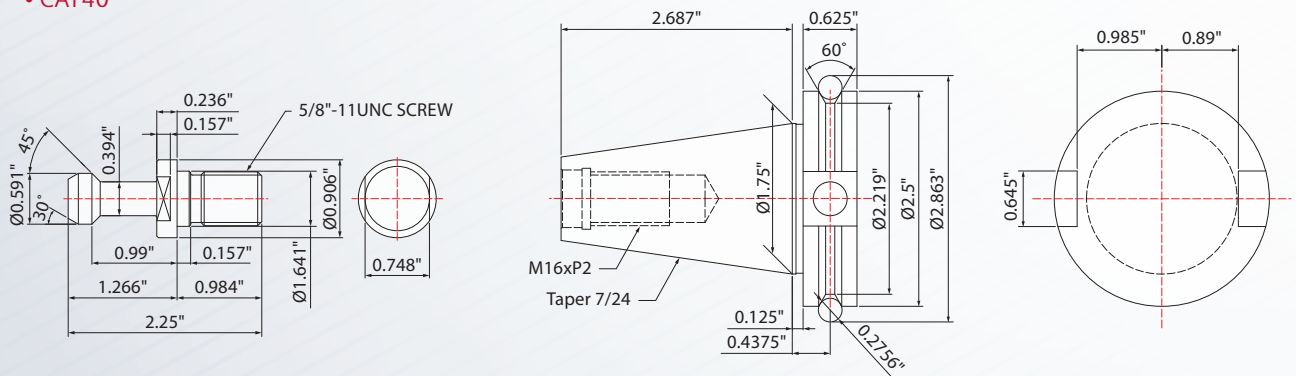


( SM 965 / 1165 / 1365 / 1565 / 1575 )

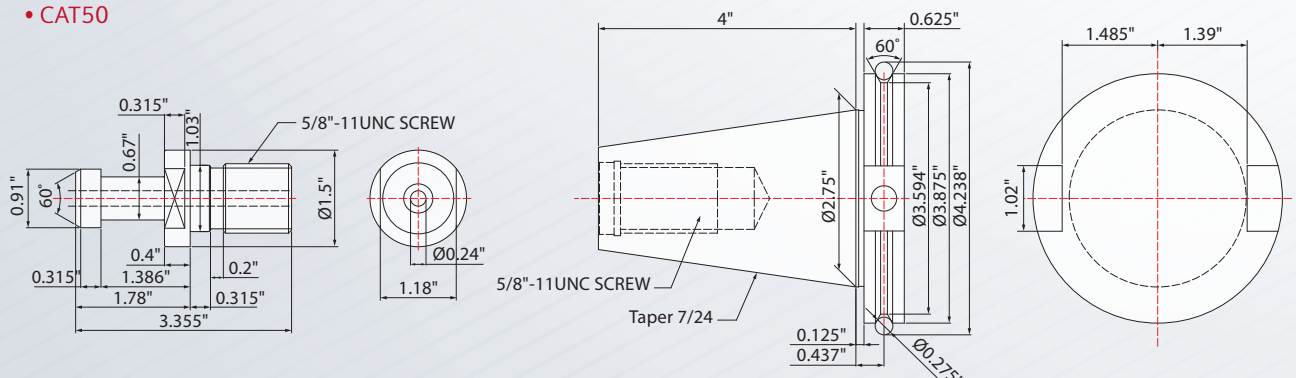
Models	A	B	C	D	E
SM 965	43.30"	25.59"	3.93"	5	4.92"
SM 1165	47.24"				
SM 1365	55.11"				
SM 1565	62.99"	27.55"	3.93"	7	1.96"
SM 1575	62.99"				

