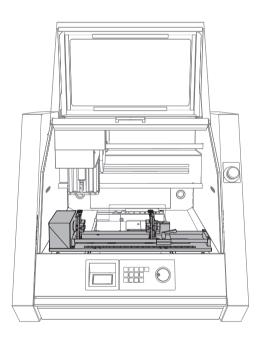


MODELA

ZCL-50

User's Manual



Thank you very much for purchasing this product.

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⚠ To Ensure Safe Use

Improper handling or operation of this machine may result in injury or damage to property. Points that must be observed to prevent such injury or damage are described as follows.

About A WARNING and A CAUTION Notices

⚠ WARNING	Used for instructions intended to alert the user to the risk of death or severe injury should the unit be used improperly.
	Used for instructions intended to alert the user to the risk of injury or material damage should the unit be used improperly.
	* Material damage refers to damage or other adverse effects caused with respect to the home and all its furnishings, as well as to domestic animals or pets.

About the Symbols

Â	The \triangle symbol alerts the user to important instructions or warnings. The specific meaning of the symbol is determined by the design contained within the \triangle symbol. The symbol on the left means "danger of electrical shock."
	The \bigcirc symbol alerts the user to items that must never be carried out (are forbidden). The specific meaning of the symbol is determined by the design contained within the \bigcirc symbol. The symbol on the left means "the unit must never be disassembled."
8-15-	The symbol alerts the user to things that must be carried out. The specific meaning of the symbol is determined by the design contained within the symbol. The symbol on the left means "the power-cord plug must be unplugged from the outlet."

⚠ Incorrect operation may cause injury



WARNING



Always unplug the power cord when attaching or removing parts and optional parts and when performing maintenance that does not require the machine to be connected to a power source.

Attempting such operations while the machine is connected to a power source may result in injury or electrical shock.



Keep children away from the machine.

The machine includes areas and components that pose a hazard to children and may result in injury, blindness, choking, or other serious accidents.



Never attempt to disassemble, repair, or modify the machine.

Doing so may result in fire, electrical shock, or injury. Entrust repairs to a trained service technician.



Be sure to follow the operation procedures described in the user's manual. Never allow anyone unfamiliar with the usage or handling of the machine to touch it.

Incorrect usage or handling may lead to an accident.



Never operate the machine while tired or after ingesting alcohol or any medication.

Operation requires unimpaired judgment. Operating the machine with impaired judgment may result in an accident.



Conduct operations in a clean, brightly lit location.

Working in a location that is dark or cluttered may lead to an accident, such as becoming caught in the machine as the result of an inadvertent stumble.

WARNING



Never attempt operation while wearing a necktie, a necklace, loose clothing, or gloves. Bind long hair securely.

Such items may become caught in the machine, resulting in injury.



Exercise caution to avoid being pinched or becoming entangled in the machine.

Inadvertent contact with certain areas may cause your hand or fingers to be pinched or become entangled in the machine. Use care when performing operations.



Be careful around the cutting tool.

The cutting tool is sharp. Broken cutting tools are also dangerous. To avoid injury, exercise caution.



Never use a cutting tool that has become dull. Perform frequent maintenance to keep the machine in good working order. Inappropriate usage may result in fire or injury.



⚠ CAUTION



Never climb or lean on the machine.

The machine is not made to support a person. Climbing or leaning on the machine may dislodge components and cause them to fall off the machine.



Never operate the machine if the cover is cracked or broken.

Doing so may result in injury. If the cover is cracked or broken, contact your authorized Roland DG Corp. dealer.

Cutting waste and workpieces are flammable and toxic.

$\hat{\mathbb{L}}$ WARNING



Never attempt to cut magnesium or any other such flammable material.

Fire may occur during cutting.



Keep open flame away from the work area.

Cutting waste may ignite. Powdered material is extremely flammable, and even metal material may catch fire.



When using a vacuum cleaner to take up cutting waste, exercise caution to prevent fire or dust explosion.

Taking up fine cuttings using an ordinary vacuum cleaner may cause danger of fire or explosion. Check with the manufacturer of the vacuum cleaner. When the safety of use cannot be determined, clean the machine using a brush or the like, without using a vacuum cleaner.

⚠ CAUTION



Wear dust goggles and a mask. Wash away any cutting waste remaining on the hands.

