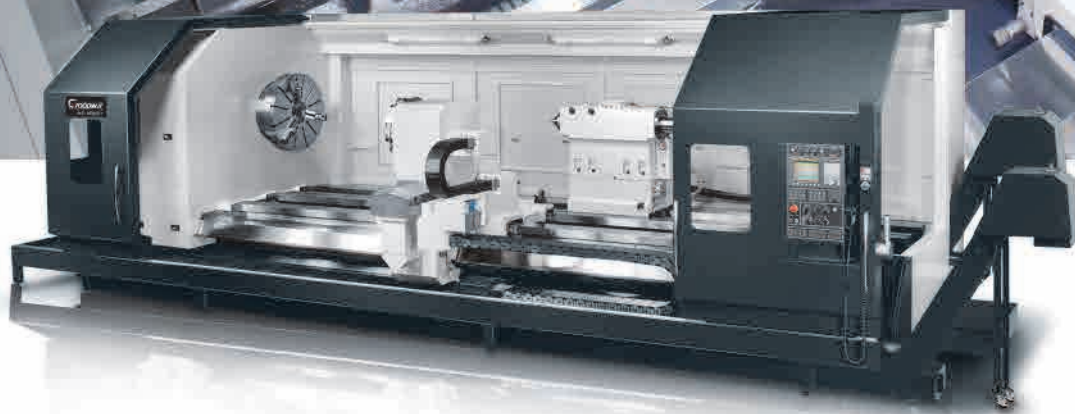
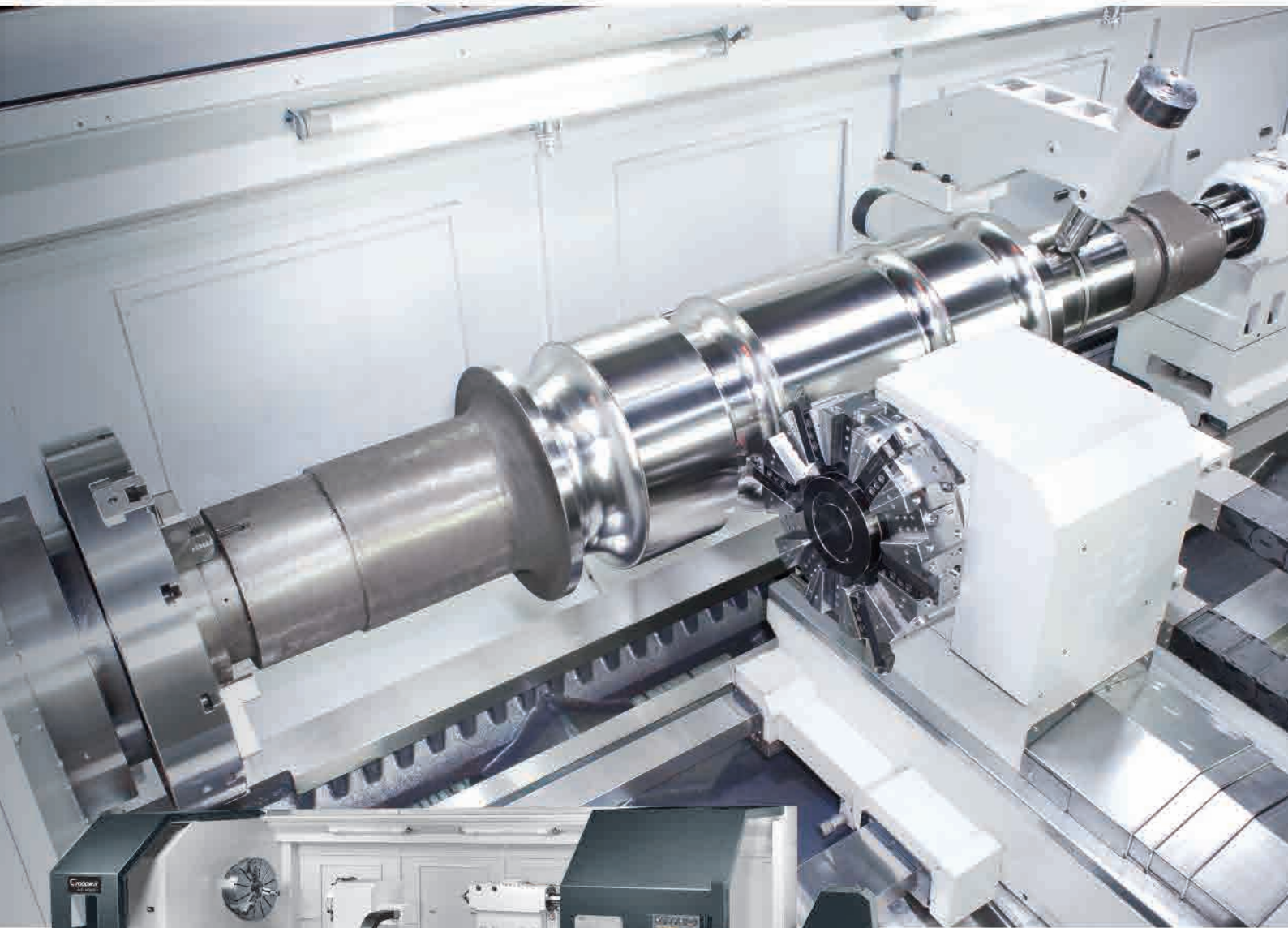


