High-Precision Seibu EDM Technology

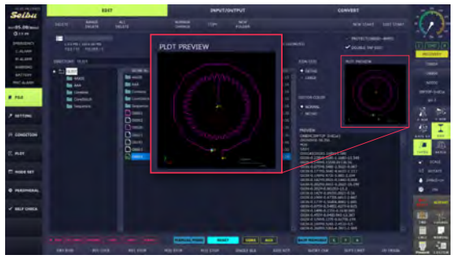
SuperMM80B
MM75B
M75B
MM50UP
MM35UP
M50HP
M35HP

Installed by SMART Smart NC

Operating interface with easy-to-see graphics with a smartphone feel

We have achieved an operating environment with a smartphone feel by using a multi-touch panel with a large screen of 21.5 inch. For the screen design we have maintained the same system of operation while using graphics to improve the clarity and user-friendliness.

1. Edit: additional multi-editing feature that is self-explanatory with the preview function



2. Cutting Conditions: set the conditions quickly with the scrolling search engine

3. Drawing: easy check with expanding, shrinking, and rotation using the multi-touch feature

4. Positioning: increase the set-up efficiency with the abundant types of positioning functions

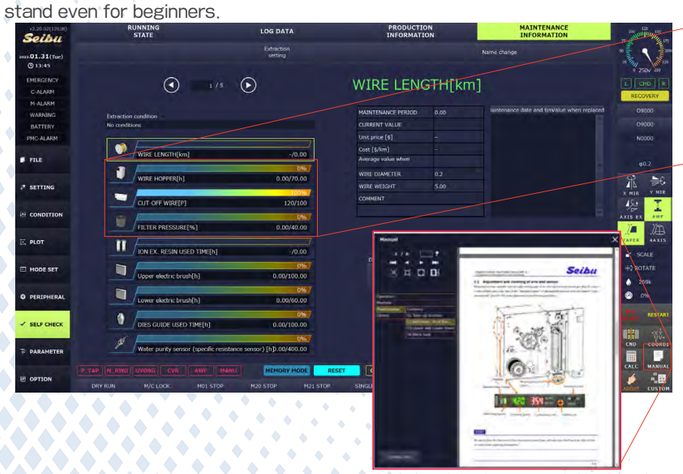
5. Cutting: confirm the cutting progress in real time

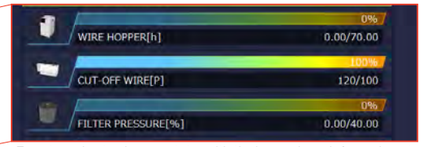
CAM-Station: NC program conversion is possible from the CAD data (2D/3D)

*Option

New maintenance screen (MM-UP/M-HP Series)

We have added a cost calculation feature, a history feature, and a feature for viewing the replacement and cleaning procedures. The replacement and cleaning procedures can be checked in our videos or manual, so support is provided that is easy to understand even for beginners.





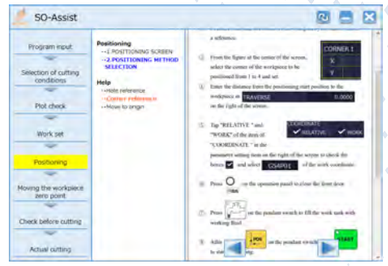
Easy-to-understand usage status with the icon and graph for each part.

A manual that is text searchable.

Explanatory video

Simple operation assist SO-Assist

We have developed an assist feature that can confirm in order of process the operations required from entering the program into the machine up to the processing. The required operations can be confirmed with the operation assist feature when the operator is inexperienced or confirmation of the operations is desired.



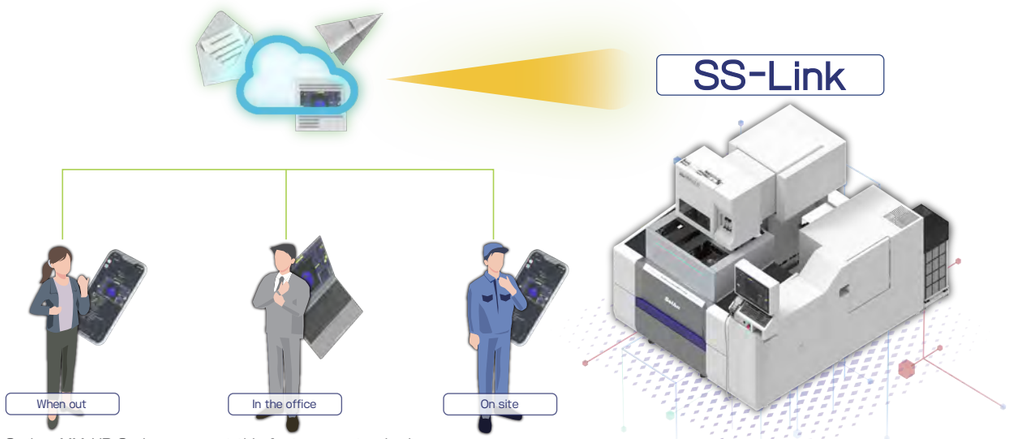
The process flow on the operation assist screen is linked to the main screen.

Cutting condition support CC-Support

We have added a cutting condition adjustment feature for measurements, straightness, corner dull and leftovers, approach flaws, and step flaws. It is easy to adjust the cutting conditions by setting the meter to the desired adjustable amount.