Accidentally swallowing or inhaling cutting waste may be hazardous to your health.

⚠ Danger of electrical short, electrical shock, or fire

$\hat{\mathbb{L}}$ WARNING



Never use the machine outside or in any location where exposure to water or high humidity may occur. Do not touch the power cord, plug, or electrical outlet with wet hands.

Doing so may result in fire or electrical shock.



Never allow any foreign object to get inside the machine. Never expose the machine to liquid spills.

Inserting objects such as coins or matches or allowing beverages to be spilled into the ventilation ports may result in fire or electrical shock. If anything gets inside, immediately disconnect the power cord and contact your authorized Roland DG Corporation dealer.



Never place any flammable object nearby. Never use a combustible aerosol spray nearby. Never use the machine in any location where gases can accumulate.

Combustion or explosion may occur.

∕!\ WARNING



Never use the machine for any purpose for which it is not intended or use the machine in an excessive manner that exceeds its capacity.

Doing so may result in injury or fire.



Never use cutting oil.

This machine is not designed for the flow of cutting oil. Oil may get inside the machine and cause fire or electrical shock.



Never use a pneumatic blower.

This machine is not compatible with a pneumatic blower. Cutting waste may get inside the machine and cause fire or electrical shock.



If sparks, smoke, burning odors, abnormal noise, or abnormal operations occur, immediately unplug the power cord. Never use the machine if any component is damaged. Continuing to use the machine may result in fire, electrical shock, or injury. Contact your authorized Roland DG Corp. dealer.



Pour utiliser en toute sécurité

La manipulation ou l'utilisation inadéquate de cet appareil peuvent causer des blessures ou des dommages matériels. Les précautions à prendre pour prévenir les blessures ou les dommages sont décrites ci-dessous.

\triangle Avis sur les \triangle avertissements

ATTENTION	Utilisé pour avertir l'utilisateur d'un risque de décès ou de blessure grave en cas de mauvaise utilisation de l'appareil.
<u> </u>	Utilisé pour avertir l'utilisateur d'un risque de blessure ou de dommage matériel en cas de mauvaise utilisation de l'appareil.
PRUDENCE	* Par dommage matériel, il est entendu dommage ou tout autre effet indésirable sur la maison, tous les meubles et même les animaux domestiques.

À propos des symboles

Le symbole △ attire l'attention de l'utilisateur sur les instructions importantes ou les avertissements. Le sens précis du symbole est déterminé par le dessin à l'intérieur du symbole △. Le symbole à gauche signifie « danger d'électrocution ».
Le symbole 🚫 avertit l'utilisateur de ce qu'il ne doit jamais faire, ce qui est interdit. Le sens précis du symbole est déterminé par le dessin à l'intérieur du symbole 🚫. Le symbole à gauche signifie que l'appareil ne doit jamais être démonté.
Le symbole prévient l'utilisateur sur ce qu'il doit faire. Le sens précis du symbole est déterminé par le dessin à l'intérieur du symbole . Le symbole à gauche signifie que la fiche du câble d'alimentation doit être débranchée de la prise.

Une utilisation incorrecte peut causer des blessures

ATTENTION



Toujours débrancher le câble d'alimentation lors de la fixation ou du retrait de pièces et de pièces en option et du nettoyage ou des travaux d'entretien qui n'exigent pas un branchement de l'appareil à une source d'alimentation.

Tenter ces opérations pendant que l'appareil est branché à une source d'alimentation peut causer des blessures ou un choc électrique.



Garder les enfants loin de l'appareil.

L'appareil comporte des parties et des composants qui présentent un danger pour les enfants et qui peuvent causer des blessures, la cécité, la suffocation ou d'autres accidents graves.



Ne jamais tenter de démonter, de réparer ou de modifier l'appareil.

Le non-respect de cette consigne peut provoguer un incendie, un choc électrique ou des blessures. Confier les réparations à un technicien ayant la formation requise.



S'assurer de suivre les procédures d'utilisation décrites dans le manuel utilisateur. Ne jamais permettre à quiconque ne connaissant pas le fonctionnement ou la manutention de l'appareil de le toucher. L'utilisation ou la manutention incorrectes peuvent causer un accident.



