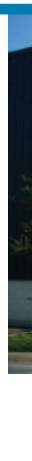
AMADA MACHINE TOOLS AMERICA, INC.

THE VISION OF PRECISION

CNC High-Speed Grinders

AMADA®

Contents



Amada Machine Tools America

With more than 70 years of industry experience, Amada Machine Tools America is committed to helping our customers deliver dependable service and top-quality work with exceptional grinding solutions.

Whether you need profile, forming, surface, or rotary grinding, we have the right solution for your specific needs.

Market-Leading Quality—We believe quality work begins with quality tools designed and built from the ground up to deliver outstanding performance, time after time.

Customer-Driven Innovation—Every feature, function and configuration we offer has been developed to address the needs of our customers.

Proven Accuracy—We help you take your work to the next level and exceed your customers' expectations.

Reliable Productivity—We understand productivity is the heart of your business, and we can help you optimize it in multiple ways.

A History of Cutting-Edge Manufacturing

Since we began building profile grinders back in the 1940s, our goals have always been to provide our customers with increased accuracy and productivity. Throughout our history, we've maintained our time-honored tradition of hand-fitting our grinders to deliver the ultimate in quality and precision.

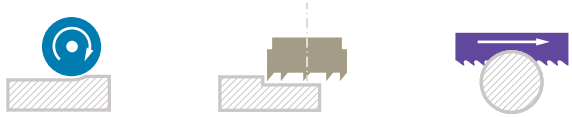
And, as technology has evolved, we've embraced CNC automation as a core strength, improving throughput and helping new operators become productive more quickly.

Today, we are uniquely positioned to help you expand your capabilities and grow your business.

Solutions Designed Around Customer Needs

No two manufacturing needs are exactly alike. Finding the right solution means thoroughly understanding your objectives and configuring a solution to match them precisely. Our engineers bring decades of industry experience to help you achieve your specified goals with a process that fits—and enhances—your workflow.

TECHNOLOGIES OF AMADA



GRINDING MILLING SAWING

Amada Grinding Technology

When the tightest tolerances and accurate repeatability matter, Amada is a world leader in optical profile grinding and high-precision surface and profile work. Suppliers to high-tech electronics and semiconductor manufacturers have trusted Amada grinders for years to deliver the flexibility, precision and productivity they need to stay ahead in a rapidly changing industry.

- Integrated measuring technology
- Award-winning innovation
- Maximum accuracy optimized through use of the most modern construction/design
- High speed for increased efficiency
- Integrated automation for higher efficiency
- Automatic swiveling grinding head during the grinding cycle
- External programming software to optimize part production
- Modular construction for versatile and economic specification

Engineered to Perform

Optimum Balance Supports High-Reciprocating Grinding—As a pioneer in high-reciprocating grinding and processing, we have achieved a superb, dynamic balance between the machine and the grindstone to deliver superior performance with the widest range of work materials.

High-Quality Grinding that Exceeds Specifications—The accuracy of our grinding and processing work goes beyond simply measuring RZ to deliver mark-less and sharp-edge mirror finishes.

Reliable, High-Rigidity Structure—The form of the machine has been developed by advanced three-dimensional design and finalized through a comprehensive series of demonstration tests to create high-dimensional rigidity.

Consistent Repeatability—Through superior design and meticulous assembly practices, Amada grinders are engineered to account for thermal displacement, ensuring maximum accuracy throughout the working process.

Advanced, Easy-to-Use CNC Software—Every Amada grinder has dedicated software to allow your operators to take full advantage of each machine's capabilities.

From Surface Grinding to Molding to Profile—Amada's exclusive WAPS platform gives you complete control of all forming processes—rough, semi-finish, and finish processing. It also prepares charts for optical profile grinding and data for profile dressing.

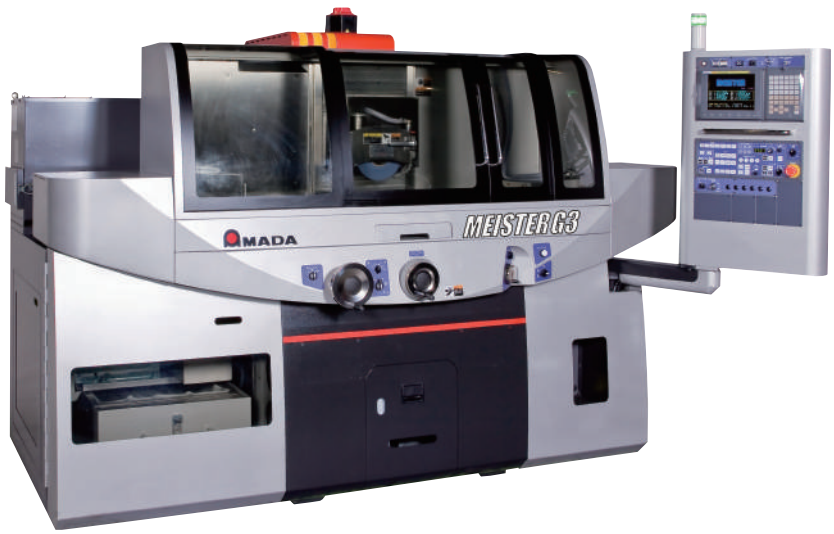
Original Measurement Technology on Equipment—Save time and steps while ensuring maximum accuracy with built-in measurement technology.

GRINDING TECHNOLOGY

CNC Grinders

Amada's user-friendly software makes numeric control easy for operators with a wide range of experience. Coupled with the exceptional precision these machines deliver, Amada CNC grinders can help your business thrive.

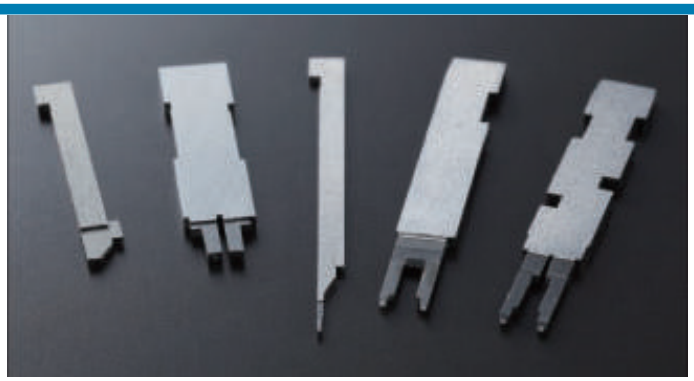
Meister G3 and V3



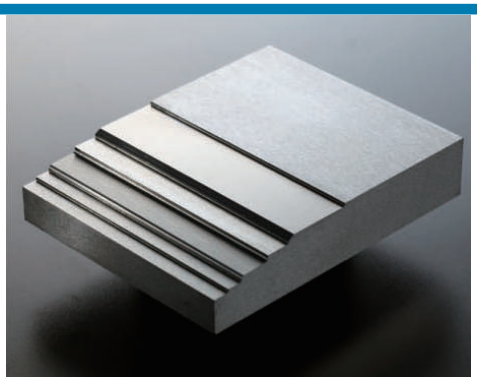
Meister G3 and Meister V3 High-Precision Forming Grinders

The Meister series of grinders offers outstanding versatility for every use—from simple to complex grinding tasks.