HA SERIES

FLAT-BED CNC TURNING CENTERS



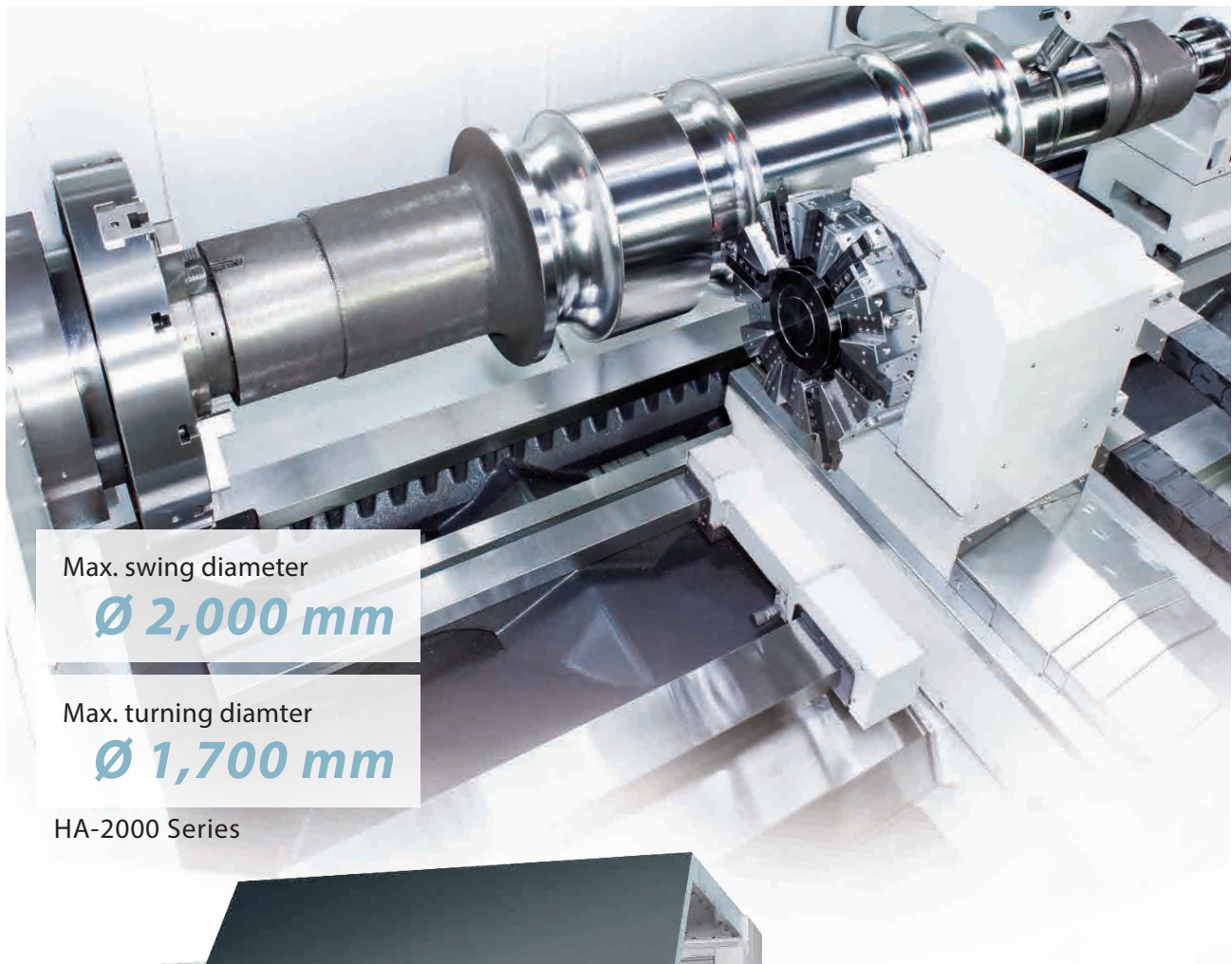
FLAT-BED CNC TURNING CENTER

Together with the latest technology and high quality components, the GOODWAY HA series utilizes super rigidity four box way bed with 3-step gear spindle and servo indexing turret to provide heavy-duty cutting capability for super large work-piece applications. It is suitable for energy, aerospace and shipbuilding industry. The optional four-way toolpost, boring tooling, and steady rest provide a more efficient turning performance for large work-piece applications. Further more, the live tooling turret and C-axis is also available which allows the machine to perform more complicated tasks such as turning, milling, and drilling to fulfill your needs for today and tomorrow.

- ▶ One-piece 4 box way and flat bed casting provides a large platform with a heavy-duty structure, suitable for super large work-pieces of any cutting applications.
- ▶ 3-step gear spindle provides great torque output under low speed, to fulfill heavy cutting needs.
- ▶ Z-axis twin chip conveyor system with separated large coolant tank design provides high efficient chip disposal and stable turning accuracy.



(HA-1600L⁵ model shown.)