Ne jamais faire fonctionner l'appareil après avoir consommé de l'alcool ou des médicaments, ou dans un état de fatigue. L'utilisation de l'appareil exige un jugement sans faille. L'utilisation avec les facultés affaiblies peut entraîner un accident.



Utiliser l'appareil dans un endroit propre et bien éclairé.

Travailler dans un endroit sombre ou encombré peut entraîner un accident; l'utilisateur risque, par exemple, de trébucher malencontreusement et d'être coincé par une partie de l'appareil.



!\ ATTENTION



Ne jamais faire fonctionner l'appareil si l'on porte une cravate, un collier, des vêtements amples ou des gants. Bien attacher les cheveux longs.

Ces objets peuvent se retrouver coincés dans l'appareil, ce qui pourrait causer des blessures.



Faire preuve de prudence pour éviter l'écrasement ou le coincement dans l'appareil.

La main ou les doigts peuvent être écrasés ou coincés s'ils entrent accidentellement en contact avec certaines parties. Faire preuve de prudence lors de l'utilisation de l'appareil.



Être attentif dans le périmètre de l'outil de coupe.

L'outil de coupe est acéré. Les outils de coupes brisés sont aussi dangereux. Faire preuve de prudence pour éviter les bles-



Ne jamais utiliser un outil de coupe émoussé. Procéder fréquemment aux travaux d'entretien pour garder l'appareil en bon état de fonctionnement.

L'usage inapproprié peut causer un incendie ou des blessures.



PRUDENCE



Ne jamais grimper ni s'appuyer sur la machine.

La machine n'est pas conçue pour supporter le poids d'une personne. Grimper ou s'appuyer sur la machine peut déplacer des éléments et causer un faux pas ou une chute, ce qui causerait des blessures.



Ne pas utiliser si un couvercle avant est fissuré ou brisé.

Le non-respect de cette consigne peut provoquer des blessures. Si le couvercle est fissuré ou brisé, communiquer avec le représentant Roland DG autorisé.



🗥 Les rebuts et morceaux de la coupe sont inflammables et toxiques.

ATTENTION



Ne jamais tenter de couper du magnésium ni aucun autre matériau inflammable.

Un incendie peut se produire pendant la



Garder toute flamme nue loin de l'espace de travail.

Les rognures de coupe peuvent s'enflammer. Les matériaux pulvérisés sont extrêmement inflammables. Les matériaux métalliques peuvent également s'enflammer.



Si un aspirateur est utilisé pour ramasser les rognures de coupe, faire preuve de prudence pour empêcher que la poussière s'enflamme ou explose.

Ramasser des rognures fines à l'aide d'un aspirateur ordinaire peut créer un risque d'incendie ou d'explosion. Vérifier auprès du fabricant de l'aspirateur. Dans les cas où il est impossible de déterminer si un aspirateur peut être utilisé sans danger, nettoyer l'appareil à l'aide d'une brosse ou d'un article semblable plutôt que d'un aspirateur.

PRUDENCE



Porter des lunettes de protection et un masque. Rincer toutes les rognures de coupe qui pourraient rester collées aux mains.

Ingérer ou respirer accidentellement des rognures de coupe peut être dangereux pour la santé.

A Risque de court-circuit, d'électrocution ou d'incendie

ATTENTION



Ne jamais utiliser l'appareil à l'extérieur ni à un endroit où il risque d'être exposé à l'eau ou à une forte humidité. Ne pas toucher le câble d'alimentation, la fiche ou la prise électrique avec des mains mouillées.

Le non-respect de cette consigne peut provoquer un incendie ou un choc électrique.



Ne jamais insérer d'objet étranger dans l'appareil. Ne jamais exposer l'appareil aux déversements de liquides.

L'insertion d'objets comme des pièces de monnaie ou des allumettes ou le déversement de liquides dans les orifices de ventilation peuvent causer un incendie ou un choc électrique. Si un obiet ou du liquide s'infiltre dans l'appareil, débrancher immédiatement le câble d'alimentation et communiquer avec le représentant Roland DG autorisé.



Ne jamais placer d'objet inflammable à proximité de l'appareil. Ne jamais utiliser de produit inflammable en aérosol à proximité de l'appareil. Ne jamais utiliser l'appareil dans un endroit où des gaz peuvent s'accumuler.