Operation Status Notification Feature SS-Link

The user can confirm the progress while the machine is cutting anytime and anywhere on a smartphone, tablet, PC, etc. The feature now also supports social media such as LINE and Slack.

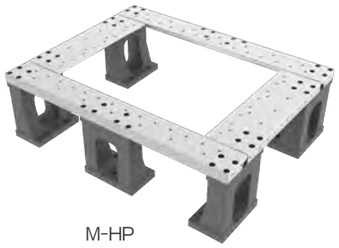


- The M-HP Series, MM-UP Series support this feature as standard.
- This feature is an option for machines with Windows 10 Version SmartNC, such as MEX15, the MB Series, the MMB Series, UltraMMB, SuperMMB80B (Available after shipment)

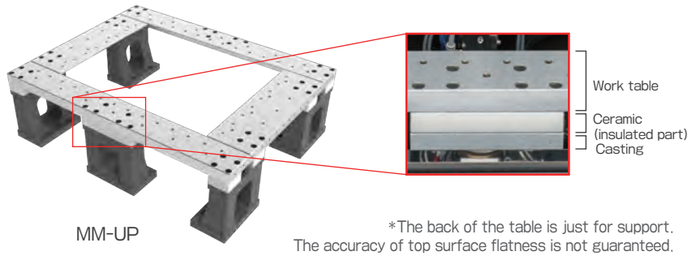
Easy Set-Up　Newly Designed Work Table (MM-UP/M-HP Series)

Square tables equipped as standard

All models are equipped with square-type work table as standard.
Since workpiece set-up is possible at the back of the table, workability can be improved.
Work table insulation specification is available for MMUP series only. (Not applicable to M-HP series.)



M-HP

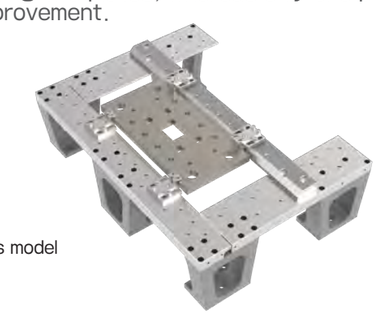


MM-UP

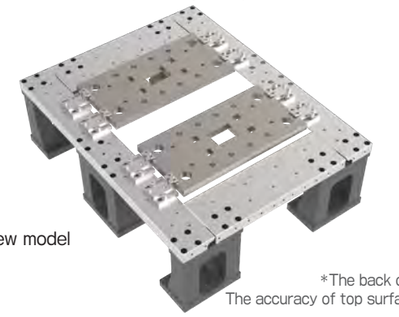
*The back of the table is just for support.
The accuracy of top surface flatness is not guaranteed.

Y-axis stroke extension

Y axis stroke has been extended by 50 mm to expand the cutting range.
By setting two plates, whereas only one plate could be set in the past, which contributes to productivity improvement.



Previous model



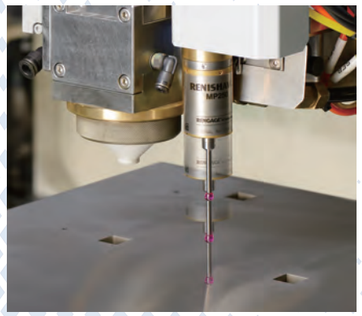
New model

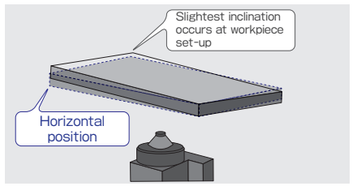
*The back of the table is just for support.
The accuracy of top surface flatness is not guaranteed.

Easy Set-Up　3D Level Adjust® (Option)

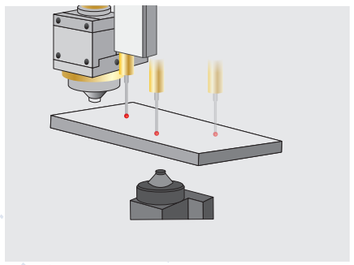
Automatic correction for vertical accuracy

Three points on the upper face of workpiece can be measured with high precision touch probe sensor mounted on the upper head.
It is possible to adjust the wire alignment automatically with reference to the workpiece inclination to the work table.
Spark positioning and horizontal adjustment jig becomes unnecessary due to this function, which reduces set-up time.





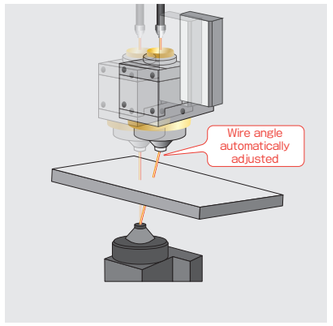
Slightest inclination occurs at workpiece set-up.



Three points on the upper face of workpiece are measured with touch probe sensor and the inclination of workpiece is calculated.

[3D Level Adjust Plus]

Shape measurement after cutting can be performed by adding software to this option.



UV axis are automatically adjusted so that wire can become vertical to the workpiece.

Easy Set-Up　Start hole device® SHM2 (Option)

SHM = Simple type start-hole cutting device

SHM2 is a start-hole drill that can be easily mounted on a machine. Hole-drilling is possible for hardened workpiece or tungsten carbide (WC).