## Tool Shank And Pull Stud Dimensions

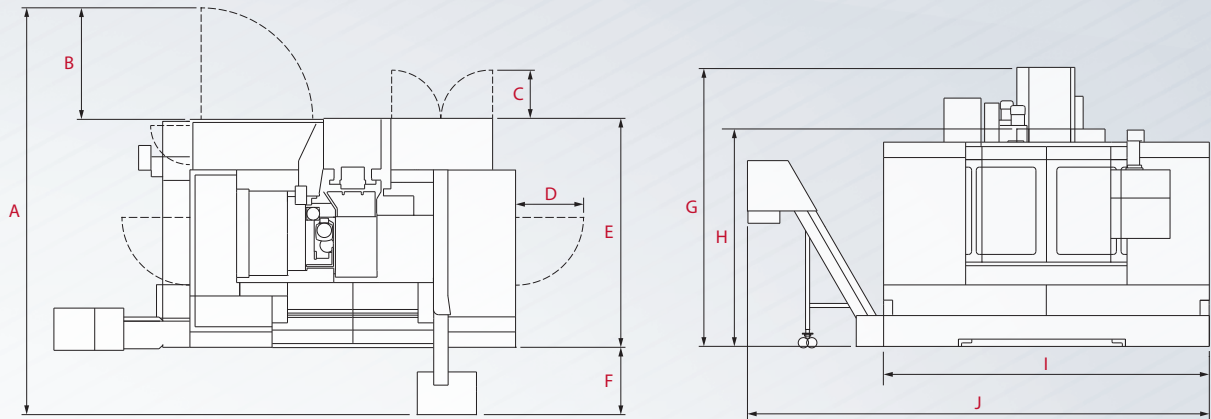
### • CAT40



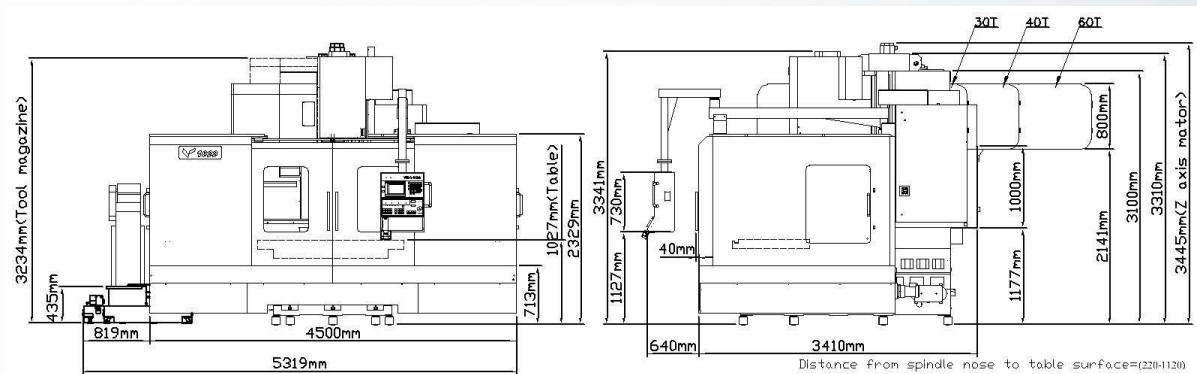
### • CAT50



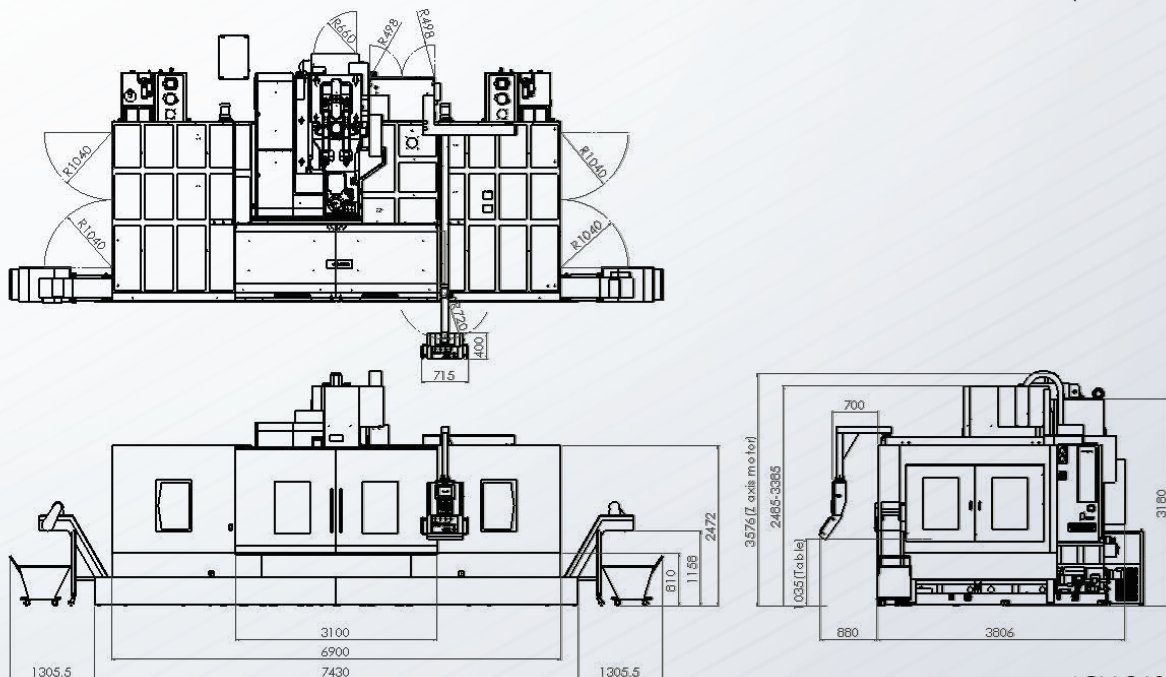
## Machine Dimensions



Models	A	B	C	D	E	F	G	H	I	J
SM 965									107.1"	159.1"
SM 1165	156.0"	31.7"	18.5"	26.0"	87.8"	25.9"	107.4"	83.4"	124.8"	176.9"
SM 1365									135.9"	187.9"
SM 1565									151.6"	203.7"
SM 1575	156.8"	29.2"	18.7"	32.6"	106.0"	30.7"	124.8"	100.7"	151.6"	199.8"