Une combustion ou une explosion peuvent se produire.

ATTENTION



Ne jamais utiliser l'appareil à des fins autres que celles pour lesquelles il est conçu. Ne jamais l'utiliser de manière abusive ou excessive.

Le non-respect de cette consigne peut provoguer des blessures ou un incendie.



Ne jamais utiliser d'huile de coupe.

Cet appareil n'est pas conçu pour traiter l'huile de coupe. L'huile peut s'infiltrer à l'intérieur de l'appareil et causer un incendie ou un choc électrique.



Ne jamais utiliser d'air sous pression.

Cet appareil n'est pas conçu pour être nettoyé à l'aide d'un appareil soufflant. Des rebuts de coupe peuvent s'infiltrer à l'intérieur et causer un incendie ou un choc électrique.



S'il se produit des étincelles, de la fumée, une odeur de brûlé, des bruits inhabituels ou un fonctionnement anormal, débrancher immédiatement le câble d'alimentation. Ne jamais utiliser l'appareil si un composant est endommagé.

Continuer à utiliser l'appareil peut causer un incendie, un choc électrique ou des blessures. Communiquer avec le représentant Roland DG Corp. autorisé.

Important Notes on Handling and Use

This machine is a precision device. To ensure the full performance of this machine, be sure to observe the following important points. Failure to observe these points may not only result in loss of performance but may also cause malfunction or breakdown.

This machine is a precision device.

- > Handle this machine carefully and never subject it to impacts or excessive force.
- > Carefully clean away cutting waste.
- > Use this machine within the range of its specifications.
- > Never attempt to move the A axis by hand with undue force.
- Never needlessly touch anywhere inside the machine except for locations specified in this document.

Install this machine in a suitable location.

- > Install this machine in a location that meets the specified conditions for temperature, humidity, and the like.
- > Install this machine in a quiet, stable location offering good operating conditions.
- > Never install this machine outside.
- > Never use this machine in an environment where silicone substances (oil, grease, sprays, etc.) are present. Doing so may cause poor switch contact.

This machine becomes hot.

- > Never cover this machine with cloth or a similar object or cover the gaps with tape.
- > Install this machine in a well-ventilated location.

About tool burs

- > Use an appropriate tool bur that matches the workpiece and the cutting method.
- > The tip of the tool bur is breakable. Handle the tool bur with care, being careful not to drop it.

About This Machine

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Features of This Machine

This machine is an optional unit for adding an A axis to the MODELA from DGSHAPE Corporation. Attaching this machine to the cutting machine makes it possible to use an A axis (rotary axis) in addition to the X, Y, and Z axes, which enables multiple-surface cutting such as "rotary processing" and "double-sided processing."

Installable Model

For the latest information on this machine, see the DGSHAPE Corp. website (http://www.dgshape.com/).

MODELA MDX-50

Organization of the User's Manual

Installation and operation of this unit require prior knowledge of the handling and operation of the cutting machine. Before you read this document, be sure to familiarize yourself with the handling and operation of the cutting machine. This document describes the items shown below. For any items not described in this document, see the manual included with the cutting machine.

- ➤ How to install the machine
- > How to adjust and perform maintenance for the machine
- Explanations of functions added by the machine