Max. swing diameter

Ø 2,000 mm

Max. turning diameter

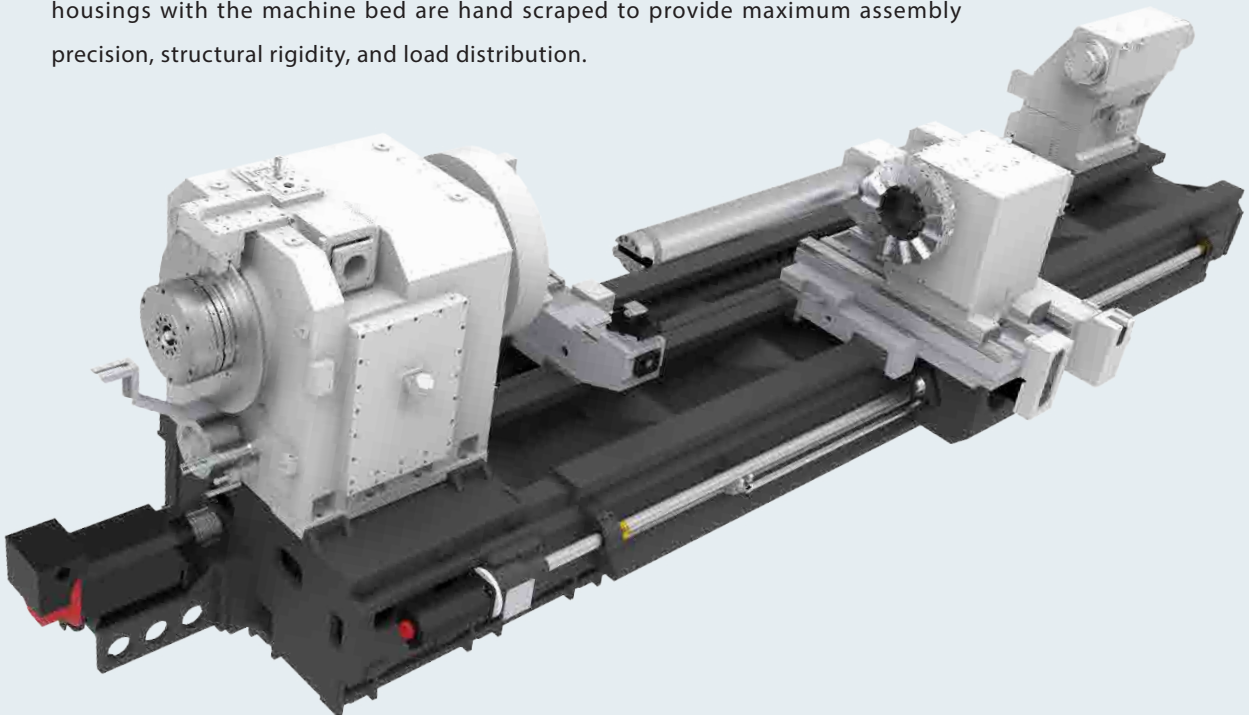
Ø 1,700 mm

HA-2000 Series



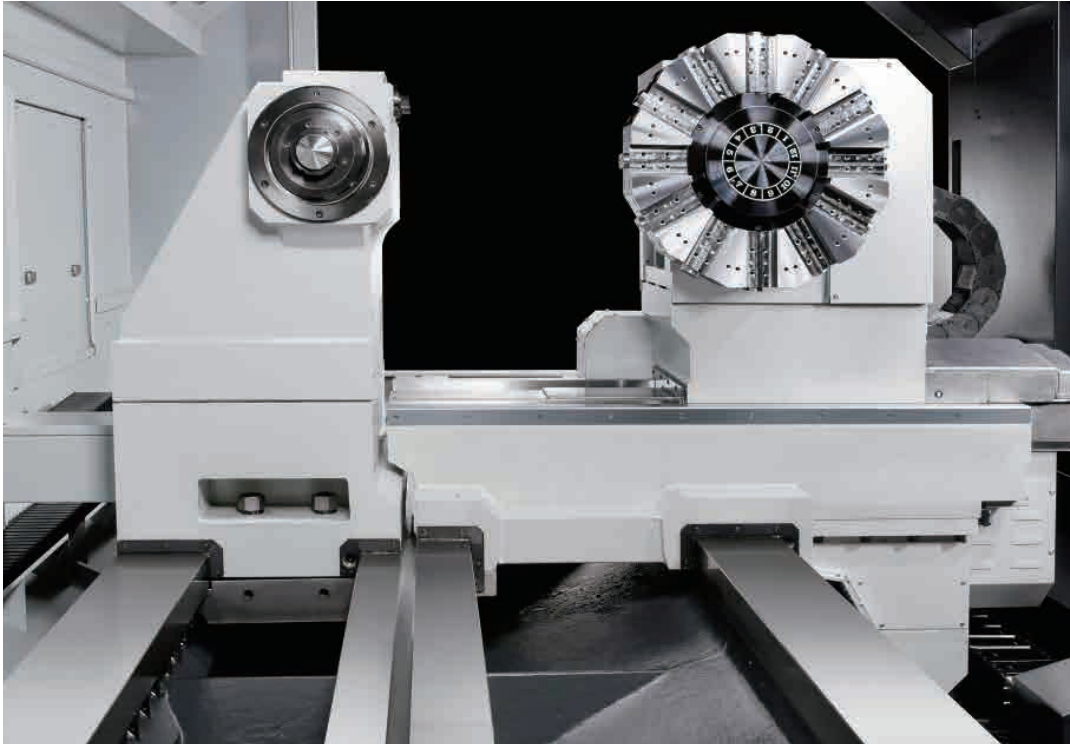
HEAVY-DUTY CONSTRUCTION

- ▶ The flat-bed is designed with a low center of gravity, which allows the work-piece weight to be evenly distributed throughout the flat-bed. This can greatly increase machine's overall structure and heavy-duty cutting capability.
- ▶ Built to endure years and years of rigorous high production turning, the heavily ribbed, one-piece thermally balanced bed and casting components are of FC35 MEEHANITE casting. FC35 grade cast iron is capable of withstanding much greater stress without deforming and provides maximum vibration damping, which result in a machine that will outlast and outperform the competition.
- ▶ By using Finite Element Methods (FEM), optimal reinforce ribbings are directly cast into the one-piece bed structure. Mechanical rigidity has been increased by more than compared to conventional designs.
- ▶ Contact surfaces of all slides, headstock, turret, tailstock, and ball screw bearing housings with the machine bed are hand scraped to provide maximum assembly precision, structural rigidity, and load distribution.



- ▶ C3 class hardened and precision ground ball screws ensure the highest accuracy and durability possible. Plus, pretension on all axes minimizes thermal distortion.
- ▶ The Z-axis ball screw of the HA-L⁴ series and all other super-long models are equipped with supportive mechanism.





- ▶ The one-piece casting components of the box way, bed, and saddle are designed with large span to reach maximum strength and accuracy.
- ▶ The X-axis saddle and tailstock travel are designed separately, which allows the tailstock to support the work-piece without crossing the saddle. This prevents the tailstock from overhanging which can influence the rigidity.

- ▶ The tailstock is equipped with $\varnothing 200$ mm rotary tailstock spindle, combining the MT#6 dead center quill and sufficient thrust power, to provide stable and accurate support for the work-piece.
- ▶ The tailstock spindle control panel is directly integrated in the tailstock base, which allows the operator to easily control the tailstock positioning.
- ▶ X-axis carriage locks onto the tailstock base manually and moves it to the desired position with precision accuracy.
- ▶ The tailstock is designed with an auxiliary retention which gives a firm support to prevent the tailstock from sliding backwards when working on heavy work-pieces.





- ▶ High performance twin chip conveying system allows the chip to be quickly disposed on both sides of the Z-axis travel through the chip conveyor. This ensures the working area to maintain its temperature while increasing turning stability and accuracy.
- ▶ 2,115 L (L⁵ Series) super large coolant tank allows optimal air circulation for faster heat dispersion and coolant temperature, which will help extend coolant life.

- ▶ The control panel is integrated onto the splash guard. The operator can easily move it to the desired position without safety problems.



- ▶ The splash guard and saddle can be synchronized to move together manually during the working progress, which ensures safety for the operator.

ULTIMATE TURNING POWER

- ▶ The one-piece casting headstock has a net weight over 4,000 kg, which gives outstanding rigidity and also provides an ideal balance for super heavy work-pieces.
- ▶ The spindle is support by super rigidity bearings for maximum level of support and precision. Bearing configuration is designed for super heavy-duty cutting with ultra-smooth performance and long term durability with a higher level of accuracy.
- ▶ The spindle uses a high performance lubrication system to efficiently and evenly lubricate the spindle bearings. Also, with a special maze protection design, it can prevent the gear box from contamination thus extending the life of the bearings.

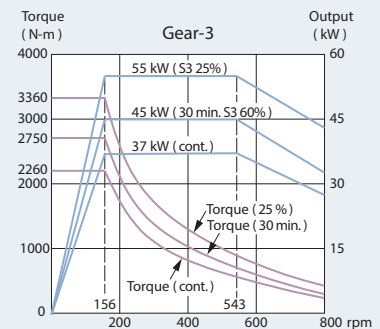
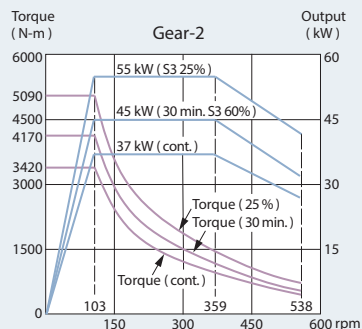
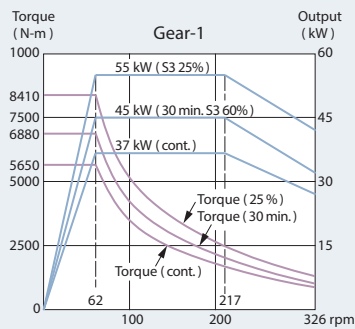


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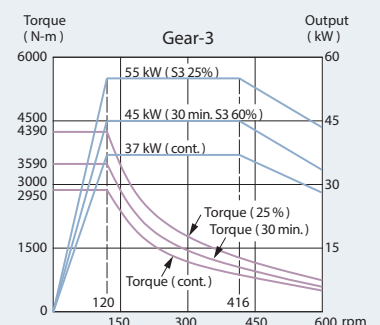
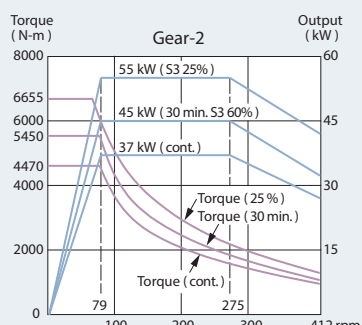
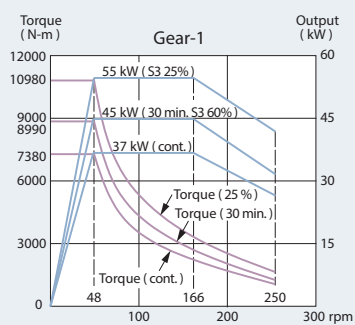
6