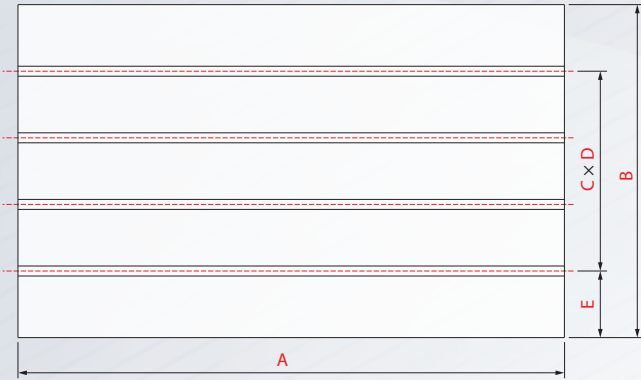


( SM 1688 )



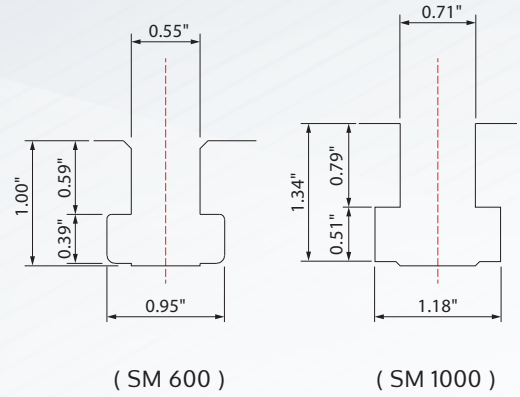
( SM 2600 )

## Table Dimensions



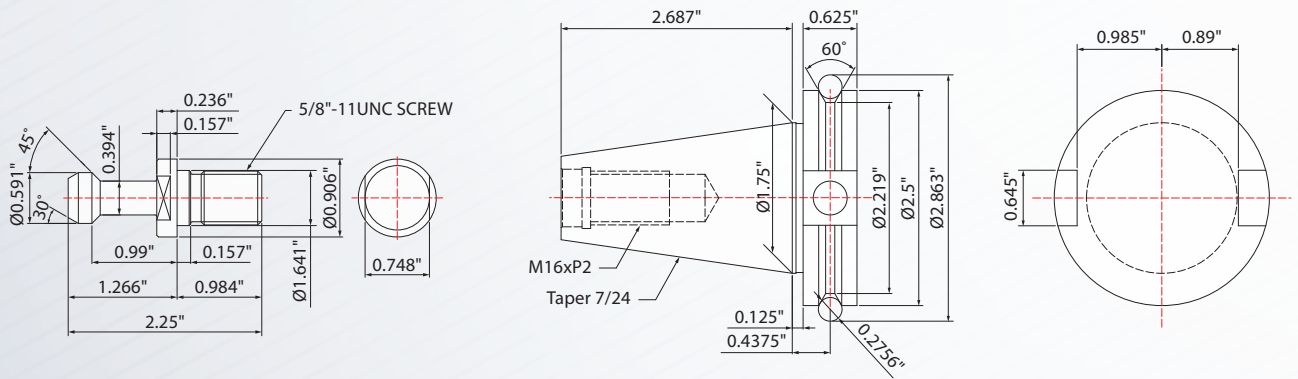
Models	A	B	C	D	E
SM 600	29.52"	20.07"	3.93"	4	4.13"
SM 1000	47.24"				