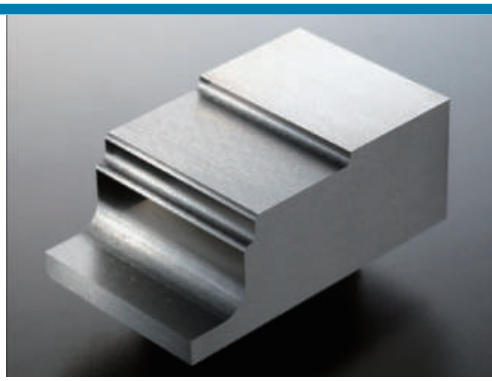
Steel, carbide, ceramics, and other materials can be ground in manual mode or in CNC mode. The machines come equipped with dressing and continuous path grinding technology and can be used for surface and profile grinding.



Core Pin Parts



Contour Grinding



Contour Grinding

The Universally Recognized Masterpieces

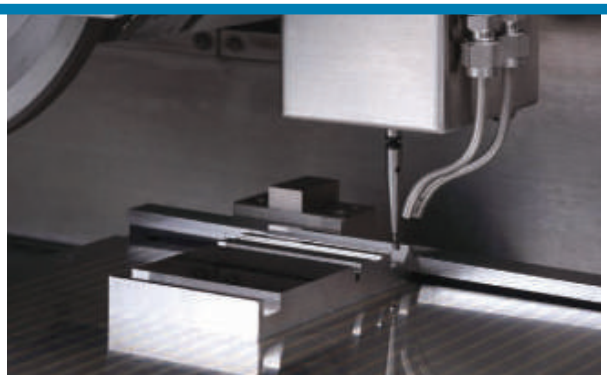
The Meister G3 and Meister V3 deliver ultra-precision surface and profile grinding with a fast-stroke mechanism. Advanced standard equipment includes CNC units, high-precision dressing and continuous path grinding technology for Y and X axes, spindle and hydraulic cooling, ceramic spindle bearings, and full enclosures.

The control units of the Meister Series grinders offer optimum operability. Sophisticated macros make programming extremely convenient, even for inexperienced CNC users.

A touch probe mounted on the grinding head measures the workpiece. Residual grinding allowances are automatically calculated and the machine will repeat the grinding cycle in unattended operation until the finish dimension has been reached—quickly and safely. And, the touch probe can now determine the start position of the grinding wheel on the workpiece.

Four-Fold Increase in Productivity

By way of direct comparison, users analyzed the machining time for a pair of mold and die parts made of carbide. Thanks to the convenient programming of the Amada grinding software and the fast-stroke mechanism, time savings of 75% can be reached compared to a CNC profile grinding machine.

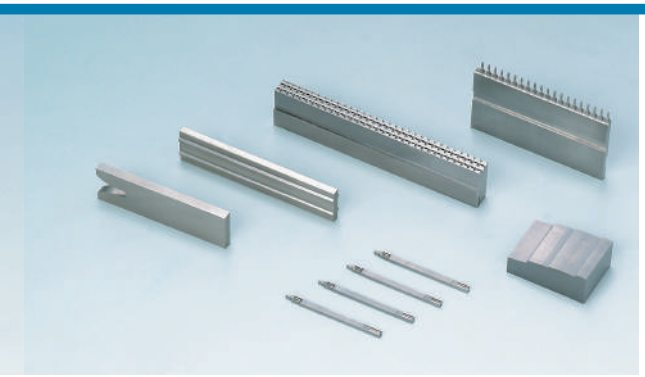


Automatic Measurement Equipment

Ultra-Precision Parts

Meister G3 and V3 Features

- Grinding area
  - Meister V3: 6" x 14" (152 mm x 355 mm)
  - Meister G3: 8" x 16" (203 mm x 406 mm)
- High-quality equipment for surface, plunge-cut, and continuous path grinding as well as dressing
- Fast-stroke system
- Spindle available with ceramic bearings and 8,000 RPM capacity (option)
- High-resolution measuring systems
- Contour dressing and contour grinding with external programming software
- Built-in touch probe technology
- Three separate hand wheels for easy setup and manual operation
- Built-in coolant system for increased thermal stability



Mold Tool Parts

Vertical Feed System—The column has a symmetrical structure to minimize thermal deformation and is covered with heat-insulating materials for protection against changes in temperature and other environmental factors.

The fully enclosed loop feedback system with the linear scale of 0.05µm resolution is standard for the Meister G3 (optional for others).

Wheel Spindle—The 3 HP (2.2 kW) spindle motor and inverter is standard on all models.

The spindle cooling system with oil color (±1ºC) is standard on the Meister G3 (optional for others).

Table—The table features "V-V" slideways for exceptional straightness and features a servo-valve-controlled transverse drive system with teaching function.

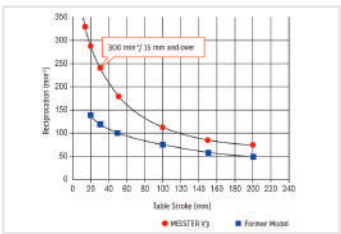
The Meister V3 features V-flat slideways with hollow runners for high speed and high accuracy.

Bed—The position of the jack bolts and ribs on the bed are optimized to support high-speed table reciprocation.

New Model Control/Operation Panel—The space-saving control panel with original software can improve machining efficiency.

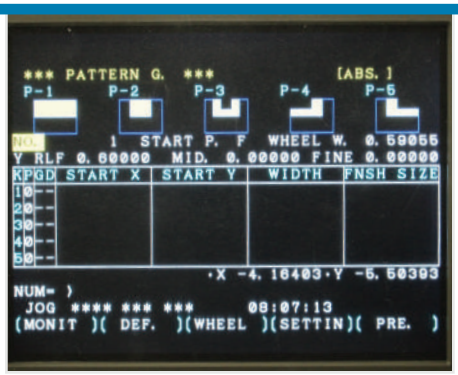
RAPID RECIPROCATION TABLE

Meister Series grinders support reciprocation speeds two to three times faster than any former model, greatly improving machining efficiency.