Spindle Output

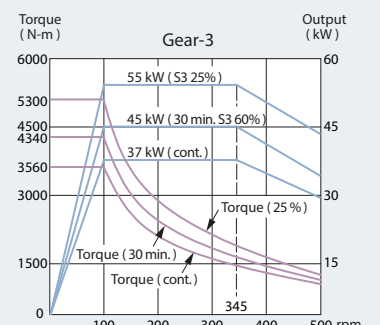
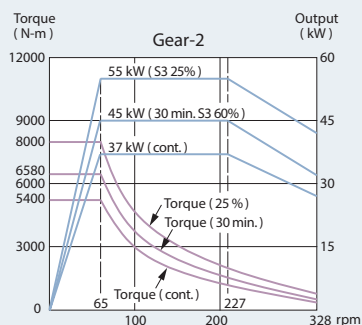
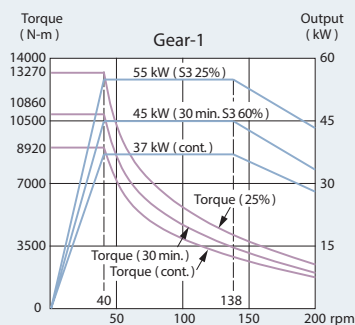
Hole through spindle \varnothing 205 mm



Hole through spindle \varnothing 260 mm



Hole through spindle \varnothing 320 mm



ADVANCED TURRET TECHNOLOGY

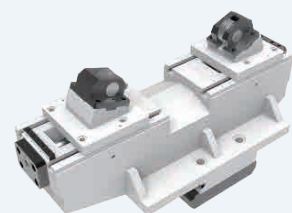
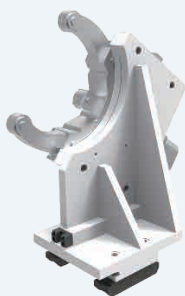
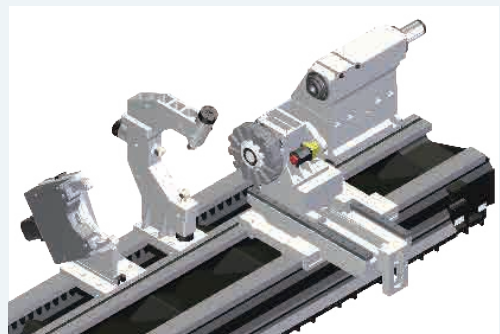
- ▶ \varnothing 320 mm diameter 2-piece CURVIC couplings accurately position the turret disk and 10,000 Kg (26,400 lb) of clamping force ensures abundant turret rigidity for all cutting conditions.
- ▶ The 12-station servo indexing turret achieves 0.3 second indexing times for adjacent stations and 0.8 second times for stations at the opposite end of the disk turret.

- ▶ Optional 4-way toolpost for super heavy cutting.



HEAVY-DUTY STEADY REST

- ▶ The available heavy-duty steady rest can prevent the long work-pieces from deflection during high speed rotation while ensuring precise concentricity of the work-piece.
- ▶ When the work-piece diameter is not more than \varnothing 600 mm, the saddle and steady rest will not interfere each other during the progress. Thus the operator does not need to stop the machine to remove the steady rest, which greatly increases working efficiency.



(Hydraulic) \varnothing 125 ~ 460 mm*1

(Manual) \varnothing 300 ~ 600 mm*1

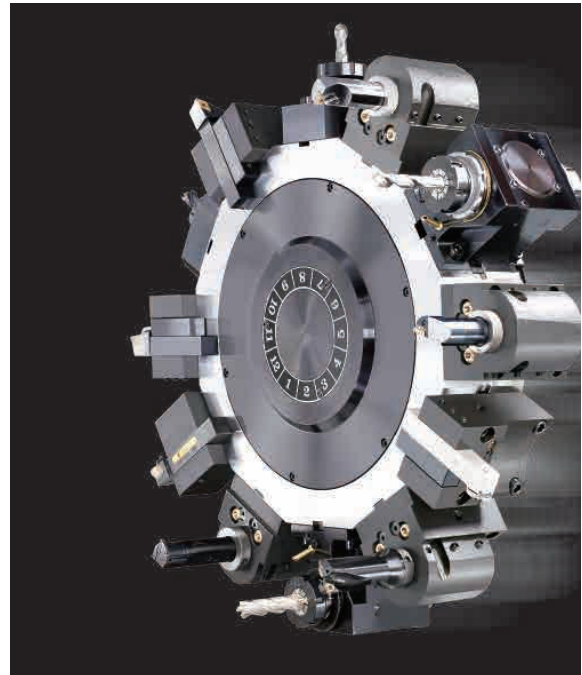
(Manual) \varnothing 500 ~ 800 mm

(Manual) \varnothing 800 ~ 1,000 mm

*1 The steady rest does not need to be removed during the working progress.

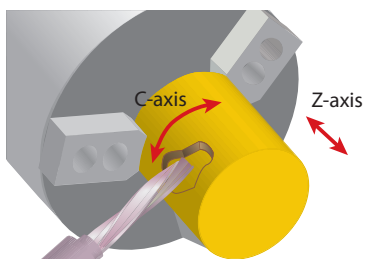
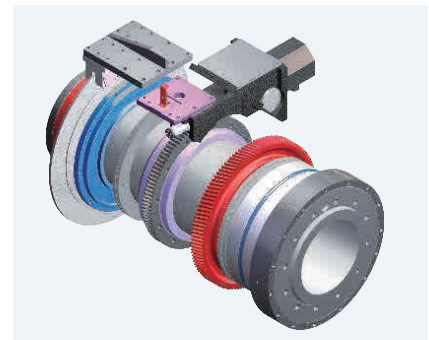
LIVE TOOLING TURRET

- ▶ Live tooling and C-axis control capabilities on the HA series allows the machine to perform multiple tasks on a work-piece, such as turning, milling, drilling and tapping. It eliminates manpower and cycle time, while reducing accuracy lost, which will occur if the part is moved from machine to machine.
- ▶ The 12-station GOODWAY live tooling turret offers 12 station available for live tooling, live tools rotate in working position only to reduce power loss and heat.
- ▶ GOODWAY live tooling turret utilizes advance servo indexing technology to achieve 0.3 second indexing times for adjacent stations and 0.8 second for stations at the opposite end of the disk.