## T-slot Dimensions

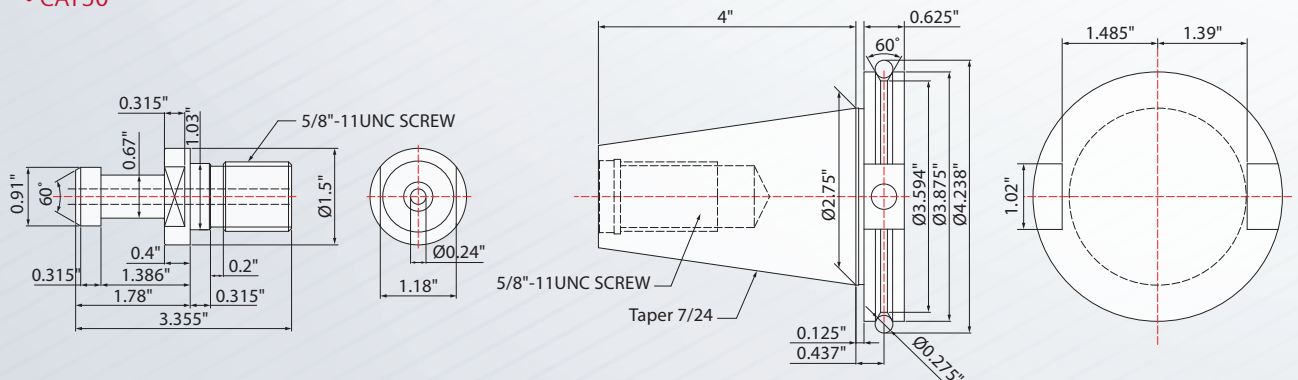


## Tool Shank And Pull Stud Dimensions

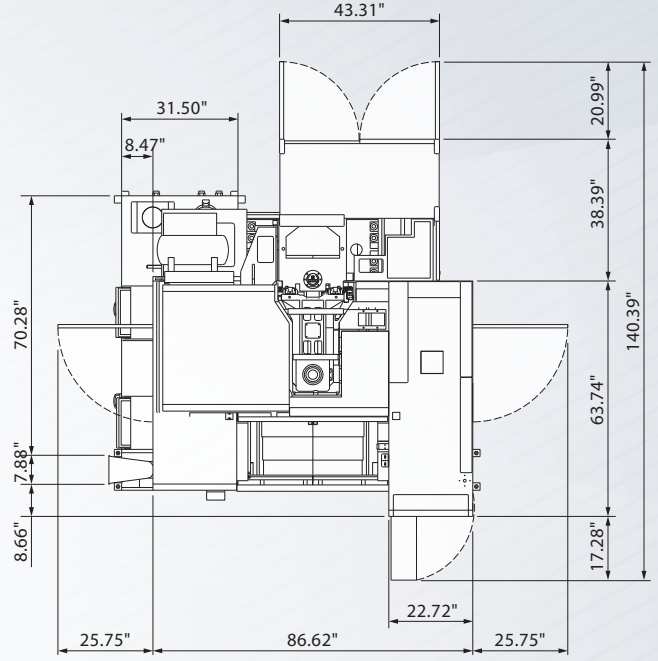
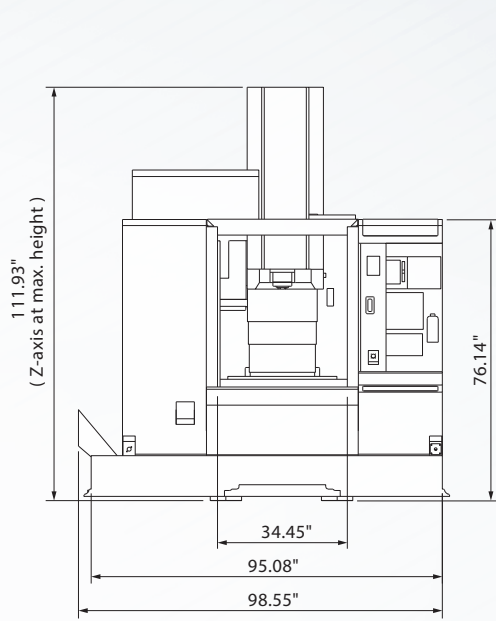
### • CAT40



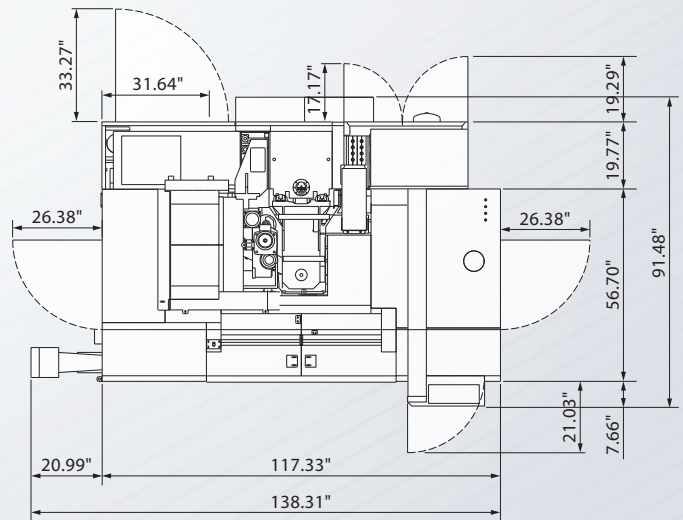
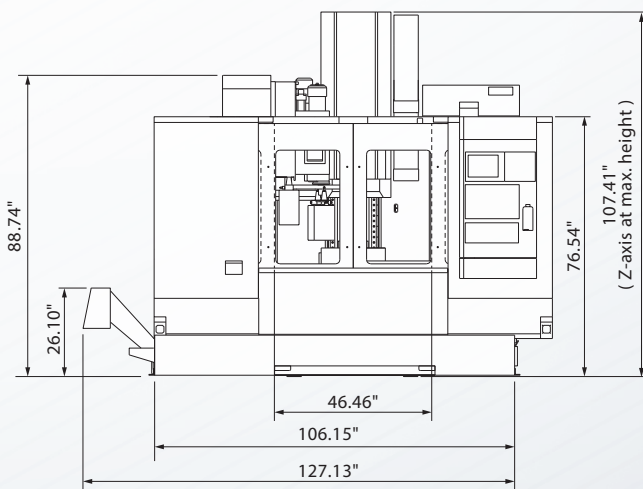
### • CAT50



## Machine Dimensions



( SM 600 )



( SM 1000 )