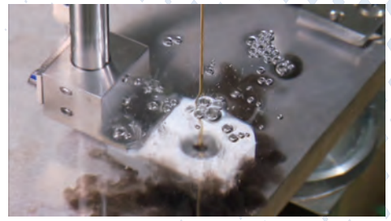
- Standard Φ1.0 pipe electrode
- Max. workpiece thickness 60mm
- Drilling speed 10mm/min (SKD11)

Setting operation cutting conditions can be easily performed using a dedicated operation screen.

- Applicable electrode diameter
Φ0.3, Φ0.5, Φ0.8, Φ2.0, Φ3.0

Start hole device (SHM2) is Seibu unique function.

Start hole device (SHM2) mounting



Start hole drilling

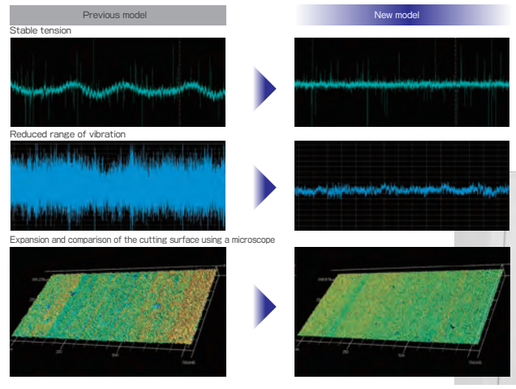
Dedicated screen

Electrode diameter	SKD11		WC	
	Maximum drilling height (mm)	Average drilling speed (mm/min)	Maximum drilling height (mm)	Average drilling speed (mm/min)
Φ3.0	60	5.0	40	1.5
Φ2.0	60	7.0	40	3.0
Φ1.0	60	10.0	40	4.0
Φ0.8	40	4.0	20	2.5
Φ0.5	10	3.0	10	1.0
Φ0.3	5	0.5	5	0.5

Reliable feeding technology　Thin wire travel (SMM80B/MM75B/MM-UP Series)

Twin tension dancer roller

Through improvement in the wire tension system, we have achieved stable tension and reduced vibration when the wire is traveling.　This has improved the cutting surface quality during finish cutting.

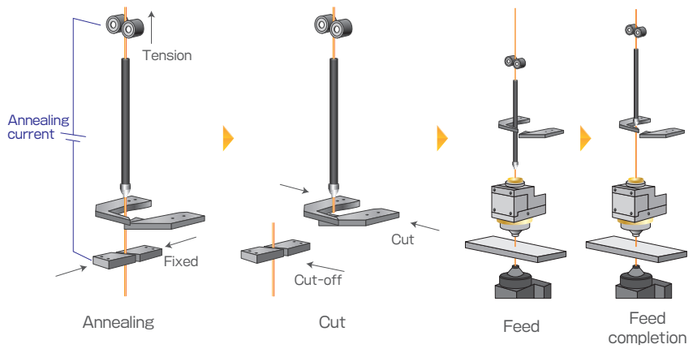


Reliable feeding technology　Automatic wire feeding device (AWF)

Greatly improved automation efficiency

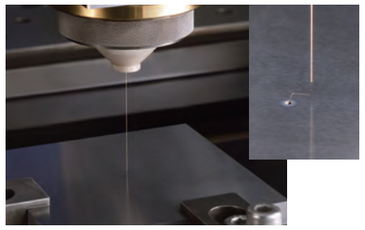
We have used the anneal dry method consistently since 1981.
In recent years, we developed functionality that allows annealing in a fixed position without rotating the rollers.
We are continuing advances that increase the wire feeding rate. This feature is essential for increasing the utilization rate and for automation of wire EDM.

Automatic wire feeding (AWF)



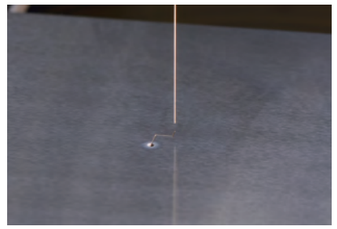
All-in-one AWF

Feed at wire break point



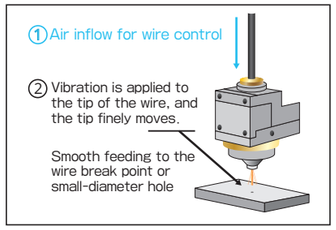
Wire can be reliably threaded even at the break point.
This is an essential function for core stitch cutting.

Friction sensor



Using Seibu's patented "Friction sensor" technology, the wire can thread reliably through a start hole or slot. (PATENTED)

Friction Sensor Wire Feeding System



Wire feeding in water

It is possible to thread wire in water, through slot due to anneal dry method.

Skip figure function

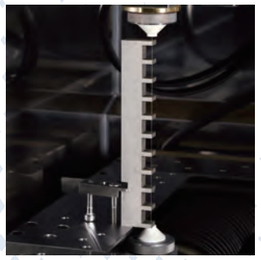
Automatic operation can continue without stopping even at an unexpected trouble.

Thin wire feeding

It contributes to the automatization of microfabrication.

Various functions

Reliable feeding to difficult workpiece



It is possible to feed automatically through the slit of comb-shaped workpiece with annealing and friction sensor.