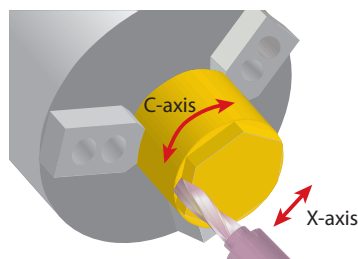


ULTIMATE C-AXIS SPINDLE

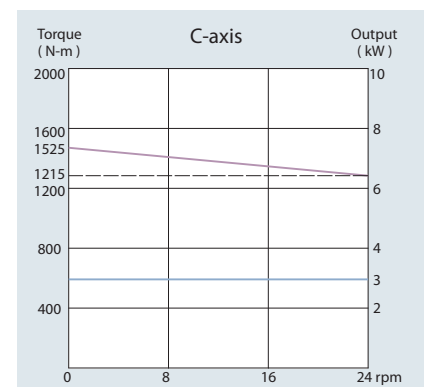
- ▶ The Cf-axis and disk brake system available on the HA series provide the most rigid and powerful type of C-axis on the market today. In Cf-axis mode, a servo motor is engaged and drives the rotation of the spindle; engagement time is approximately 1 second.
- ▶ Working with the live tooling turret, the Cf-axis and disk brake system enables the machine to perform multiple tasks, such as drilling, tapping, and milling operations, including cylindrical and polar coordinate interpolations, resembling a 4th-axis rotary table on a machining center.
- ▶ With the FANUC servo motor generating an ultra high resolution of 1,000,000 pulses per spindle rotation and 1,500 N-m of spindle torque (Cont.). Plus, dynamic accuracy is within $\pm 0.02^\circ$ even under heavy cutting loads.



Cylindrical Interpolation.



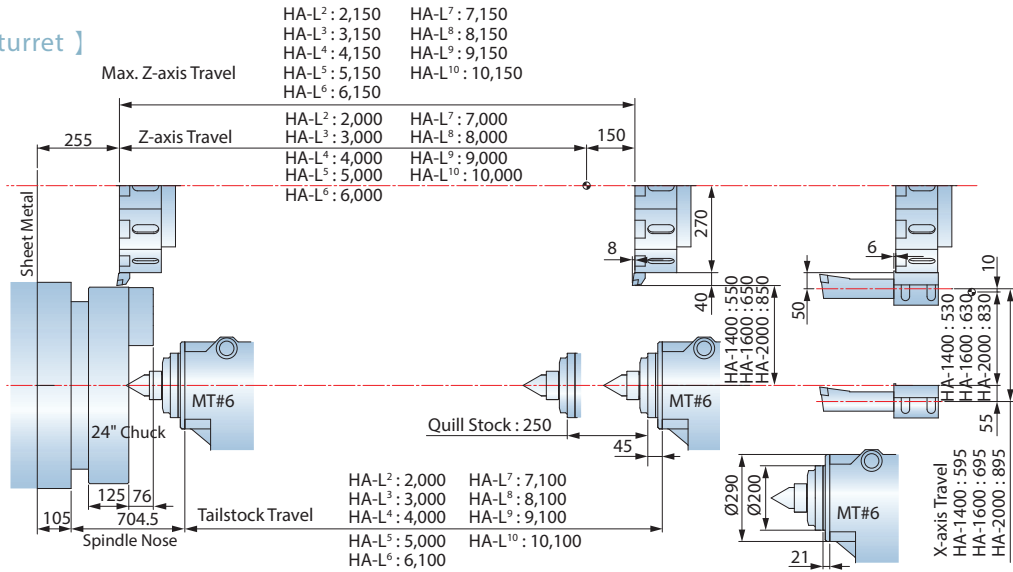
Polar Coordinate Interpolation.



GENERAL DIMENSION

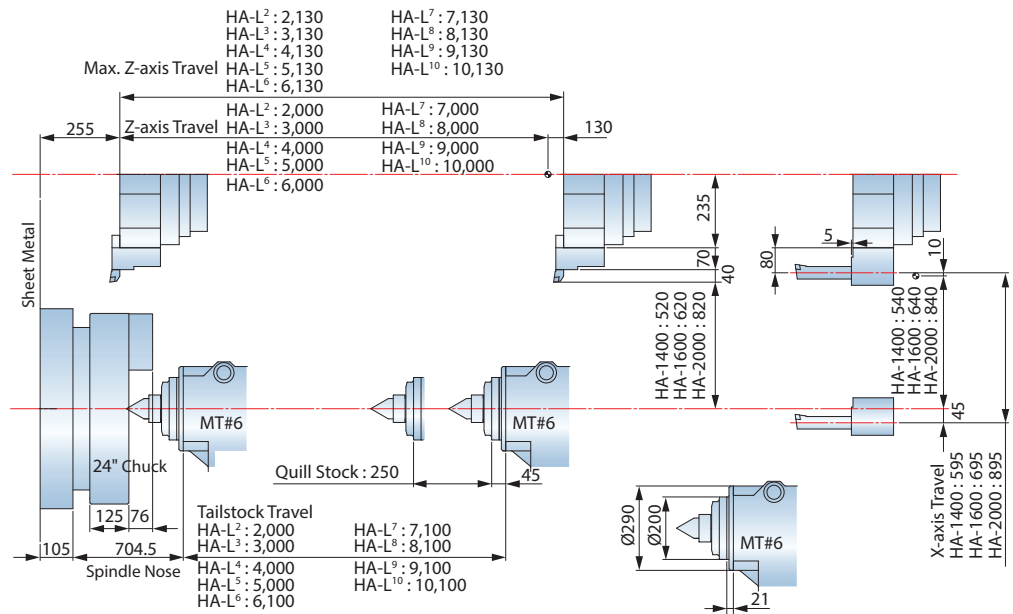
Work Range

[Standard 12-station turret]

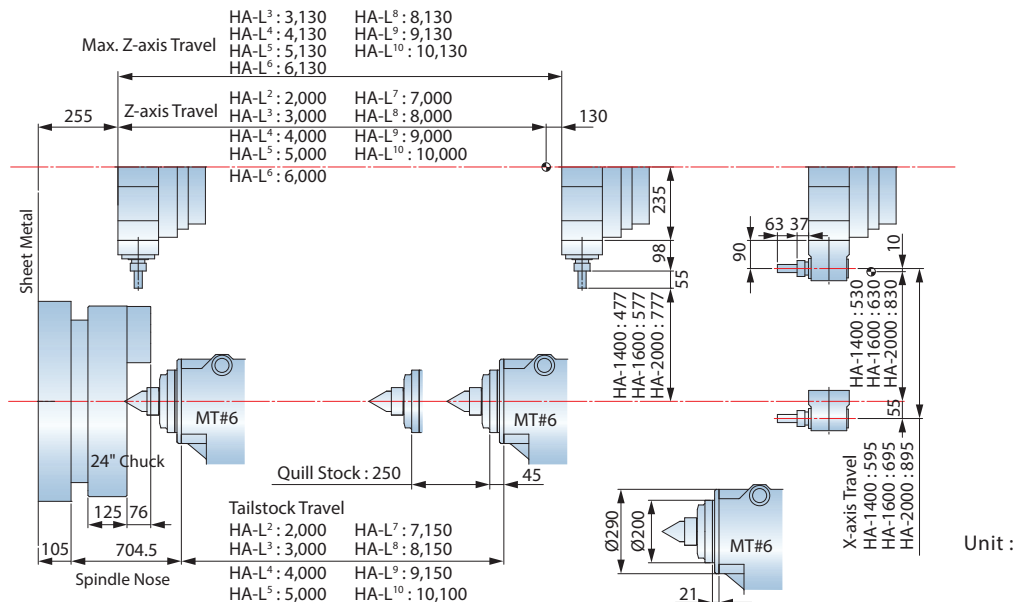


[Optional 12-station live tooling turret]