# Dimensions

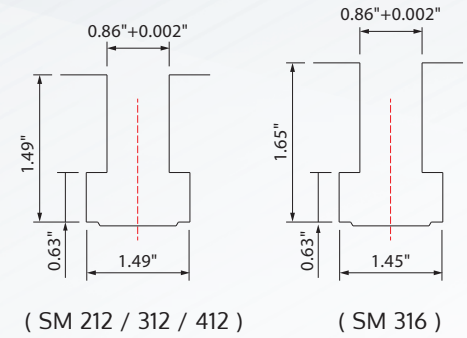
BRIDGE TYPE

SM 212 / 312 / 412 / 316

## Table Dimensions



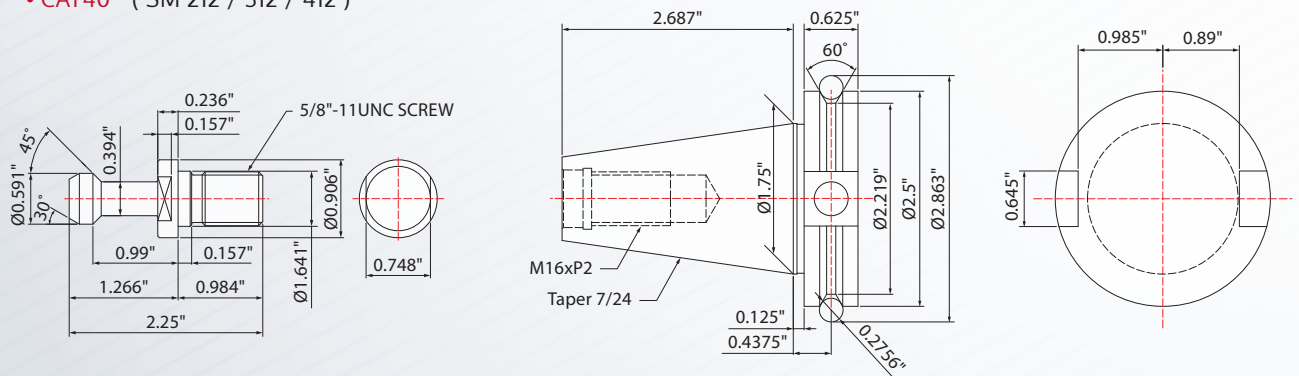
## T-slot Dimensions



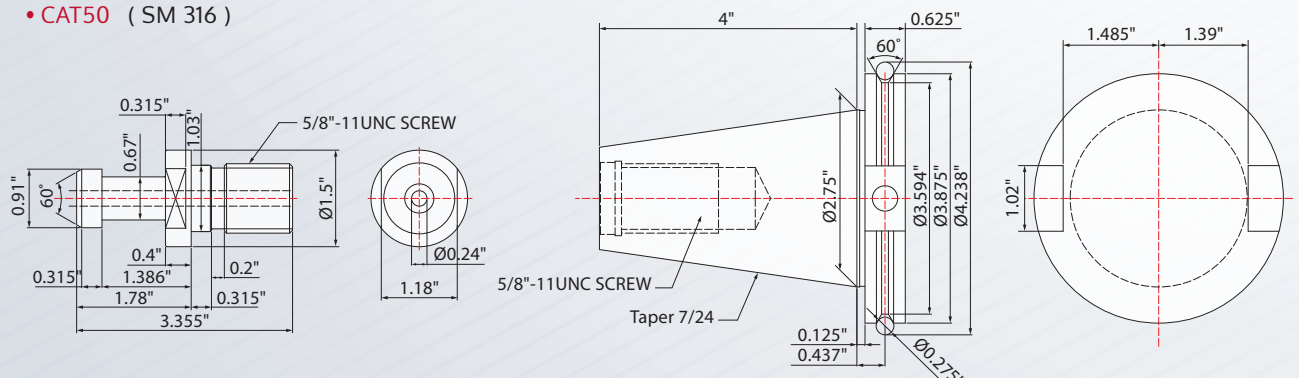
Models	A	B	C	D	E
SM 212	78.74"				
SM 312	118.11"	6.69"	43.30"	6.29"	7
SM 412	157.48"				
SM 316	128.35"	7.24"	59.06"	6.69"	7