Round diamond die guide

A Round guide is used that focuses on cutting accuracy. (Common to the upper and lower guides)

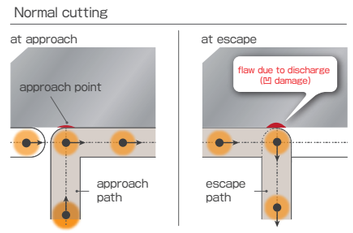
Jet feed guide　Option

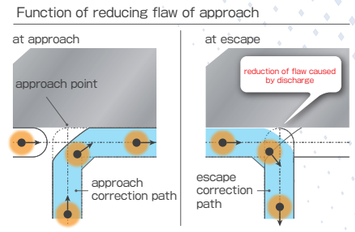
Water jet (option) is flushed from upper head nozzle to enhance the success rate of feeding. (Guides are not common to upper and lower guide.)

Always accurate　Increased cutting accuracy

Function of reducing flaw of approach

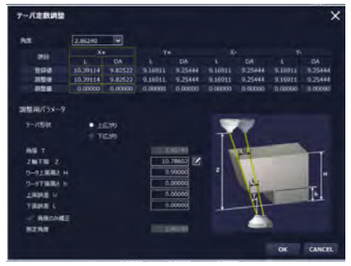
In general cutting, the discharge flaw was caused by passing two approach points (at approach and at escape).
It is possible to reduce the flaw of approach part by correcting the path of both approach and escape.
For other correction function, corner shape correction and taper cut correction are available.

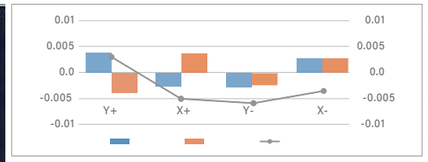




Feature for increasing taper cutting accuracy

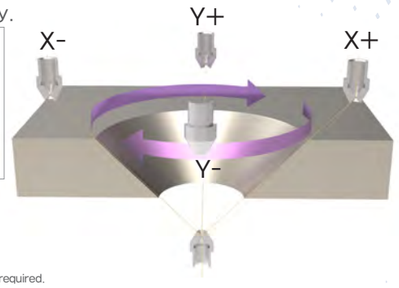
We have developed a feature that can recalculate the taper dimensions from the results of test cutting, and simultaneously correct the angle and dimension accuracy.
We have greatly increased the taper angle accuracy and dimension accuracy.





Machine used : MM50UP (U-V linear scale/Large taper offset feature used)
Material : SKD11　Wire diameter : Φ0.20
Thickness : 30mm
Taper degree : 5 degree　Ra : 0.22μm
Number of cuts : 5 passes　Rz : 2.0μm

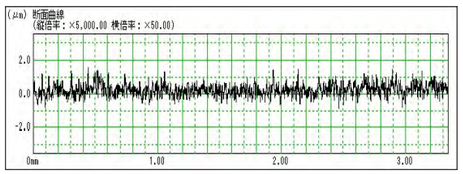
For the 4-directional taper offset feature, the large taper cutting option is required.



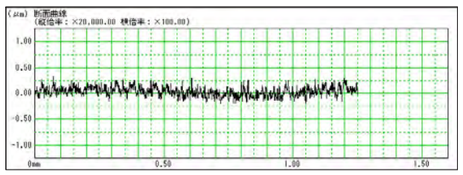
Best surface finish/Improvement of cutting surface finish

The effect of the insulation table enables stable output of micro current pulses, resulting in improved surface finish, shorter finishing stroke, and shorter total cutting time. Especially we could achieve under Rz 0.5μm with steel.

Material : SKD11　Number of cuts : 4 passes　Surface finish
Thickness : 30mm　Model : M35HP　Ra 0.264μm
Wire diameter : Φ0.20　Rz 2.092μm

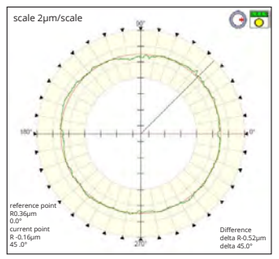


Material : SKD11　Number of cuts : 9 passes　Surface finish
Thickness : 30mm　Model : MM50UP　Ra 0.064μm
Wire diameter : Φ0.10　Rz 0.448μm



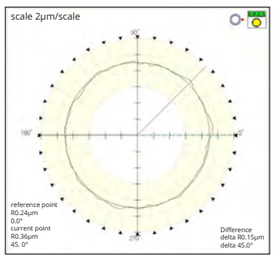
Roundness

Straightness of XY axis has been improved and achieved roundness 0.81μm by stable table feed.



Material : STAVAX
Nozzle state : open nozzle
Wire diameter : Φ0.20
Hole dia.: Φ12mm
Model: M50HP

Roundness 1.32μm



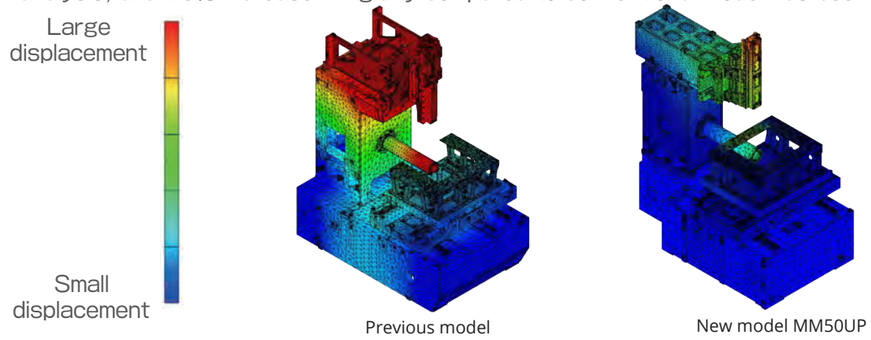
Material: WC (G5)
Nozzle state: open nozzle
Wire diameter: Φ0.20
Hole dia.: Φ10mm
Model: MM50UP