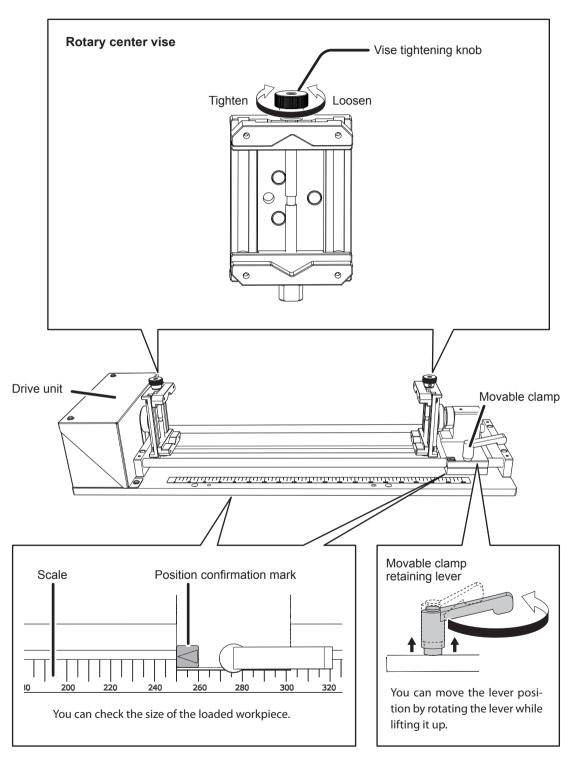
Operating the Machine

After you attach this machine to the cutting machine, you can use the built-in panel and VPanel to operate this machine. For details on the built-in panel and VPanel that are not explained in this document, see the cutting machine's user's manual.

Part Names

External View





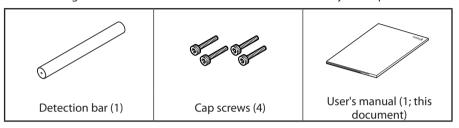
Installation and Basic Operation

Machine	Installation	.18
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	Manual Feed of the A Axis (VPanel)	25

Sudden movement of the machine may cause injury or burns.

Step 1: Checking the Included Items

The following items are included with the machine. Make sure they are all present and accounted for.



Step 2: Preparing the Cutting Machine

ACAUTION

If a rotary axis unit is attached, temporarily switch off the cutting machine's power supply.

Failing to do so may result in sudden movement of the cutting machine, causing the hands or fingers to become caught and resulting in injury.

Procedure

- Check that the cutting machine has been set up.

 Finish installing the cutting machine, installing the software, and connecting the cutting machine to the computer.
- If a tool bur has been attached to the cutting machine, return the tool bur to the magazine.
- 6 Clean inside the cutting machine.

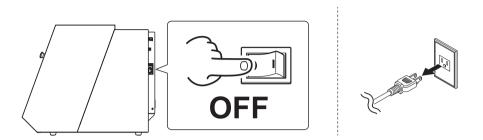
 Before installing this machine, clean away any cutting waste from inside the cutting machine and any debris from the installation surface. Any foreign matter that becomes caught between components may reduce the machine's accuracy.
- Move the spindle to the leftmost position and the table to the frontmost position.
- Turn off the cutting machine, and then unplug the power cord.

43

BASIC

Important

At this point in time, be sure to turn off the power and unplug the cord. Connecting to this machine while the cutting machine is on may cause malfunctions.



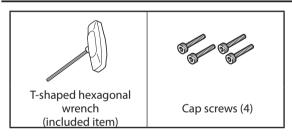
Step 3: Attaching This Machine to the Cutting Machine

ACAUTION

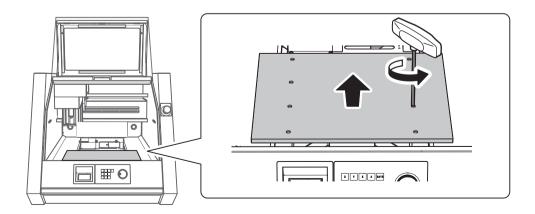
When attaching the rotary axis unit, exercise caution to prevent it from dropping.

Failing to do so may result in injury.

Required Items



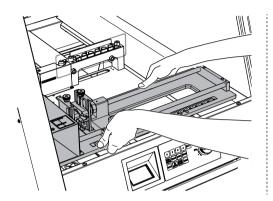
- 1. Remove the table, and then attach the rotary axis unit.
- Remove the table from the cutting machine. (8 locations)



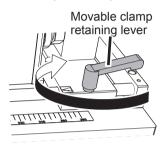
2 Attach the rotary axis unit.

Hold this machine and load it inside the cutting machine as shown in the following figure. Check that no cutting waste has adhered to

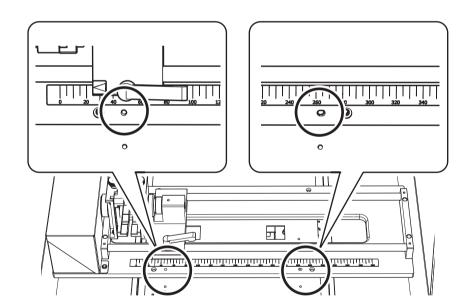
the installation surfaces of the cutting machine and the rotary axis unit.