## Tool Shank And Pull Stud Dimensions

### • CAT40 ( SM 212 / 312 / 412 )

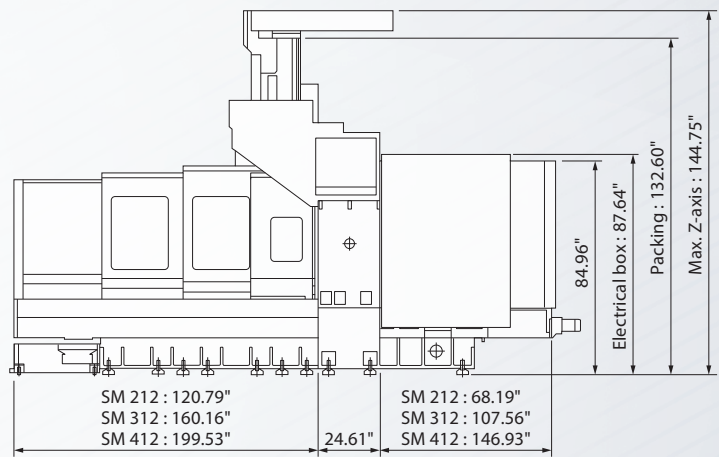
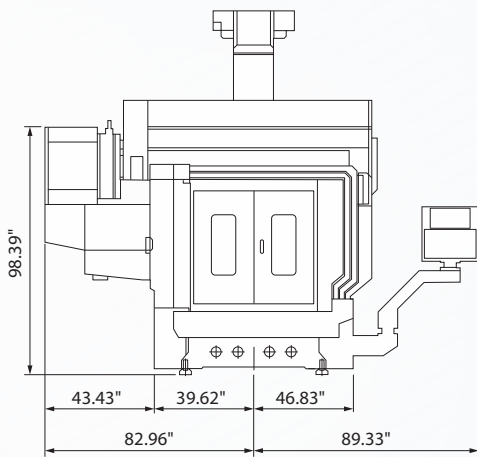
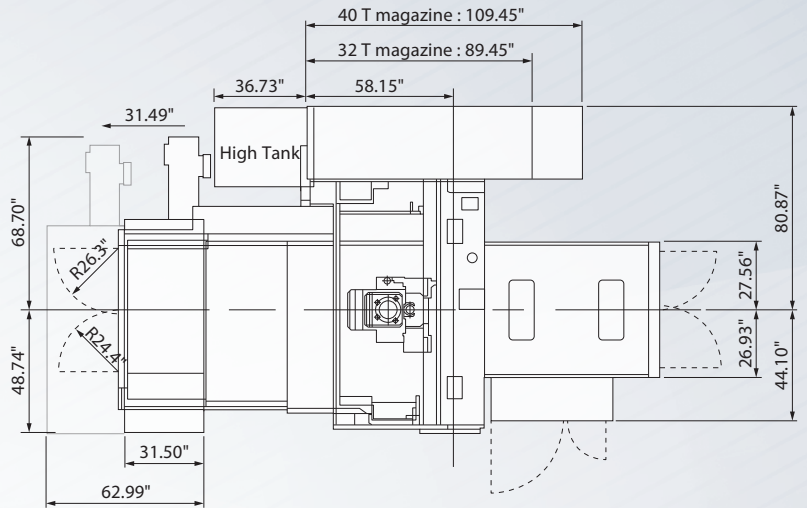


### • CAT50 ( SM 316 )

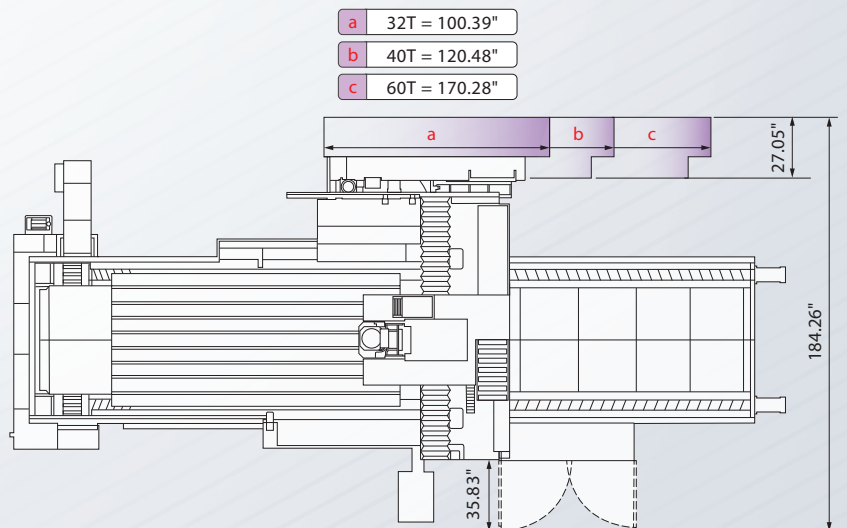
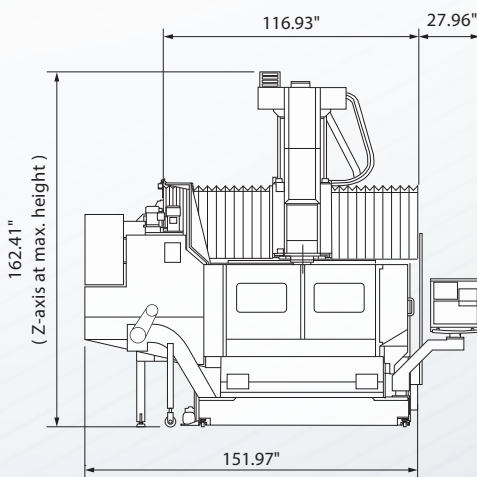




# Machine Dimensions



( SM 212 / SM 312 / 412 )



( SM 316 )