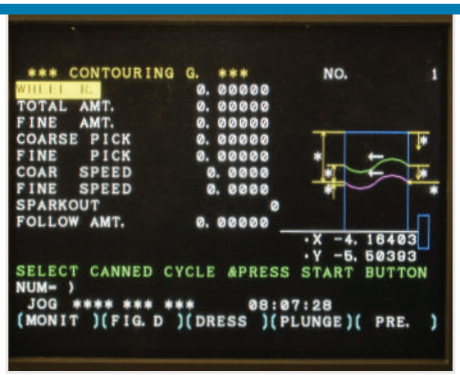


PROVISIONS TO PREVENT THERMAL DISPLACEMENT

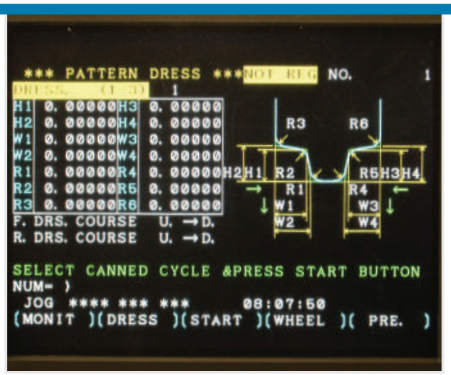
The hydraulic unit is isolated from the main body and the hydraulic oil temperature is maintained at ±1ºC by the built-in oil temperature controller.



Pattern Grinding



Contour Grinding



Pattern Dressing

Original Software

The software of Meister G3 and V3 grinders enables your operators to become productive without having to know complex NC programming.

Pattern Grinding—Complex shapes can be processed easily by combining five patterns. The combination of plunge and traverse options makes selecting the appropriate processing easy.

Contour Grinding—Molding grinding can be implemented by inputting the graphic data of arbitrary shapes. Rough grinding by plunge grinding can also be implemented, and the created data can be saved in the NC program area.

Pattern Dressing—By inputting the dimensions required for the basic shape on the screen, the grindstones perform the molding using a simple profile dresser, NC profile dresser, or high-speed wafer dresser. The grindstones can also perform the molding during processing and interrupt dressing.

Machine Specifications

			MEISTER G3	MEISTER V3
CAPACITY	Table working surface (L x W)		21.6" x 7.8" (550 mm x 200 mm)	17.7" x 5.9" (450 mm x 150 mm)
	Max. longitudinal travel		23.6" (600 mm)	19.6" (500 mm)
	Max. cross travel		9.8" (250 mm)	7.8" (200 mm)
	Spindle center height from table		15.7" (400 mm)	15.7" (400 mm)
	Standard chuck size (L x W x H)		15.7" x 7.8" x 3.9" (400 mm x 200 mm x 100 mm)	13.7" x 5.9" x 3.9" (350 mm x 150 mm x 100)
TRAVEL	Longitudinal feed		3~131 ft/min*	
	Max. no. of reciprocation (15 mm stroke)		250 min^{-1}*	250 $min.^{-1}$*
SADDLE	Rapid cross feed (jog)		0~1312 ft/min, 1640 ft/min, 3280 ft/min	
	Handle feed	Per rev.	0.0004", 0.004", 0.04", 0.15" (0.01 mm, 0.1 mm, 1.0 mm, 4.0 mm)	
		Per grad.	0.000004", 0.00004", 0.0004", 0.0015" (0.0001 mm, 0.001 mm, 0.01 mm, 0.04 mm)	
	Minimum input increment		0.000010" (0.0001 mm)	
	Position detection system		Glass scale/0.05µm	
WHEEL HEAD	Rapid wheel head feed (jog)		3.9"/min, 39"/min (100 mm/min, 1000 mm/min) (2 steps)	
	Handle feed	Per rev.	0.0004", 0.004", 0.04", 0.15" (0.01 mm, 0.1 mm, 1.0 mm, 4.0 mm)	
		Per grad.	0.000004", 0.00004", 0.0004", 0.0015" (0.0001 mm, 0.001 mm, 0.01 mm, 0.04 mm)	
	Minimum input increment		0.000010" (0.0001 mm)	
	Position detection system		Linear scale 0.05 µm (standard)	Linear scale 0.05 µm (OP)
WHEEL SPINDLE	Size (OD x width x bore)		Ø8" x 0.25"~1" x Ø1.25" (Ø205 mm x 6.4 mm~25 mm x Ø31.75 mm)	
	Wheel spindle speed			500 min^{-1}~5000 min^{-1}
	Motor requirement			3 HP~2 P (22~2 kW-P)
NC CONTROL AXIS				Simultaneously 2 axis
FLOOR SPACE (W X L X H)			105" x 80" x 74" (2670 mm x 2040 mm x 1900mm)	74" x 58" x 74" (1880 mm x 1475 mm x 1900mm)
MACHINE NET WEIGHT			5280 lb (2400 kg)	4840 lb (2200 kg)

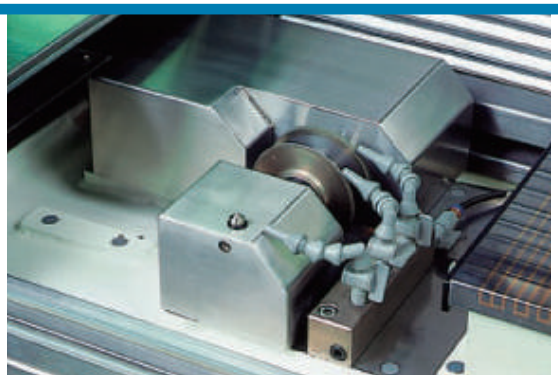
** The table speed depends on work load on the table.*

Winstar and Winstar SP

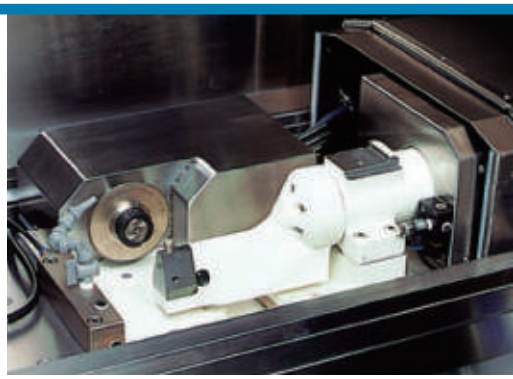
Winstar and Winstar SP Ultra-High Precision Forming Grinders

The Winstar SP was specifically designed for users who push their demands for quality, dimensional accuracy, and flatness to the limits of technical feasibility.