Turn the movable clamp retaining lever to attach the rotary axis unit with the movable clamp secured in place.

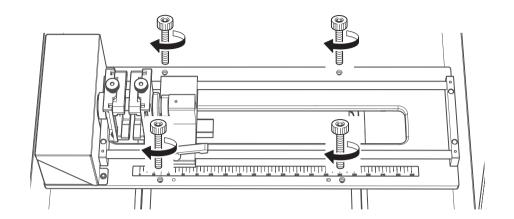


Align the positioning protrusions.



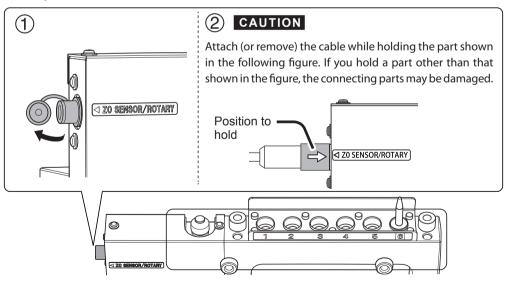
Use cap screws to secure the rotary axis unit in place. (4 locations)

Tightening the screws temporarily and then tightening them fully makes it easier to attach the rotary axis unit.



- 2. Connect the cable.
- 1 Check that the cutting machine is off.
- 2 Connect the rotary axis cable.
 - (1) Remove the protective "Z0 SENSOR/ROTARY" cap.
 - 2 Connect the rotary axis cable.

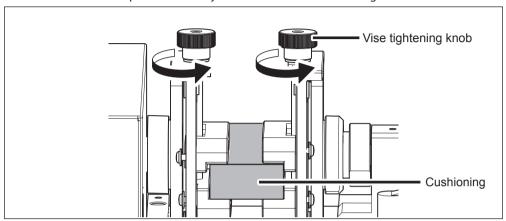
Orient the cable so that its arrow mark is as shown in the following figure, and then insert the cable until you hear it click.



3. Remove the vise cushioning.

Loosen the vise tightening knobs. (2 locations)

Loosen the vises to a position where you can remove the cushioning.



- Remove the cushioning.
 This completes the installation of this machine.
- 4. Turn on the cutting machine.
 - **1** Connect the power cord, and then switch on the cutting machine's power switch. This enables A-axis operation.

Step 4: Performing Automatic Correction

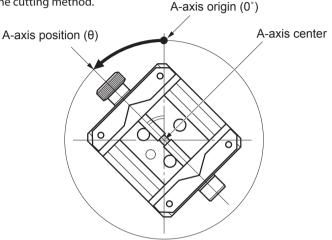
When you perform automatic correction on this machine, the Y- and Z-axis origins are automatically set to a position at the center of rotation.

P. 43, "Rotary Axis Position Correction"

Basic Operation of This Machine

About the A-axis Coordinate

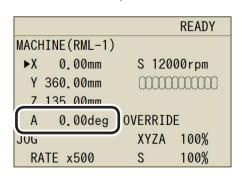
The position of the A axis is indicated as an angle of rotation. In this way it differs from how the X, Y, and Z axes are indicated (as distances). Despite this difference between angles and distances, in other respects it is treated the same as X-, Y-, and Z-axis coordinates. As with any of the other axes, you can freely set the position of the origin (despite it being an "angle" and not a "point," here it is treated as a "point") and select the coordinate system. It is most common to align the Y- and Z-axis origins with the center of the A axis, although this may vary according to the cutting method.



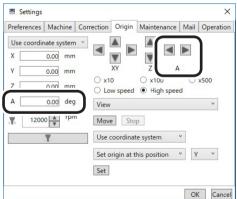
A-axis Display on the Operation Screen

When the rotary axis unit is installed, you can operate the A axis in the same manner as the X, Y, and Z axes from the built-in panel and from VPanel. The unit of measurement used to indicate A-axis coordinates is the degree, and this cannot be changed. The unit is expressed as "deg," which indicates "1°."





VPanel



A-axis Operating Range

The A-axis operating range is $\pm 2146680.000^{\circ}$ (approximately ± 5963 rotations). Infinite turning is not possible.