# Specifications

## BOX WAYS

		SM 965	SM 1165	SM 1365	SM 1565	SM 1575
X-axis travel		35.43"	43.30"	51.18"	59.05"	59.05"
Y-axis travel		25.59"				29.13"
Z-axis travel		24.01"				24.01"
Dist. from spindle center to column		27.95"				30.70"
Dist. from spindle nose to table center		4.92" ~ 28.93"				4.92" ~ 28.93"
<b>Work Table</b>						
Table size ( X direction )		43.31"	47.24"	55.12"	62.99"	62.99"
Table size ( Y direction )		25.59"				27.55"
Table load capacity		1,984 lbs	2,425 lbs	2,756 lbs	3,197 lbs	2,314 lbs
<b>Spindle</b>						
Spindle speed	CAT40	8,000 / 12,000 rpm		8,000/12,000 rpm		12,000 rpm
	CAT50	6,000 rpm		6,000 rpm		--
Spindle motor	CAT40	20/25 hp		20/25 hp		25 hp
	CAT50	25 hp		25 hp		--
Spindle taper		CAT40 / CAT50				CAT40
<b>Feed Rate</b>						
X / Y axes rapid feed rate		1,181 IPM				1,181 IPM
Z-axis rapids feed rate		945 IPM				945 IPM
Cutting feed rate		590 IPM				394 IPM
<b>Tool Magazine</b>						
Tool magazine capacity	CAT40	24/36		36		36
	CAT50	30		30		--
Max. tool length *1		11.81"				
Max. tool weight *1		15.43 lbs				
Max. tool diameter / adj. pocket empty *1		Ø3.07" / Ø5.91"				
<b>Accuracy</b>						
Positioning accuracy ( ISO0230-2 )		± 0.000315"				
Repeatability ( ISO0230-2 )		± 0.000236"				
<b>General</b>						
Control system		FANUC Oi -MF				
Pneumatic pressure requirement		85 PSI				
Power requirement		40 kVA				
Coolant tank capacity		95 gal	98 gal	100 gal	103 gal	185 gal
Machine weight		14,995 lbs	15,435 lbs	16,755 lbs	18,080 lbs	19,180 lbs

\*1 CAT40 36T

Specifications are subject to change without notice.

### Standard Accessories

- 3 axes auto lubrication system
- 3 axes ball screw pretension
- Spindle air curtain
- Coolant nozzle around spindle
- Air blow system
- Front side chip auger
- Roof enclosed splash guard
- Rigid tapping
- Lubricating oil recovering system

# Specifications LINEAR WAYS

	SM 600	SM 1000
X-axis travel	23.62"	40.15"
Y-axis travel	20.07"	
Z-axis travel	20.07"	
Distance from spindle center to column	23.62"	
Distance from spindle nose to table center	3.94" ~ 24.01"	
<b>Work Table</b>		
Table size ( X direction )	29.52"	47.24"
Table size ( Y direction )	20.07"	
Table load capacity	1,102 lbs	1,543 lbs
<b>Spindle</b>		
Spindle speed	12,000 rpm	
Spindle motor	25 hp	
Spindle taper	CAT40	
<b>Feed Rate</b>		
X / Y axes rapid feed rate	1,259 IPM	
Z-axis rapids feed rate	945 IPM	
Cutting feed rate	590 IPM	
<b>Tool Magazine</b>		
Tool magazine capacity	24	
Max. tool length	9.84"	
Max. tool weight	17.63 lbs	
Max. tool diameter / adj. pocket empty	Ø3.14" / Ø5.90"	
<b>Accuracy</b>		
Positioning accuracy ( ISO0230-2 )	± 0.000236"	
Repeatability ( ISO0230-2 )	± 0.000197"	
<b>General</b>		
Control system	FANUC Oi -MF	
Pneumatic pressure requirement	85 PSI	
Power requirement	25 kVA	
Coolant tank capacity	84 gal	114 gal
Machine weight	9,260 lbs	11,465 lbs

Specifications are subject to change without notice.

- Heat exchanger for electrical cabinet
- RS-232 interface
- Tool box
- Air gun
- Water gun
- Alarm light
- Foundation bolt kit
- Automatic power-off system

# Specifications BRIDGE TYPE

	SM 212	SM 312	SM 412
X-axis travel	78.74"	118.11"	157.48"
Y-axis travel		47.24"	
Z-axis travel		29.92"	
Distance between columns		51.18"	
Distance from spindle nose to table top		7.87" ~ 37.79"	
<b>Work Table</b>			
Table size ( X direction )	78.74"	118.11"	157.48"
Table size ( Y direction )		43.29"	
Table load capacity	7,710 lbs	9,920 lbs	13,220 lbs
<b>Spindle</b>			
Spindle speed		12,000 rpm	
Spindle motor		25 hp	
Spindle taper		CAT40	
<b>Feed Rate</b>			
X-axis rapids feed rate	945 IPM	788 IPM	394 IPM
Y-axis rapids feed rate		945 IPM	
Z-axis rapids feed rate		788 IPM	
Cutting feed rate		472 IPM	394 IPM
<b>Tool Magazine</b>			
Tool magazine capacity		40	
Max. tool length		13.77"	
Max. tool weight		33 lbs	
Max. tool diameter / adj. pocket empty		Ø4.92" / Ø9.01"	
<b>Accuracy</b>			
Positioning accuracy ( JIS B 6338 )		± 0.00039" / Full Travel	
Positioning accuracy ( VDI 3441 )		P ≤ 0.00078" / Full Travel	P ≤ 0.000118" / Full Travel
Repeatability ( JIS B 6338 )		± 0.000118"	
Repeatability ( VDI 3441 )		Ps ≤ 0.00059"	Ps ≤ 0.00078"
<b>General</b>			
Control system		FANUC Oi -MF	
Pneumatic pressure requirement		71 ~ 100 PSI	
Power requirement		40 kVA	
Coolant tank capacity		121 gal	
Machine weight	35,300 lbs	44,100 lbs	52,910 lbs

Specifications are subject to change without notice.