MT#6 Dead Center (I.D. / O.D. Tools)



MT#6 Live Center (Live Tooling)



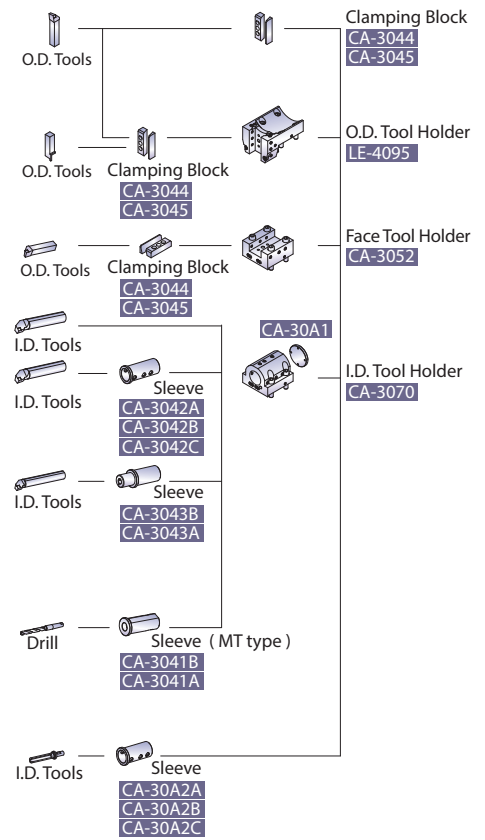
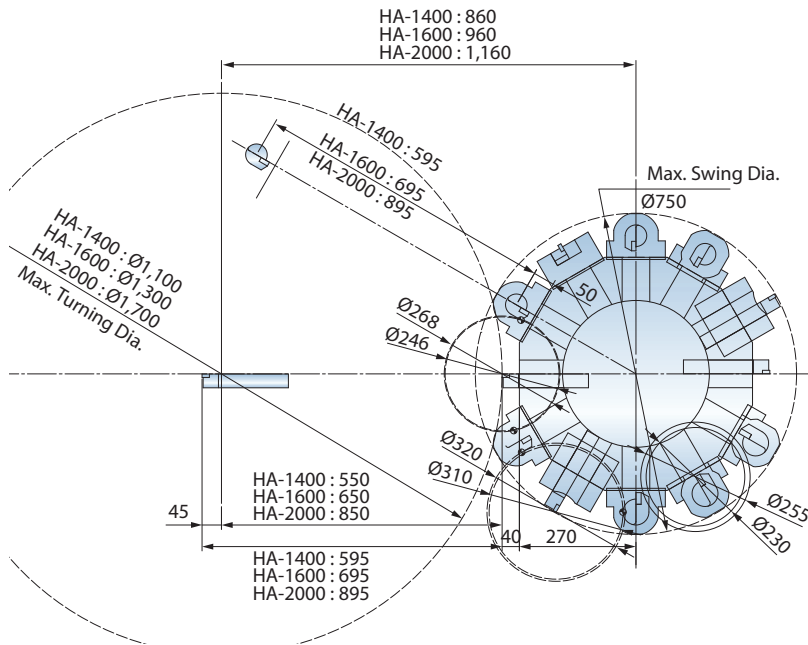
Interference Diagram

Tooling System

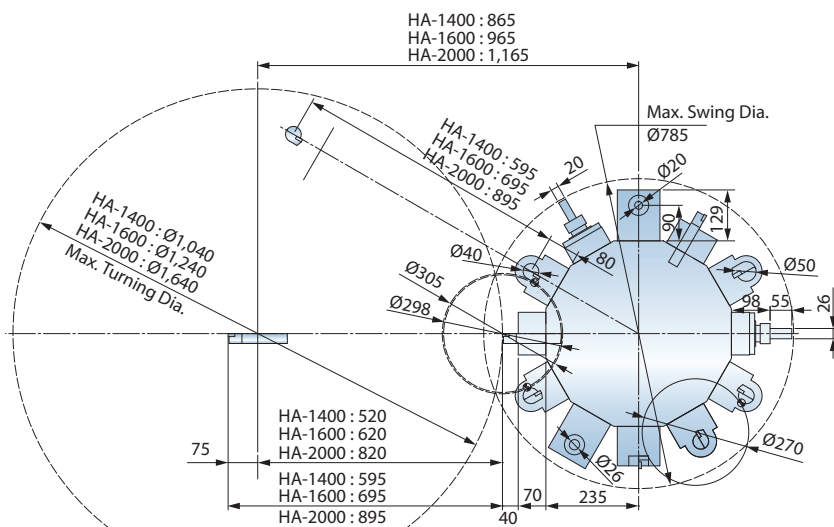
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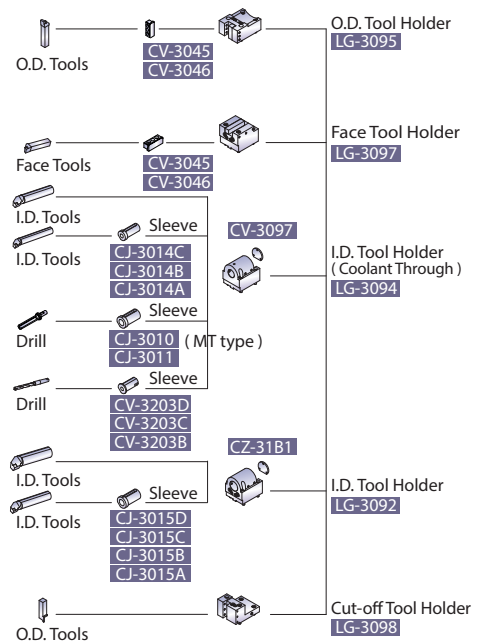
【 Standard 12-station turret 】