Roundness 0.81μm

Stable precision — High Rigidity Mechanical Structure

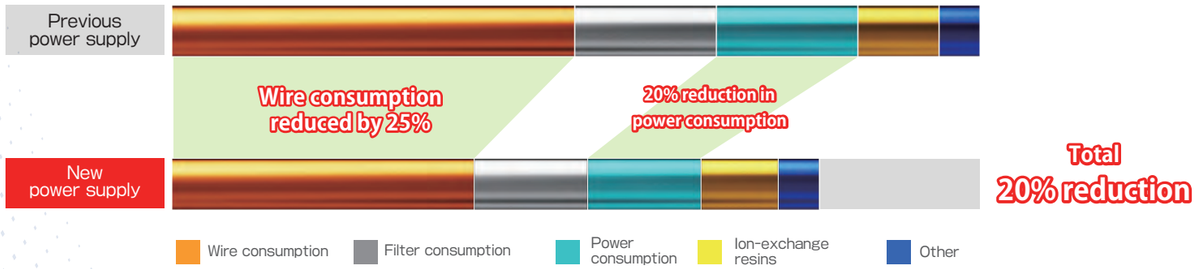
Increased machine rigidity

To achieve further stable cutting accuracy than MB Series, we reviewed the machine structure using CAE analysis, and 25% increase in rigidity compared to conventional model has been achieved.



Stable precision — High Precision, Highly Efficient Power Supply MPSC-20

Reduced power and wire consumption, energy savings, and low running cost



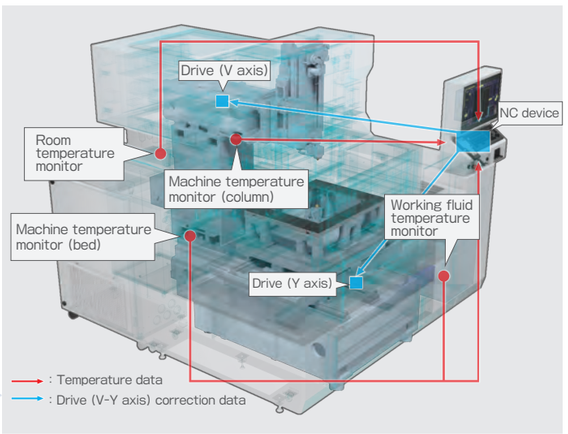
Stable precision — Thermal Adjust 24® (Option)

Thermal displacement can be corrected by CNC.

Thermal Adjust 24 is a function to maintain wire verticality by correcting the thermal displacement caused by the temperature change between upper and lower head.

Temperature monitor screen

Wire vertical error was improved by 62% using this function. (in Seibu factory)



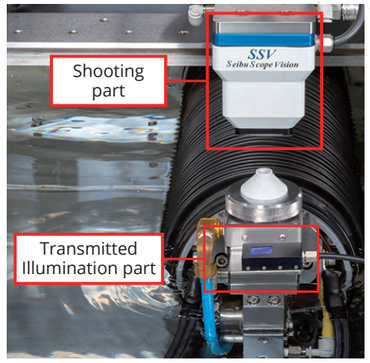
Task reduction — Vision measurement function SSV [Seibu Scope Vision®] (Option)

High-precision automatic measurement on the machine

High-precision vision measurement with a camera is possible on the machine without removing the workpiece after cutting is completed.

A wide variety of measurement options are available for measuring various shapes. It is also possible to check the CAD data and the machined shape and perform the difference measurement.

- High-precision measurement of fine shapes
- Can be measured without removing the workpiece after cutting
- High-precision edge detection with transmitted illumination
- Available in a wide variety of measure options for measuring various machined workpieces
- CAD drawings (DXF) can be read for contour verification and difference measurement



SSV Mounting

Specifications	
Shooting part	1.3 million-pixel color camera
Magnification	Optical magnification 4×, monitor magnification approx. 100×
Digital zoom	Approx. 1600 times (at maximum zoom factor)
Lighting	Epi-illumination, Transmission (simultaneous lighting)
Focal distance	Standard 40mm
Measurement function	Points, lines, circles, squares, intersections, distances
External output	CSV output
CAD loading	DXF compatible (simultaneous movement possible)
Dimensions of the shooting part	66×66×70mm

Circle measurement screen

CAD verification screen

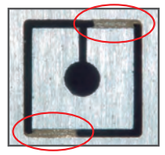
Task reduction — Core Stitch® (Option)

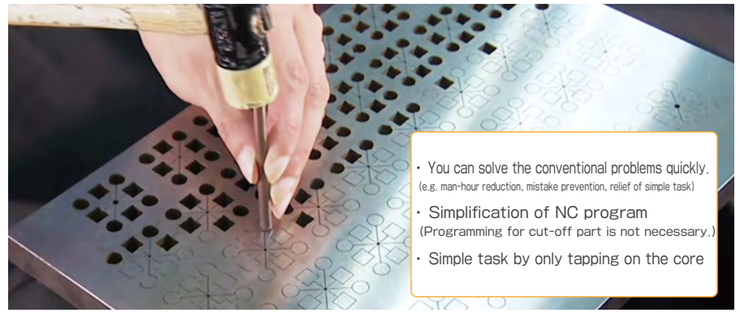
Greatly improved automation efficiency

Since the brass can be welded on the part 1 mm from the upper face, it is possible to knock out the welded part by tapping on the slugs.