## Standard Accessories

- Spindle cooling system
- Centralized automatic lubricating system
- Fully enclosed splash guard w/o roof
- Coolant system with pump and tank
- Twin coil type chip augers
- Caterpillar type chip conveyor and bucket
- Foundation bolt kit
- Tool box
- Alarm light

**SM 316**

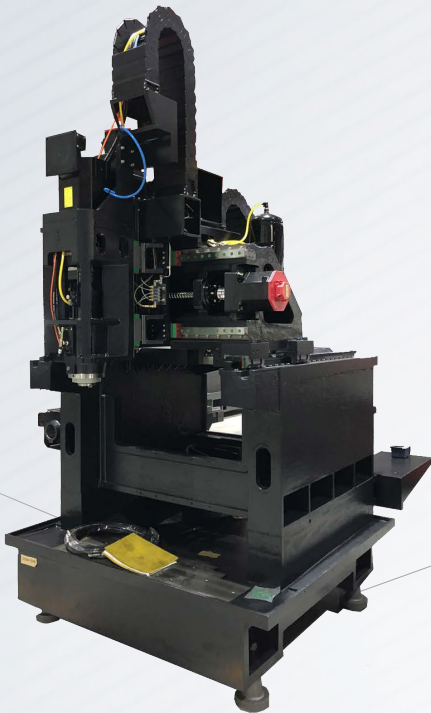
X-axis travel	120.47"
Y-axis travel	62.99"
Z-axis travel	29.92"
Distance between columns	66.92"
Distance from spindle nose to table top	7.87" ~ 37.79"
<b>Work Table</b>	
Table size ( X direction )	128.34"
Table size ( Y direction )	59.05"
Table load capacity	22,000 lbs
<b>Spindle</b>	
Spindle speed	6,000 rpm
Spindle motor	35 hp
Spindle taper	CAT50
<b>Feed Rate</b>	
X-axis rapids feed rate	788 IPM
Y-axis rapids feed rate	788 IPM
Z-axis rapids feed rate	590 IPM
Cutting feed rate	394 IPM
<b>Tool Magazine</b>	
Tool magazine capacity	32
Max. tool length	15.74"
Max. tool weight	44 lbs
Max. tool diameter / adj. pocket empty	Ø4.92" / Ø8.46"
<b>Accuracy</b>	
Positioning accuracy ( JIS B 6338 )	± 0.00059" / Full Travel
Positioning accuracy ( VDI 3441 )	P ≤ 0.00118"
Repeatability ( JIS B 6338 )	± 0.000118"
Repeatability ( VDI 3441 )	Ps ≤ 0.00098"
<b>General</b>	
Control system	FANUC Oi -MF
Pneumatic pressure requirement	71 ~ 114 PSI
Power requirement	90 kVA
Coolant tank capacity	110 gal
Machine weight	50,710 lbs

Specifications are subject to change without notice.

- Air gun
- Automatic power off system

# VX 350-5AX

High Speed 5-axis Machining Center



- > Movable column structure provides the best structural rigidity and minimizes machine footprint.
- > Rigid roller-type linear guideways provide high axial rigidity and high speed movement.
- > 32 tool magazine with double arm ATC provides highly reliable, high speed tool exchange capability.

<b>Model</b>	<b>VX 350-5AX</b>
X-axis travel	27.55"
Y-axis travel	17.71"
Z-axis travel	16.53"
Table size	Ø 13.77"
Table load capacity	154 lbs
Spindle speed	12,000 rpm
Spindle motor	15 hp
Spindle taper	CAT 40 BIG PLUS
ATC	32

Specifications are subject to change without notice.

### **Swiveling Range**

B-axis	350-5AX: -30° ~ +125°
C-axis	360°

# SX 4000

## Horizontal Machining Center



- > High speed machine features the strongest structural rigidity in its class.
- > High speed rapid feed rate of 2,480 IPM with 1G acceleration.
- > 15,000 rpm, 50 hp spindle with oil chiller.
- > 60 Tool magazine with double arm ATC.
- > Oil-cooled, double-anchored, pre-tensioned ball screws.
- > 2 APC with built in rotary table, +/- 2.5 arc sec.

<b>Model</b>	<b>SX 4000</b>
X-axis travel	22.05"
Y-axis travel	22.05"
Z-axis travel	27.17"
Table size	15.75" x 15.75"
Table load capacity	882 lbs
Spindle speed	15,000 rpm
Spindle motor	50 hp
Spindle taper	CAT 40 BIG PLUS
ATC	60

Specifications are subject to change without notice.

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