【 Optional 12-station live tooling turret 】



Unit : mm

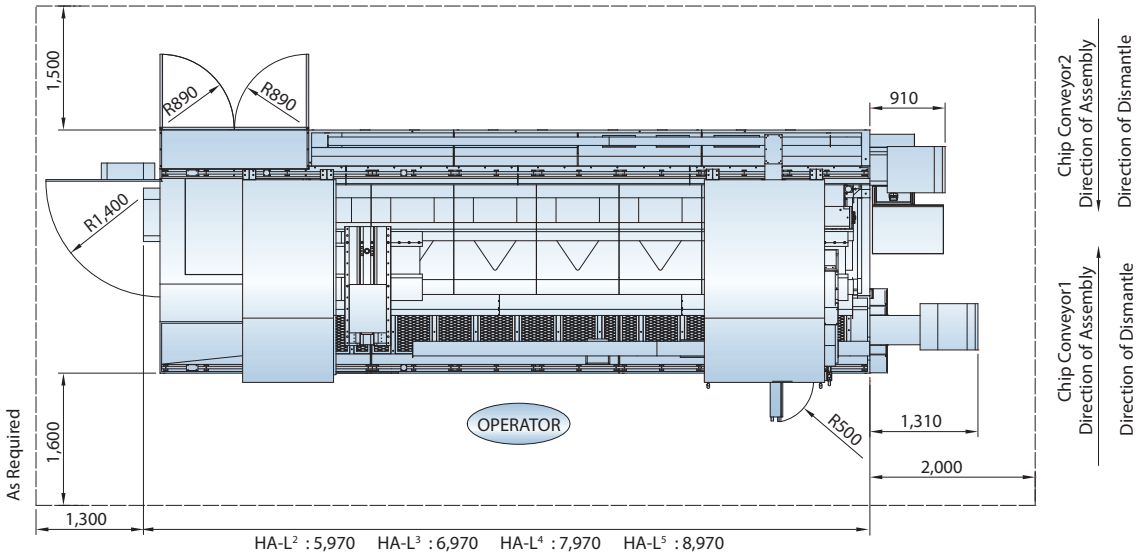


Please contact sales representative for 8-station turret.

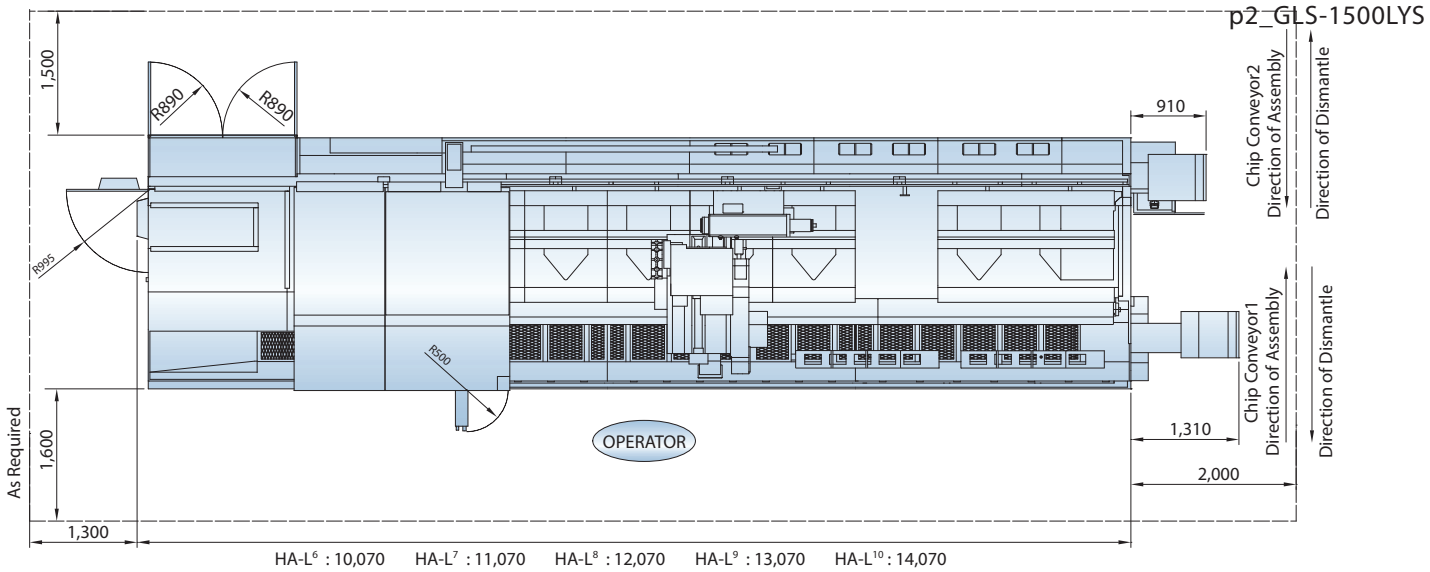
GENERAL DIMENSION

Foot - Print

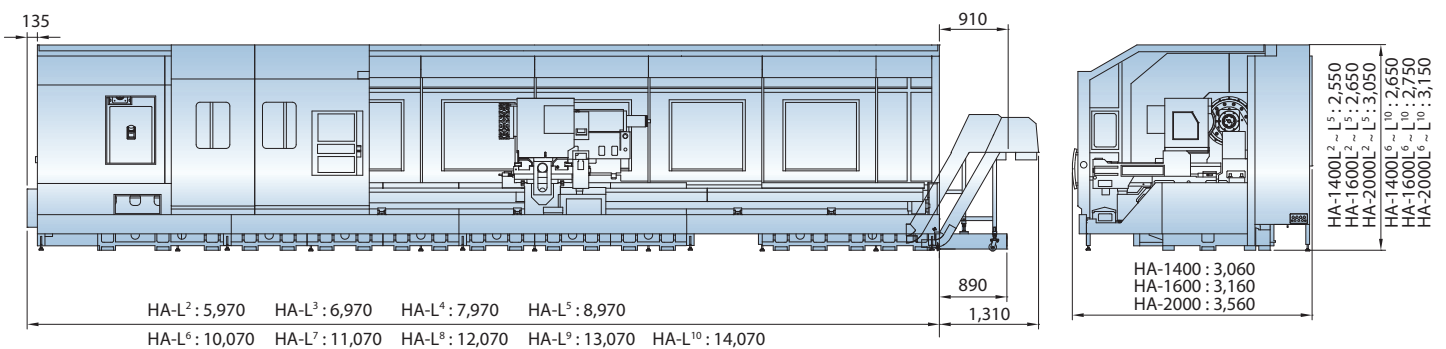
HA series L² ~ L⁵



HA series L⁶ ~ L¹⁰



Machine Layout



STANDARD & OPTIONAL FEATURES

S : Standard O : Option
 - : Not Available C : Contact GOODWAY

		HA-100	HA-160	HA-200
SPINDLE				
Main spindle configuration	3-Speed Gear	S	S	S
Rigid tapping & spindle orientation		S	S	S
Main spindle disk brake		O	O	O
WORK HOLDING				
Hollow 3-jaws chuck & 1 set soft jaws	24"	O	O	O
	32"	O	O	O
	40"	O	O	O
	50"	-	O	O
	63"	-	-	O
Foot switch for chuck operation		S	S	S
Quill hydraulic tailstock		S	S	S
MT#6 dead center quill		S	S	S
Manual steady rest		O	O	O
Self-centering hydraulic steady rest		O	O	O
Foot switch for steady rest operation		O	O	O
TURRET				
12-station turret		S	S	S
12-station live tooling turret		O	O	O
Hydraulic 4-way Toolpost		O	O	O
Tool holder & sleeve package		S	S	S
Live tooling tool holders (0° x 2 , 90° x 2)		O	O	O
COOLANT				
Coolant pump	3 Kg/cm ²	S	S	S
	5 Kg/cm ²	O	O	O
High-pressure coolant system	20 Kg/cm ²	C	C	C
Roll-out coolant tank		S	S	S
Oil skimmer		O	O	O
Coolant flow switch		O	O	O
Coolant level switch		O	O	O
Coolant intercooler system		O	O	O
CHIP				
Twin chip conveyor	Right discharge	S	S	S
Chip cart with coolant drain		O	O	O
SAFETY				
Fully enclosed guarding		O	O	O
Impact resistant viewing window		S	S	S
Tailstock stroke out - end check		S	S	S
Chuck cylinder stroke out - end check		S	S	S
Low hydraulic pressure detection switch		S	S	S
Load monitoring function		O	O	O
OTHERS				
Tri-color machine status light tower		S	S	S
External work light		S	S	S
Electrical cabinet	Heat exchanger	S	S	S
	A/C cooling system	O	O	O
Complete hydraulic system		S	S	S
Advanced auto lubrication system		S	S	S
Tailstock manual lubrication system		S	S	S
Foundation leveling & maintenance tool kit		S	S	S
Emergency maintenance electrical part package		S	S	S
Operation & maintenance manuals		S	S	S