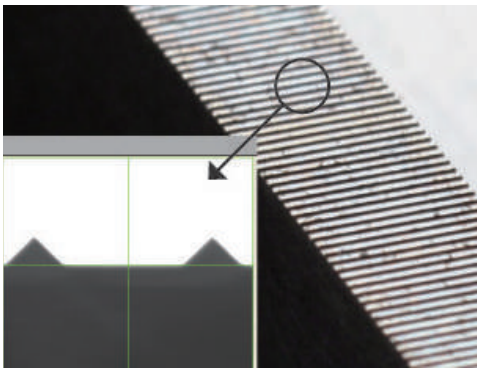
NC Index Magnetic Chuck



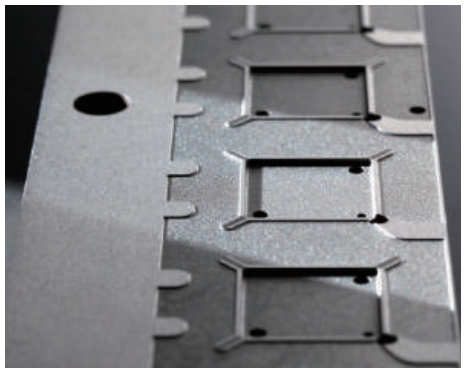
High-Precision Rotary Dresser



NC Profile Dresser



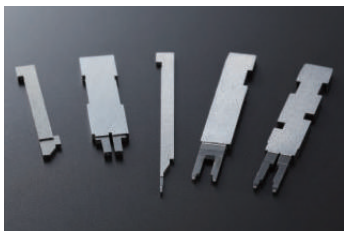
Micro Pitch Grinding (100 Slots), Height: 0.002" (0.05 mm) P 0.01" (0.3 mm)



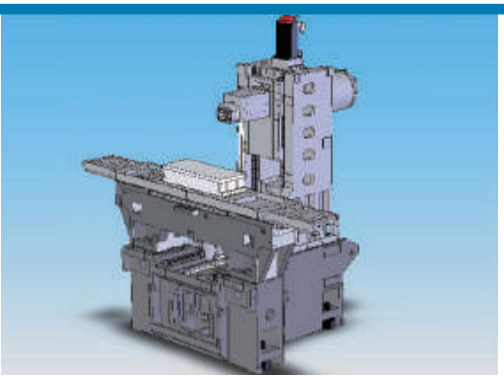
Air Vent Grinding

Solutions for Today's Grinding Needs

With a stable platform, reduced thermal displacement, and a space-saving full enclosure, the Winstar SP delivers outstanding repeatability. It also delivers short lead times and the unmatched grinding precision required in all technology-driven markets, including medical, semiconductor, and electronics.

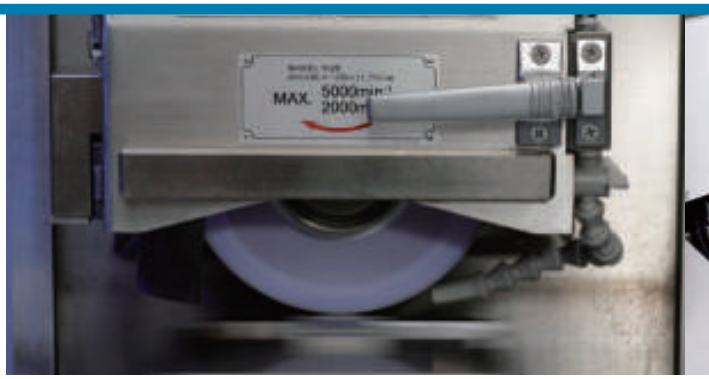


Core Pin Parts



Proprietary Column Type

Ultra-Low Vibration Spindle Motor



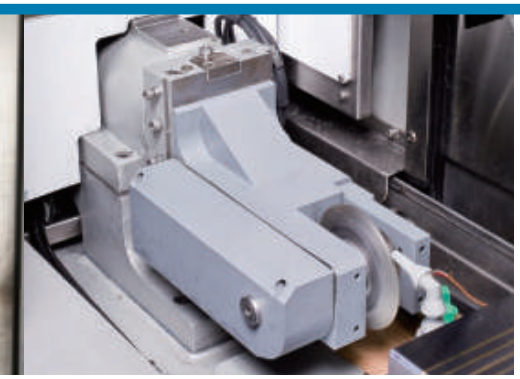
Specifications Guarantee High Productivity

Winstar Ultra-High Precision Forming Grinder

One of our best-selling forming grinders, the Winstar features an ultra-low vibration, oil-cooled spindle motor that delivers mirror-surface finishing for a wide range of applications.

Proprietary Column Type, Three-Plane Independent Structure—The Winstar's foundation is a T-bed with an elongated slide and column base. High static accuracy is ensured through an independent moving column design that provides excellent operability. In addition, the V-V slideway is fully supported, eliminating overhang and maintaining superior straightness accuracy.

Table Reciprocating Specifications Guarantee High Productivity—The Winstar uses a high-speed servo valve for high-speed stroking. At a 0.59" (15 mm) stroke, it can achieve 200 SPM inverse velocity. All series models boast high stroke reversal accuracy for stop grinding and can supply accurate longitudinal processing.



NC Swivel Rotary Dresser

Twin Dresser

Vertical Rotary Dresser

Features for a Wide Range of Grinding Needs

NC Swivel Rotary Dresser—The swivel rotary dresser achieves high-precision form dressing by means of three-axis simultaneous control with "normal" position dress capability. Together, they provide a leap in wheel-forming accuracy, from taper to straight, and radius forming. High-speed diamond disk dressing also greatly reduces inaccuracies due to diamond wear.

Twin Dresser TD-100—Previously, thin wheel dressing with a conventional wheel required a high degree of skill. But, by using the TD-100, dressing efficiency has made a great leap forward. Through the use of new, thin grinding wheels, forming widths of 0.0019" (0.05 mm) can be done by operators of any skill level.

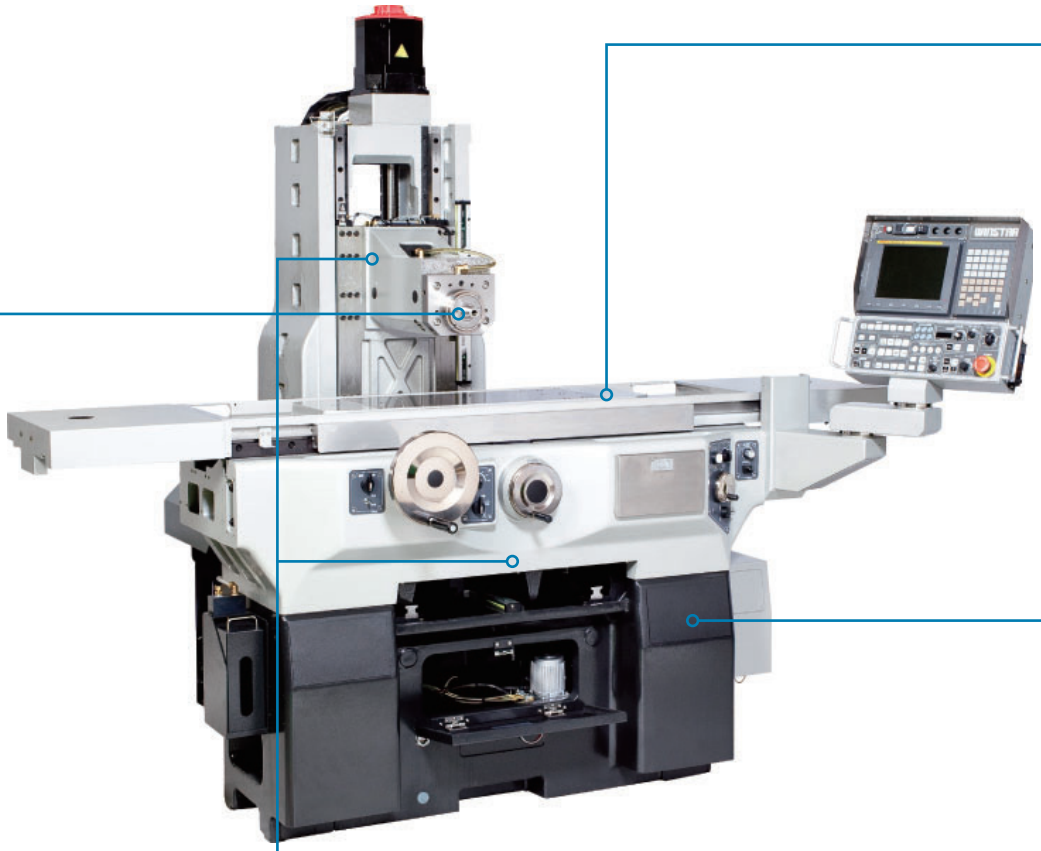
Vertical Rotary Dresser VRD-125—A motorized rotary dresser with a high-rigidity spindle delivers high-performance truing. Dressing can be performed on diamond and CBN wheels.