Conventional cut-off

Core Stitch





Core Catch (Option)

Core Catch enables you to process welded core automatically. The hammer mounted on upper head knocks off the core made after Core Stitch cutting and the core can be automatically collected. This fully automated process realizes unmanned operation for die plate finish cut.

Core Stitch conversion software (Option)

This is software for PC that optimizes the welding point and distance by analyzing NC programs and automatically inserts core stitch codes into NC programs.

Task reduction EL Coating (Option)

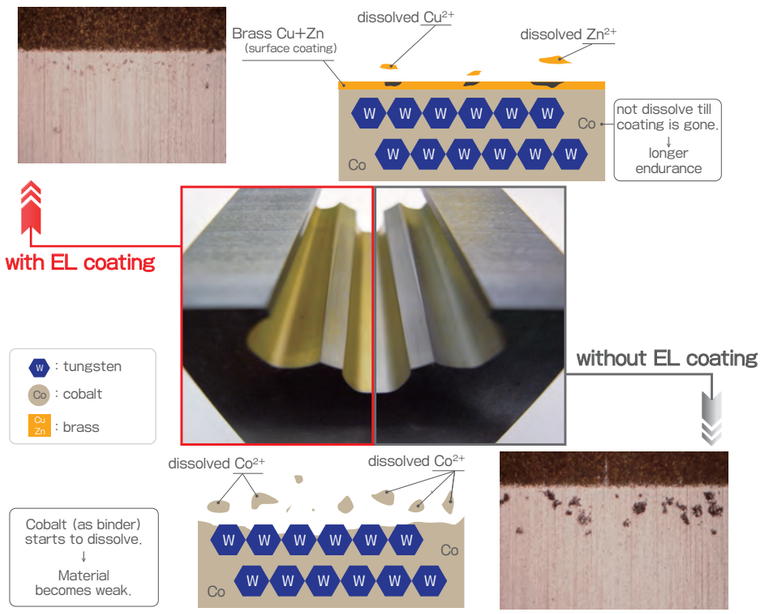
Measure against tungsten corrosion

EL coating is unique technology that prevents cobalt (Co) from dissolving in water by means of coating the cutting surface with brass. This increases the endurance of the mold. This makes it possible to cut in water (not in oil), which reduces maintenance work.

When tungsten carbide material is cut in water, the cobalt (as binder) starts to dissolve in water. As a result, the material becomes weak.

EL Coating
Cutting surface is coated with thin brass layer.

- Anti-corrosion is possible in water.
- Compared with cutting in oil, maintenance work is very easy.
- Endurance of mold is equal to mold produced in oil.



Zero tolerance Ultra-precision Plate Cutting

Mold production without jig grinding process (MM50UP: cutting example)

Inserting the pins into three plates separately cut with different thickness (T20, 22, 25mm)

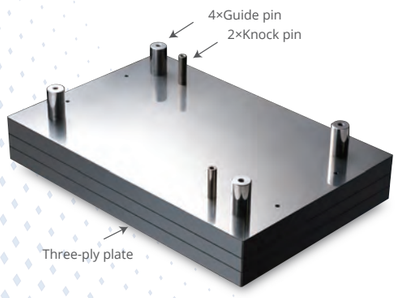
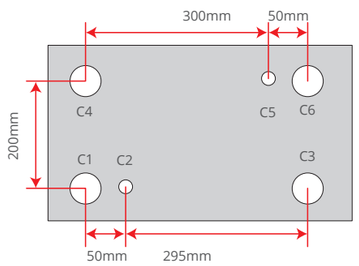
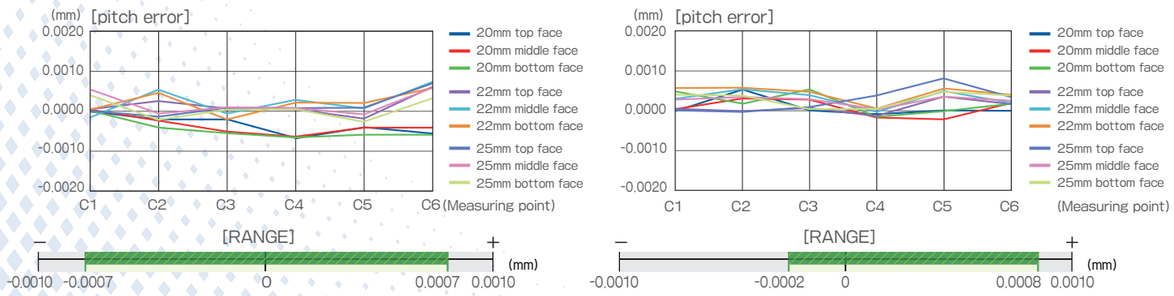


Plate cutting pitch accuracy



Material : SKD11
Thickness : 20, 22, 25mm
Number of cuts : 6 Passes
Wire diameter : Φ0.2
Ra : 0.19μm