		Oi-TF	3Ti
FANUC CONTROL FUNCTIONS			
Display	8.4" color LCD	S	—
	10.4" color LCD	O	S
Graphic function	Standard	S	S
	Dynamic	O	O
Full keypad	Small - 44 keys	S	—
	Large - 56 keys	O*1	S
Part program storage length	512K byte	S	—
	1M byte	—	S
	2M byte	O	O
	4M byte	—	O
	8Mbyte	—	O
Registerable programs	400	S	—
	800	—	—
	1,000	O	S
	4,000	—	O
	64	—	O
Tool offset pairs	99	—	S
	128	S	—
	200	O	O
	400	—	O
	499	—	O
	999	—	O
	2,000	—	O
Servo control	HRV 3	S	S
Conversational programming	Manual Guide Oi	S	—
	Manual Guide i	O*1	S
Servo motors	αi	S	S
Spindle motors	αi	S	S
Run hour & parts counter		S	S
Auto power off function		S	S
RS-232 port		S	S
Memory card input /output		S	S
USB memory input / output		S	S
Ethernet		S	S

Specifications are subject to change without notice.

*1 10.4" color LCD option needed.

MACHINE SPECIFICATIONS

CAPACITY	HA-1400L ² ~ L ¹⁰	HA-1600L ² ~ L ¹⁰	HA-2000L ² ~ L ¹⁰		
Max. swing diameter	Ø 1,400 mm	Ø 1,600 mm	Ø 2,000 mm		
Swing over saddle	Ø 1,000 mm	Ø 1,100 mm	Ø 1,500 mm		
Max. turning diameter	Ø 1,100 mm	Ø 1,300 mm	Ø 1,700 mm		
Max. turning length	2,000 / 3,000 / 4,000 / 5,000 / 6,000 / 7,000 / 8,000 / 9,000 / 10,000* ¹ mm				
Max. table load	10,000 ~ 15,000 Kg (Need to be supported by steady rest)				
Spindle center height (from ground)	1,525 mm	1,625 mm	1,825 mm		
FLAT BED					
Flat bed width	1,350 mm				
Flat bed height	815 mm				
Slide way type	Four Box Ways				
SPINDLE					
Spindle drive system	3-Step Gear box				
Spindle nose	A A2-15	B A2-15	C A2-20	D A2-28* ²	E A2-28* ²
Hole through spindle	A 205	B 260	C 320	D 420* ²	E 520* ¹ * ² mm
Spindle bearing diameter	A 260	B 340	C 400	D 500* ²	E 600* ² mm
Spindle motor type	α 40 / 6,000 <i>i</i>				
Motor output (Cont. / 30 min.)	37 / 45 kW				
Spindle speed range	A 800	B 600	C 500	D 300* ²	E 250* ² rpm
Cf-AXIS SPINDLE (OPTIONAL)					
Cf-axis drive motor	AC 3.0 kW				
Cf-axis rapid	24 rpm				
Cf-axis torque output (Cont.)	1,524 N-m				
X & Z AXES					
Max. X-axis travel	595 mm	695 mm	895 mm		
Max. Z-axis travel	2,150 / 3,150 / 4,150 / 5,150 / 6,150 / 7,150 / 8,150 / 9,150 / 10,150 mm				
X / Z axes rapids	10 / 8 m/min.				
Slide way type	Box Way				
Feed rates	1 ~ 2,000 mm/min.				
X-axis servo motor	4 kW				
Z-axis servo motor	9 kW				
X-axis ball screw Ø / pitch	Ø 50 / pitch 10 mm				
Z-axis ball screw Ø / pitch	Ø 80 / pitch 10 mm				
X / Z axes thrust (Cont.)	1,407 / 3,400 Kgf				

Specifications are subject to change without notice.

*1 Please contact Goodway for larger size requirements.

*2 Please contact Goodway for further details.

TURRET	HA-1400L ² ~ L ¹⁰	HA-1600L ² ~ L ¹⁰	HA-2000L ² ~ L ¹⁰
Stations	12 (8 / 4 Opt.)		
Indexing drive	FANUC AC Servo motor		
Indexing speed	0.3 sec. (Adjacent) / 0.8 sec. (180° Single step)		
O.D. tool shank size	□ 32 mm (□ 40 / 50 mm Opt.)		
I.D. tool shank size	∅ 60 mm		
LIVE TOOLING TURRET (OPTIONAL)			
Live tooling stations	12 (8 Opt.)		
Indexing drive type	Spindle motor		
Index speed	0.3 sec. (Adjacent) / 0.8 sec. (180° Single step)		
O.D. tool shank size	□ 25 mm		
I.D. tool shank size	∅ 50 mm		
Live tooling shank size	ER 40 collets (ER 50 collets Opt.)		
Live tooling RPM range	4,000 rpm		
TAILSTOCK (OPTIONAL)			
Quill center taper	MT#6 Dead center		
Quill diameter	∅ 200 mm Rotary type (∅ 250 mm Opt.)		
Quill travel	250 mm		
Tail stock base travel	2,000 / 3,000 / 4,000 / 5,000 / 6,100 / 7,100 / 8,100 / 9,100 / 10,100*1 mm		
Programmable quill	Yes		
GENERAL			
CNC control	FANUC Oi-TF		
Voltage / Power requirement	AC 220 V / 65 kVA		
Hydraulic tank capacity	60 ℓ		
Coolant tank capacity	2,115 ℓ (L ⁵)		
Coolant pump	0.7 kW rated at 3 bar (40 PSI)		

Specifications are subject to change without notice.

MACHINE WEIGHT

	L ²	L ³	L ⁴	L ⁵	L ⁶	L ⁷	L ⁸	L ⁹	L ¹⁰
HA-1400	26,200	28,600	31,000	33,400	40,500	43,400	46,300	49,200	52,100
HA-1600	26,800	29,200	31,600	34,000	41,100	44,000	46,900	49,800	52,700
HA-2000	28,100	30,500	32,900	35,300	42,300	45,200	48,100	51,000	53,900

Specifications are subject to change without notice.

(Unit : Kg)



GOODWAYCNC.com

GOODWAY MACHINE CORP.

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