Automatic Measurement System (Touch Sensor)—The touch sensor automatically performs measurements after grinding to given dimensions within a canned cycle, enabling the machine to automatically re-grind surfaces when measurements are out of tolerance. Measurement resolution is 0.05µm (0.000002"). and it also supports multiple workpiece measurement. Automatic workpiece approach setting is an optional function.

High-Speed Spindle 10,000 min^{-1}—Equipped with an ultra-low vibration (V1) 2.2 kW oil-cooled high-speed motor. It provides 2.2 kW at 2500 min^{-1} and covers a wide range from normal grinding to the high-speed range.

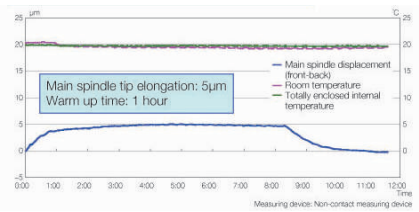
Both the spindle and motor use ceramic ball bearings, supporting high RPMs. While enabling wheels with smaller bores, it still provides power for high-speed grinding.

Canned Software Cycles Provide Simple Operation—Canned cycles are fixed cycles that give operators full command of the technology without the need to know complicated G-code programming.



ULTRA-LOW VIBRATION SPINDLE MOTOR FOR ULTRA-MIRROR SURFACE FINISHES

The grinding spindle achieves ultra-mirror surface finishes though a class V1 ultra-low vibration, oil-cooled spindle motor. The motor is equipped with an extra oil bath cooling function as standard equipment, which provides great thermal stability.



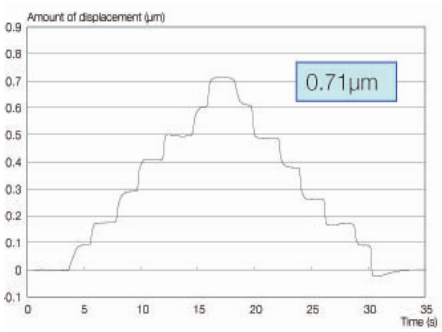
Main Spindle Thermal Displacement (Winstar Sp)

HYBRID GUIDE SURFACE WITH GLASS LINEAR SCALE

This system uses both a linear roller guide slideway (that achieves submicron accuracy) and a hybrid box way for sliding surfaces with enhanced vibration dampening for the vertical and cross axes. A 0.000002" (0.05µm) resolution scale is also included as standard equipment.

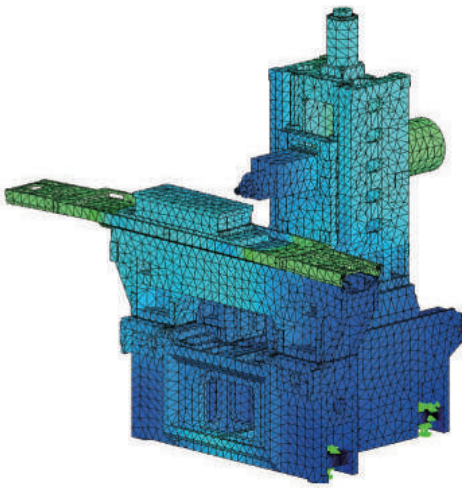
Less than 0.000004" (0.1µm) backlash capability (Winstar SP).

- X axis: 0.000026"/0.000027" (0.68 µm/0.7µm)
- Y axis: 0.000028"/0.000027" (0.71 µm/0.7µm)



HIGH-SPEED, NO-OVERHANG V-V SLIDING SURFACE

Superior straightness is achieved through the no-overhang design with a wide table base (Winstar SP: 52.75" [1,340 mm], Winstar: 55.11" [1,400 mm]) providing a maximum table stroke of 23.62" (600 mm) for the Winstar SP and 30.70" (780 mm) for the Winstar.



COLUMN TYPE THREE-FACE INDEPENDENT STRUCTURE

With Amada's unique three-face independent structure (the column moves front-to-back), the vertical, cross, and side-to-side axes are not dynamically affected by other moving axes, thus providing stable processing accuracy.

CAE structural analysis by 3D digital design

- Comprehensive analyses were conducted on the displacement of the structure caused by the machine's own weight, table movement, and column movement.
- The results of these analyses led to optimized rib placement, jack placement, and mass balance for repeatable precision.

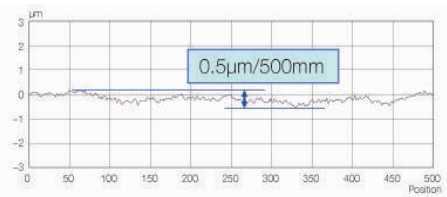


Table Straightness Accuracy
(Winstar Sp)

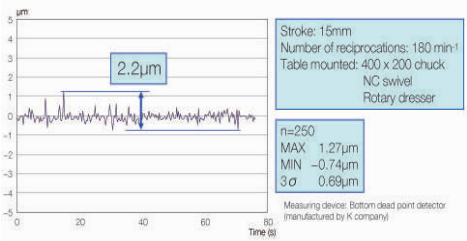


Table Reciprocation Accuracy
(Winstar Sp)

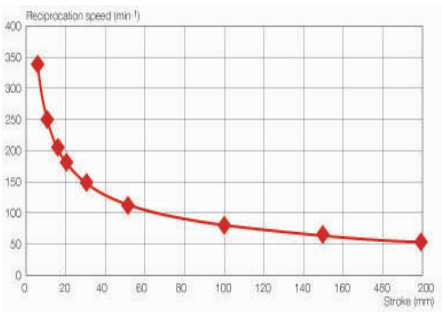
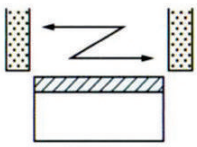
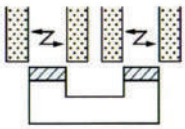


Table Reciprocation Speed
(Winstar Sp)

Grinding Cycle (Standard)

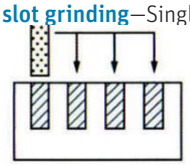


Surface grinding—Traverse grinding is easy when it's digital. The front-back and side-to-side positions can be typed as dimensions or input by the electronic teaching button.