X axis pitch error Error range 0.0014mm

Y axis pitch error Error range 0.0010mm

Zero tolerance Cutting Samples

Combination cutting

Material: SKD11 Surface finish: Ra 0.25μm Rz 2.00μm
Wire diameter: Φ0.2 Cutting time: 50 hours
Thickness: 60mm

Tall thickness cut

Dimension accuracy (mm)

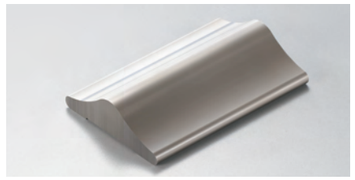
	Height	surface1	surface2
Top	120	20.0000	19.9990
	90	19.9990	19.9992
Middle	60	20.0000	19.9997
	30	20.0002	20.0000
Bottom	0	20.0004	20.0002

Material: SKD11 Surface finish: Ra 0.31μm Rz 2.50μm
Wire diameter: Φ0.2 Cutting time: 3.5 hours
Thickness: 120mm

High-precision step combination cutting

Material: SKD11 Surface finish: Ra 0.25μm Rz 2.00μm
Wire diameter: Φ0.25 Cutting time: 7 hours 18 minutes
Thickness: 60, 80mm Dimension accuracy ±2μm

Best surface finish

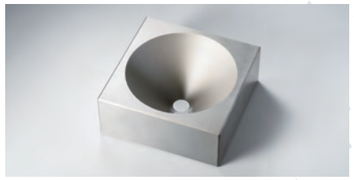


Material: SKD11 Surface finish: Ra 0.06μm Rz 0.50μm
Wire diameter: Φ0.1 Cutting time: 3 hours
Thickness: 30mm

Tall thickness taper combination cut

Material: SKD11 Surface finish: Ra 0.30μm Rz 2.80μm
Wire diameter: Φ0.25 Cutting time: 4 hours
Thickness: 100mm Taper angle: 10°

Large angle 45 taper cut

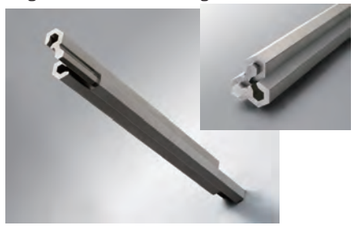


Material: SKD11 Surface finish: Ra 0.50μm Rz 4.50μm
Wire dia.: Φ0.2 (Megacut-T) Cutting time: 5 hours
Thickness: 40mm

Best surface finish

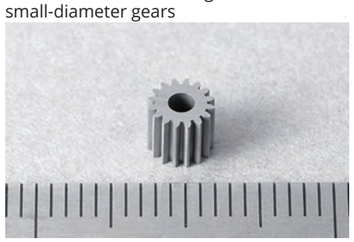
Material: SKD11 Surface finish: Ra 0.08μm Rz 0.65μm
Wire diameter: Φ0.20 Cutting time: 4 hours 16 minutes
Thickness: 30mm Dimension accuracy ±2μm

High-thickness fit cutting



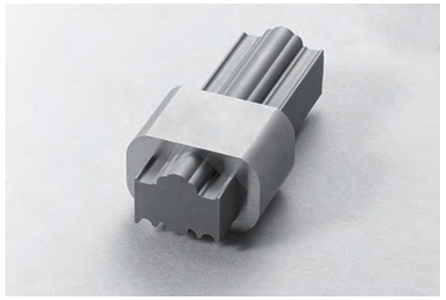
Material: SKD11 Surface finish: Ra 0.55μm Rz 4.41μm
Wire diameter: Φ0.25 Cutting time: 21 hours (Total)
Thickness: 200mm Dimension accuracy ±2μm

Full circumference cutting of small-diameter gears



Material: SKD11 Surface finish: Ra 0.28μm Rz 2.28μm
Wire diameter: Φ0.10 Cutting time: 1.5 hours
Thickness: 3mm Dimension accuracy ±2μm

Serration cutting (die/punch)



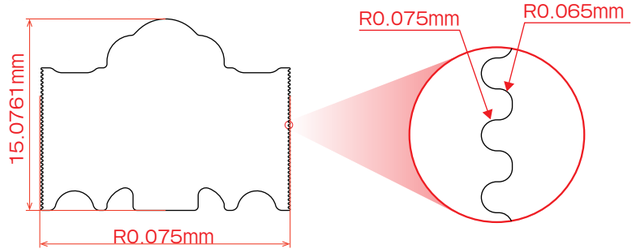
Die

Material: SKD11 Surface finish: Ra 0.15μm Rz 1.21μm
Wire diameter: Φ0.10 Cutting time: 3 hours 50 minutes
Thickness: 20mm Dimension accuracy ±2μm

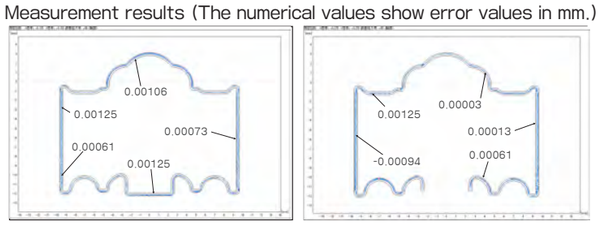
Punch

Material: WC (RG3) Surface finish: Ra 0.12μm Rz 0.98μm
Wire diameter: Φ0.10, Φ0.25 Cutting time: 8 hours 10 minutes
Thickness: 60mm Dimension accuracy ±2μm

Serration details



Measurement results (The numerical values show error values in mm.)