Manual Feed of the A Axis (Built-in Panel)

In the same manner as the X, Y, and Z axes, you can rotate the A axis by turning the hand-wheel. You can also select the level of rotation detail. You cannot operate this axis when the front cover or dust box cover is open or during cutting.

AWARNING

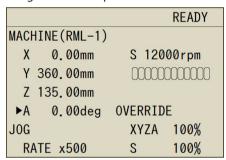
This procedure makes the machine operate.

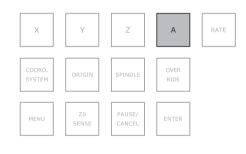
Before you perform this procedure, check to make sure that operation of the machine will not create any hazard or danger.

Procedure

- Press [MENU] several times to display the following screen.
- 2 Press [A].

The ▶ lights at the "A" position.





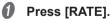
3 Turn the hand-wheel.

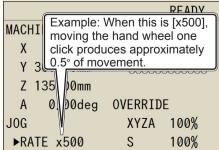
The A axis rotates.

Changing the Hand-wheel's Rotation Steps

You can set the number of steps of rotation for each click of the hand wheel. On the A axis, one step is 0.01 degrees. For instance, when this is [x100], moving the hand wheel one click produces approximately 1 degree of rotation. Lower scaling factors produce correspondingly lower amounts of rotation, enabling you to set the angle precisely.

Procedure



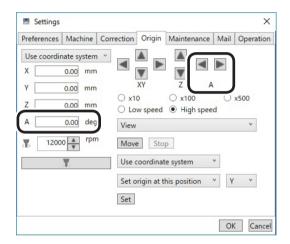


Manual Feed of the A Axis (VPanel)

You cannot operate this axis when the front cover or dust box cover is open or during cutting.

Procedure

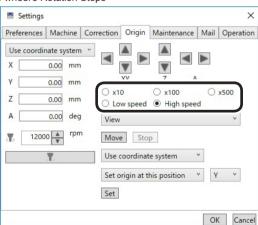
- Olick and then the [Origin] tab.
 The VPanel "Origin" tab appears.
- 2 Click or .
 The A axis rotates.



Changing the Rotation Steps

You can set the number of steps of rotation for each click.

P. 24, "Changing the Hand-wheel's Rotation Steps"



Cutting

Cutting.		28
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	Y- and Z-axis Origins: Concepts and Configuring Settings from This Machine	37
	Fine-tuning the Y- and Z-axis Origins	37
	How to Obtain the "Displacement Amount" of the Y- and Z-axis Coordinates	40

!WARNING

Do not inadvertently touch the computer or the operating panel while performing this task.

Unintended operation of the machine may lead to you being caught in the machine.

Step 1: Correcting the Rotary Axis Position

In the situations listed under "Situations When This Work Is Required" below, correct the rotary axis position. In other situations, continue to step 2.

P. 43, "Rotary Axis Position Correction"

Situations When This Work Is Required

- > When using this machine for the first time
- ➤ When reattaching the rotary axis unit
- ➤ When the position is misaligned

Step 2: Checking the Size of the Workpiece (Material) to Load

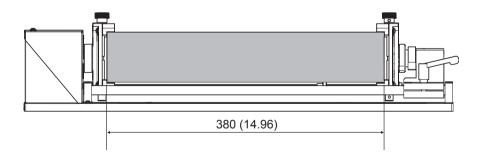
There are limitations to the size of the workpieces that you can load on this machine. If you exceed these limitations, it will not be possible to rotate the workpiece, which may lead to workpiece damage or machine malfunctions.

The Size of Workpieces That Can Be Loaded in the Vise

➤ Unit: mm (inches)

Length

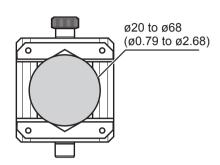
The maximum length is 380 mm (14.96 in.).



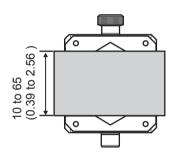
Cross-section

For workpieces that are larger than the size shown in the following figure, cut or otherwise process the tips of the workpieces before loading them in the vise.