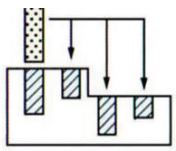


Traverse jump grinding—This cycle automatically jumps across a space between multiple surfaces on the same height. All surfaces can first be roughed, then all finished for more uniformity. (Optional on Winstar.)

Equal-depth slot grinding—Single or multiple



grooves can be easily input and ground. Equal pitch of 999 grooves or unequal pitch of 16 grooves can be set. (Optional on Winstar.)



Unequal-depth slot grinding—Complex multiple grooves can be easily input and ground. Fifty grooves of unequal depth/unequal pitch can be set. (Optional on Winstar.)

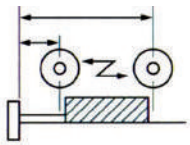


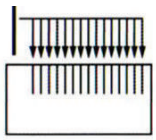
Table position setting—Table stroke position can be set on the screen. For workpieces on the chuck, end stroke positions can be set with the teaching button. The position setting screen enables changing centerline, length, and left and right position.

Taper mode—Set the taper angle, turn the handle, and the wheel moves on the angle. When re-grinding workpieces with unknown angles, the angle can be measured with two-point teaching. Using this function, any angle can be ground or dressed quickly, with no special fixtures.

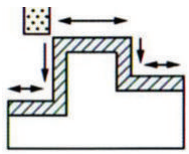
R mode (radius)—Locate the front side and top of a workpiece and set the radius required. When you turn the handle, the wheel grinds a radius profile. The feed speed is controlled by the handle. There is no faster way to grind any radius.

Taper R—Grinding/dressing is performed by selecting six types of patterns and simply setting them. By setting rough or fine cut, grinding and wheel forming from a blank are possible.

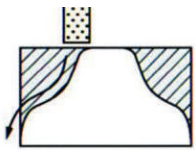
Grinding Cycle (Optional)



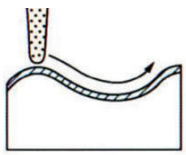
Tie bar grinding—Pitch data for multiple groove grinding can be edited easily. Finishing is done by grinding, leaving several µm each per groove. Creep grinding can also be supported. (Optional on Winstar.)



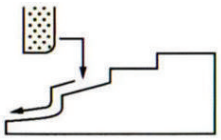
Pattern grinding—By combining the five most typical patterns, processing of complex shapes can be performed easily. Plunge/traverse can be combined for the most efficient grinding possible. (Optional on Winstar).



Pattern contouring—Contour grinding of simple shapes is as easy as inputting the required dimensions on the screen. Each shape is automatically displayed after input for operator review.



Contour grinding—Complex contour grinding can be performed by conversationally inputting figure data. A rough plunge cycle can be created and displayed automatically by the machine. G-code programs can also be uploaded and displayed for grinding.



Terraced grinding—Step forms are combined and processed with ease. Forms can be set with five steps and four processes in one pattern. Dressing cycles have been built in, and grinding wheels can be dressed to radius or taper.

Trapezoidal groove grinding—Multiple-groove grinding can be performed on trapezoidal grooves. When the groove dimensions/pitch data are set, wheel forming and processing are performed automatically. Plunge, traverse, and contour grinding can be combined. Rough, medium, and fine processing are performed separately.

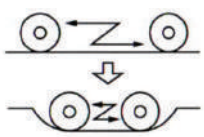
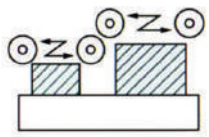
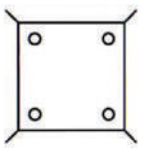


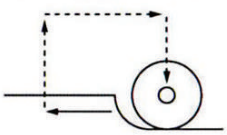
Table stroke—The speed switching function/plunge grinding/traverse grinding each have rough, medium, and fine grinding. Table speed and stroke length are adjusted automatically.



Multi-workpiece function—By setting multiple workpieces on the chuck, continuous grinding and processing can be performed. A maximum of five types of grinding data can be called up.

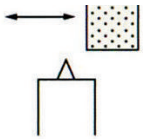


Air vent grinding (WAPS-WIN required)—Multiple grooves set on a plate can be processed while determining table strike position. This function processes by loading data created earlier with Amada's WAPS-WIN air vent cycles.

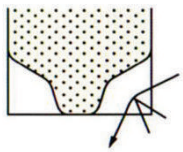


Hydraulic creep grinding—Using the table scale feedback, grinding can be performed setting table stroke shift speed to low speed. Both up-cut and down-cut are supported. Groove grinding software or tie bar grinding software is required.

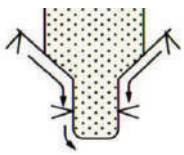
Dress Cycle



Straight dress—Dressing of wheel periphery is performed using a tabletop single-point dresser or high-speed disk dresser. This dressing cycle can be executed almost any time by the operator or a canned cycle.



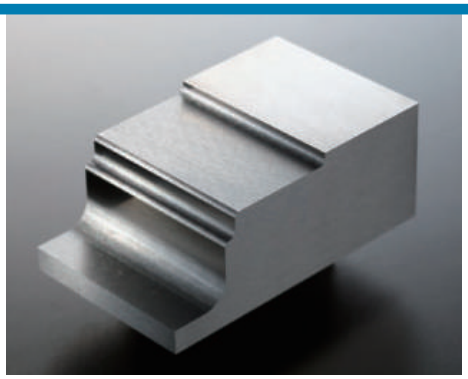
Pattern dress—Wheel forming is performed using a simple profile dresser, an NC profile dresser, or a high-speed disk dresser. Forms are created by simply imputing the dimensions required for basic shapes on the screen. This dressing cycle can be executed almost any time by the operator or a canned cycle.