Options

X-Y linear scale

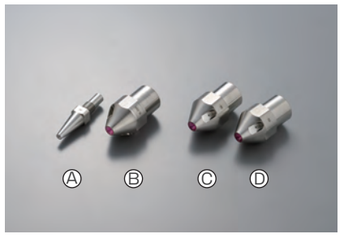
U-V linear scale

Suction unit of wire take-up for thin wire

Wire can be easily taken-up when using thin wire (Φ0.05 to Φ0.07).

Jet feed unit for thin wire

Wire feeding can be helped by water jet when using thin wire.

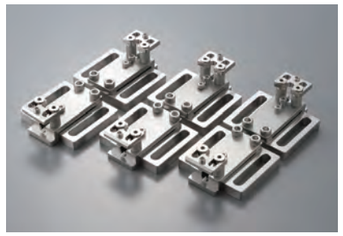


Ⓐ: UDU die guide Ⓑ~Ⓓ: UD die guide

Large taper nozzle

Standerd nozzle

20kg Roll wire feeder



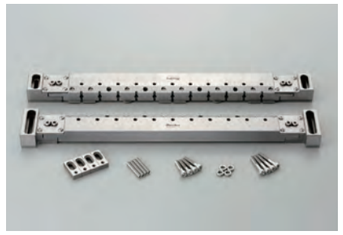
Height adjustment jig

Jig for adjusting flatness when plate cutting.

Automatic vertical square jig

Wire alignment can be automatically measured.

Sub work table



Bridge

Vise

Start hole device (SHM2) including Φ1.0pipe

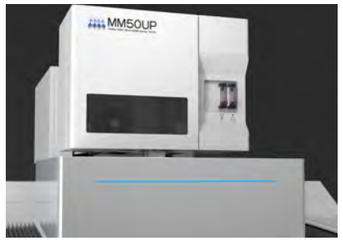
Φ0.3, Φ0.5, Φ0.8, Φ2.0, Φ3.0 selectable

Deionizer

Ion exchange resign 10L×2

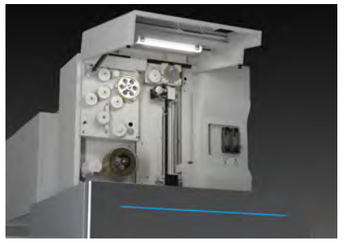
Rust-proof unit

Rust prevention



Exterior signal light

Integrated LED on the work tank front door enables operator to view the machine's operating status.

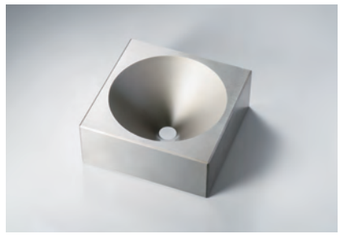


Internal lamp

LED lamp

External lamp for work tank

LED lamp

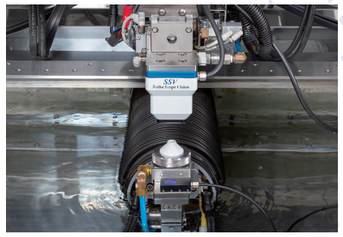


Large taper cutting

Large taper cut up to 45 degrees is available.

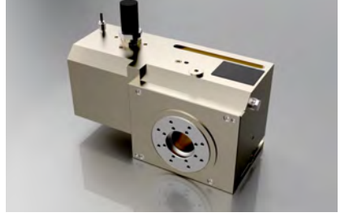
3D Level Adjust

Correction function for workpiece upper surface

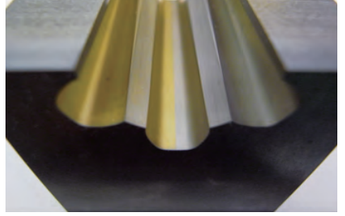


SSV

Vision measuring device using a CCD camera



Rotary Table

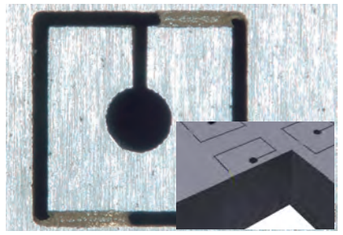


EL Coating

SF unit is required. (Specifications of Φ0.10 or more)

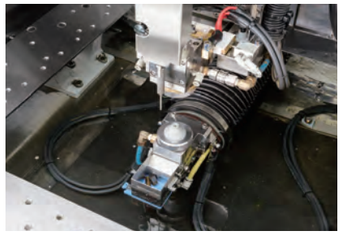
Signal lamp

Status display light (2-lamp, 3-lamp type)



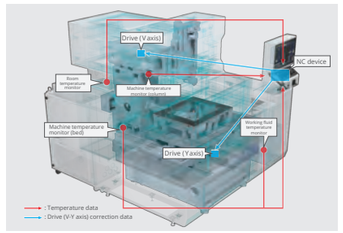
Core Stitch

Includes Core Stitch function and program conversion software for PC



Core Catch

Automatic device for core. This is used together with Core Stitch function. (Core Stitch function is necessary.)



Thermal Adjust 24

Monitors the temperature inside the machine and around the machine to compensate for thermal displacement

Inclination compensation software

Straightness of X.Y axis can be corrected.

CAM-Station

CAD/CAM software (2D data: CAD/CAM 3D data: CAM)

Optional tool set