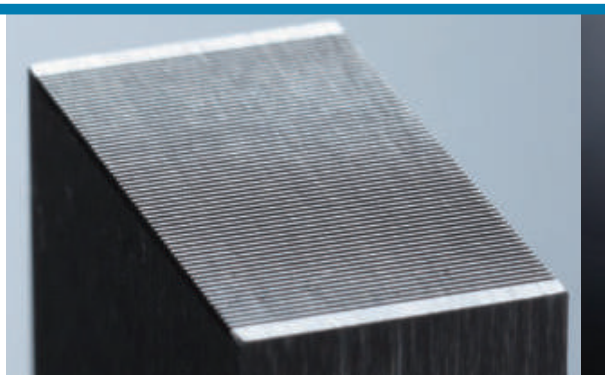
Profile dress—Wheel forming is performed on various shapes using a simple profile dresser, an NC profile dresser, or a high-speed disk dresser (oval fillister). Rough dress can also be performed. G-code programs can also be uploaded and displayed for dressing.

Overhead dress—Wheel periphery dress is performed using an overhead dresser. This dressing cycle can be executed almost anytime by the operator or a canned cycle.

Grooving dress—Wheel width is dressed to set values using a lateral face dresser and a high-speed wafer dresser. When the lateral face dresser is used, a back taper can be formed on the wheel.



Contour Grinding



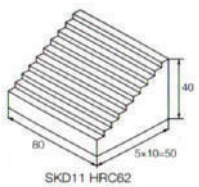
Angular Groove

Unrivaled Grinding Precision by Design

STEP GRINDING ACCURACY

Grinding conditions

- Grinding wheel: CBN170 Ø7.87" x 0.39" x Ø1.25" (Ø200 mm x 10 mm x Ø31.75 mm)
- Table stroke: 4.72" (120 mm) 57 SPM
- Stock removal: 0.0008" (0.02 mm)
- Grinding processing time: 230 seconds
- Measuring device: Digital length measuring device (Nikon)

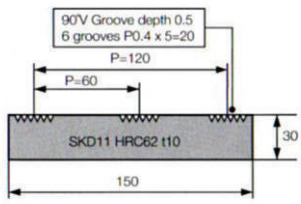


	CUMULATIVE ERRORS	PITCH ERROR
MINIMUM VALUE	-0.000008" (-0.0002 mm)	-0.000008" (-0.0002 mm)
MAXIMUM VALUE	0.00001" (0.0003 mm)	0.000008" (0.0002 mm)
MAXIMUM ERROR	0.00002" (±0.0005 mm)	

V GROOVE PITCH GRINDING PRECISION

Grinding conditions

- Grinding wheel: 89A400I (Tyrolit) 8.07" x 0.25" (V mountain forming) x Ø1.25" (Ø205 mm x 6.4 mm x Ø31.75 mm)
- Table stroke: 0.79" (20 mm) 150 SPM
- Number of grooves: 18
- Stock removal: 0.019" (0.5 mm)
- Times sparked out: 5
- Grinding processing time: 85 min. (including processing dress one time per groove)
- Measuing device: Non-contact laser 3D measuring device (Mitaka Kohki Co., Ltd.)



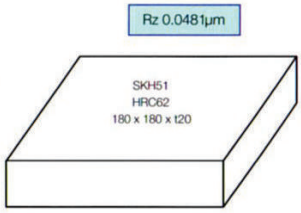
	CUMULATIVE ERRORS	PITCH ERROR
MINIMUM VALUE	-0.000012" (-0.0003 mm)	-0.000016" (-0.0004 mm)
MAXIMUM VALUE	0.000016" (0.0004 mm)	0.000016" (0.0004 mm)
MAXIMUM ERROR	0.000012" (±0.00035mm)	

Mirror Grinding

MIRROR GRINDING

Grinding conditions

- Grinding wheel: D2000 Ø7.87" x 0.24" x Ø1.25 (Ø200 mm x 6 mm x Ø31.75 mm)
- Wheel speed: 900 RPM (peripheral speed: 1902 ft/min. (580 m/min.)
- Table stroke: 7.87" (200 mm)
- Table speed: 32.9'/min. (10 m/min.)
- Total grinding: 0.0003" (0.008 mm)
- Rough/fine: 0.00002"/0.000008" (0.0005 mm/0.0002 mm)
- Rough/fine in feed: 0.02"/0.008" (0.5 mm/0.2 mm) sync feeding
- Grinding time: 83 min.
- Measuring device: Surface roughness measuring device (Taylor Hobson)



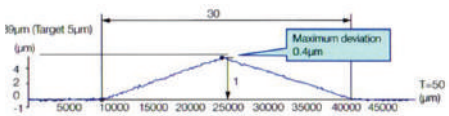
CONTOUR GRINDING

Grinding method

After forming the grindstone corner radius with the rotary dresser, contour grinding is performed.

Grinding conditions

- Grinding wheel: 1GB100 2 J 6VCSS Ø6.69" x 0.18" x Ø1.25" (Ø170 mm x 4.5 mm x Ø31.75 mm)
- Table stroke: 1.38" (35 mm) 120 SPM
- Number of grinding passes: 1
- Grinding time: 30 min.
- Measuring device: Non-contact laser 3D measuring device (Mitaka Kohki Co., Ltd.)



Machine Specifications

				WINSTAR SP	WINSTAR
				Simultaneous 2 axis + 1 axis (hydraulic)	Simultaneous 2 axis + 1 axis (hydraulic)
TYPE				Column type	
CAPACITY	Table working surface (length x width)			21.6" x 7.8" (550 x 200 mm)	24" x 10.6" (610 x 270 mm)
	Table maximum side-to-side displacement			23.6" (600 mm)	30.7" (780 mm)
	Column maximum front-back displacement			9.8" (250 mm)	13.3" (340 mm)
	Spindle height (spindle C/L to table)			3.5"~15.7" (90~400 mm)	3.1"~17.7" (80~450 mm)
	Chuck size (length x width x height)			19.6" x 7.8" x 3.9" (500 x 200 x 100 mm)	23.6" x 11.8" x 3.9" (600 x 300 x 100 mm)
	Table height to floor			39.3" (1000 mm)	
	Maximum weight (chuck included)			330 lb (150 kg)	550 lb (250 kg)
RECIPROCATION (RIGHT TO LEFT)	Manual	Handle feed rotation	Normal	3.9" (100 mm)	3.9" (100 mm)
			Slight	0.19" (5 mm)	
		Drive system		Hydraulic servo/mechanical manual pulse handle	Hydraulic servo/ mechanical handle
	Automatic	Feedrate	Normal	3~131 ft/min (1~40 m/min)	
			Creep feed (OP)	Hydraulic creep Low speed: 0.4"~7.8"/min (10~200 mm/min) High speed: 393"/min (10,000 mm/min)	Hydraulic creep Low speed: 0.4"~7.8"/min (10~200 mm/min) High speed: 393"/min 10,000 mm/min
		Drive system		Servo valve + scale/ hydraulic cylinder	Servo valve + scale/ hydraulic cylinder
		Reciprocation speed (15 mm stroke)		200 min^{-1}	200 min^{-1}
	Minimum setting units			0.0004" (0.01 mm)	0.0004" (0.01)
	Position detection/scale resolution			Magnetically guided ABS scale/0.1 µm	Linear scale/1 µm
	Guide surface			W turcite	
CROSS	Manual	Handle feed Magnification switch, x1, x10, x100, x400, automatic	One rotation	0.0004", 0.004", 0.04", 0.15" (0.01, 0.1, 1.0, 4.0 mm)	0.0004", 0.004", 0.04", 0.15" (0.01, 0.1, 1.0, 10.0 mm)
			One scale	0.000004", 0.00004", 0.0004", 0.0015" (0.0001, 0.001, 0.01, 0.04 mm)	0.000004", 0.00004", 0.0004", 0.0015" (0.0001, 0.001, 0.01, 0.1 mm)
		Drive system		Ball screw/mechanical manual pulse handle	
	Automatic	Feedrate	Jog feed	0~15, 39, 78"/min (0~400 mm/min, 1000, 2000 mm/min)	0~15, 19, 39, 78"/min (0~400, 500, 1000, 2000 mm/min)
			Rapid traverse	157"/min (4000 mm/min)	196"/min (5000 mm/min)
			Grinding feed	0.0004~157"/min (0.1~4000 mm/min)	0.0004~196"/min (0.1~5000 mm/min)
	Minimum setting units			0.000010" (0.01 µm)	
	Position detection/scale resolution			ABS linear scale/0.05 µm	Linear scale/0.05 µm
	Guide surface			Linear roller guide + slide (hybrid guide)	

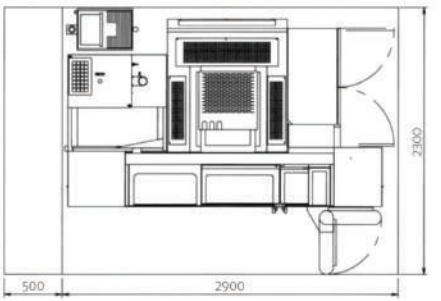
Machine Specifications

				WINSTAR SP	WINSTAR
				Simultaneous 2 axis + 1 axis (hydraulic)	Simultaneous 2 axis + 1 axis (hydraulic)
WHEEL HEAD	Manual	Handle feed	One rotation	0.0004", 0.004", 0.04", 0.15" (0.01, 0.1, 1.0, 4.0 mm)	
			One scale	0.000004", 0.00004", 0.0004", 0.0015" (0.0001, 0.001, 0.01, 0.04 mm)	
		Drive system		Ball screw/mechanical manual pulse handle	
	Automatic	Feedrate	Jog feed	3.9, 39, 78"/min (100, 1000, 2000 mm/min)	3.9, 7.8, 19, 39"/min (100, 200, 500, 1000 mm/min)
			Rapid traverse	78"/min (2000 mm/min)	
			Grinding feed	0.004~19"/min (0.1~500 mm/min)	
	Minimum setting units			0.000010" (0.01 µm)	
	Position detection/scale resolution			ABS linear scale /0.05 µm	Linear scale/0.05 µm
	Guide surface			Linear roller guide + slide (hybrid guide)	
WHEEL	Outer diameter x width x bore diameter			Ø8 x 0.25~1 x Ø1.25" (Ø205 x 6.4~25 x Ø31.75 mm)	Ø10 x 0.25~1 x Ø2" (Ø255 x 6.4~25 x Ø50.8 mm)
	Spindle speed			500~5000 (inverter)	
HYDRAULIC	Hydraulic oil/lubrication oil/cooling oil			Hydraulic oil 40 (tank separated) Lubrication oil 12 (tank separated)	Hydraulic oil 100 (tank separated) Lubrication oil 20 (bed)
	Hydraulic/cooling unit capacity (hydraulic oil not included)			286 lb (130 kg)	550 lb (250 kg)
	Oil cooler capacity (50/60Hz)			3.7/4.2 HP (2.8/3.2 kW)	5/5.7 HP (3.8/4.3 kW)
	Cooling medium			HCFC R410 (zero for ozone depletion potential)	
MOTOR	Wheel spindle			5 HP (3.7 kW) (oil cooler)	
	Hydraulic pump			2 HP~4 P (1.5~4 kW-P)	3 HP~4 P (2.2~4 kW-P)
	Cross feed			1.3 HP (1.0 kW)	0.8 HP (0.6 kW)
	Longitudinal feed			1.6 HP (1.2 kW)	0.5 HP (0.4 kW)
	Reciprocation feed			2.4 HP (1.8 kW) (ß12is)	None
	Automatic lubrication pump			25W	
	Cooling pump (50/60Hz)			0.4 shared with oil cooling pump (24/28.8L/min^{-1})	0.4 shared with oil cooling pump (24/28.8L/min^{-1})
POWER CAPACITY				12 kVA	14 kVA
FLOOR SPACE			Width	106" (2700 mm)	124" (3150 mm)
			Length	82" (2100 mm)	96" (2450 mm)
			Height	77" (1975 mm)	82" (2094 mm)
MACHINE TOTAL WEIGHT				8800 lb (4000 kg)	10,340 lb (4700 kg)

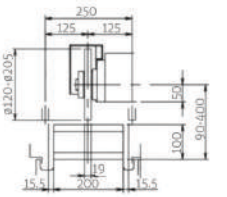
Note: OP indicates an option.

Winstar SP Floor Space and Travel

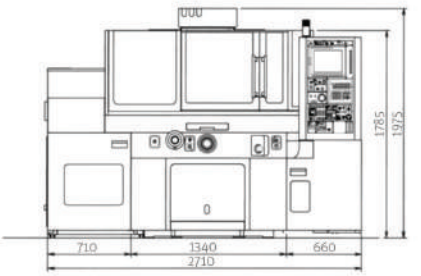
Plane view



Travel

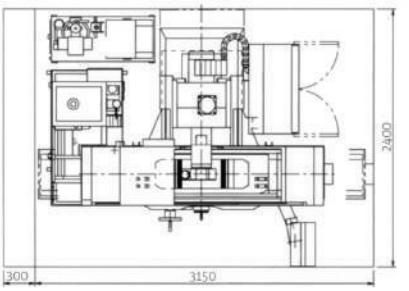


Front view

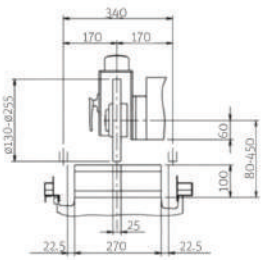


Winstar Floor Space and Travel

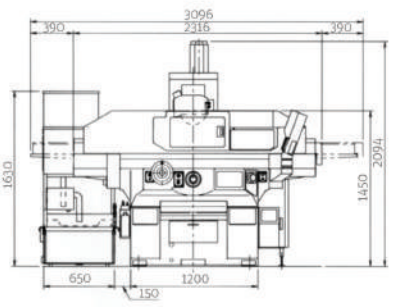
Plane view



Travel



Front view



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