Round workpiece



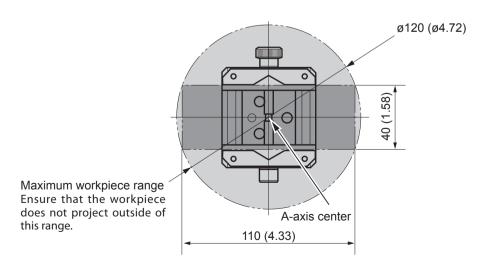
Square workpiece



Rotatable Workpiece Size

Attach workpieces so that they do not protrude past 60 mm (2.36 in.; diameter: 120 mm [4.72 in.]) from the center of the A axis. If you exceed this value, it will not be possible to rotate the workpiece due to the interference of the table and similar parts. For example, with a square workpiece having a height of 40 mm (1.57 in.), the maximum depth is 110 mm (4.33 in.).

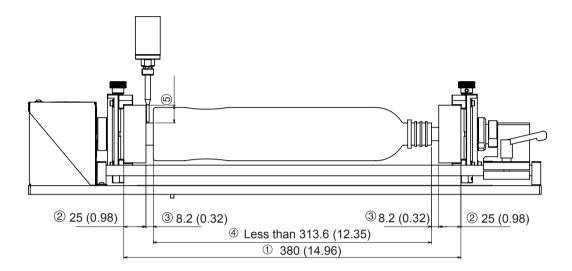
➤ Unit: mm (inches)



29

Actual Length That Can Be Cut

Room to secure both ends of the workpiece with the center vise, a margin for cutting with the tool bur, and room for finishing are all required. Cutting the full size of the workpiece is not necessarily possible. Refer to the figure below to check the size of the model that you want to cut and the corresponding required workpiece size. > Unit: mm (inches)



- (1) Maximum length of the workpiece that can be loaded on the rotary axis
- (2) Margin for grasping the workpiece

To prevent interference between the spindle and the workpiece chuck, this is set to 25 mm (0.98 in.) in SRP Player.

(3) Margin for cutting both ends of the model

This varies depending on the thickness of the tool bur being used. When using a tool bur with a diameter of 6 mm (0.24 in.), room for finishing must be included, which means that approximately 8.2 mm (0.32 in.) is required.

(4) Data size that can actually be cut

This varies depending on values (1) to (3).

5 Cutting depth

Select a tool bur that has a blade that is longer than this value.

Step 3: Checking the Tool Bur Length

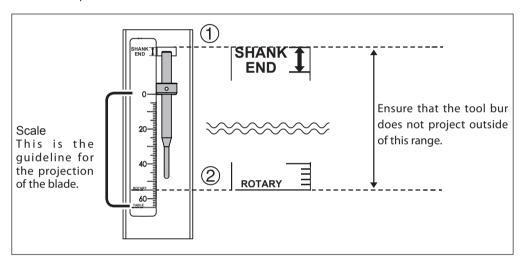
For details on how to install tool burs, see the user's manual included with the cutting machine.

Tool Bur Loading Position When the Rotary Axis Is Installed

- 1 Pass the tool bur through the tool holder with the orientation shown in the following figure and ensure that the shank part is within the range indicated with "SHANK END."
- (2) Load the tool bur such that it does not extend past the "ROTARY" line.

CAUTION

If the tool bur extends past the ROTARY line, the tool bur may interfere with the vise knob or with the workpiece to rotate.

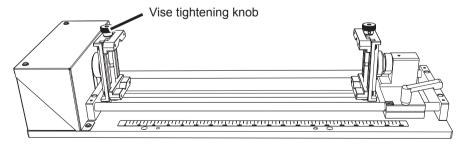


Step 4: Loading the Workpiece

Procedure

Use manual feeding to move the tightening knob of the rotary center vise to the upper surface.

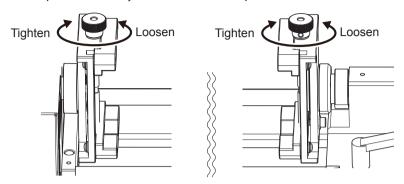
P. 24, "Manual Feed of the A Axis (Built-in Panel)"



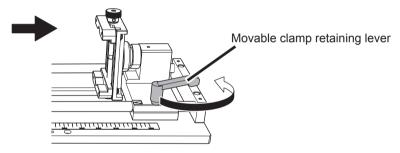
Open the front cover.

3 Loosen the vise tightening knobs. (2 locations)

Loosen the vises to a position where you can load the workpiece.

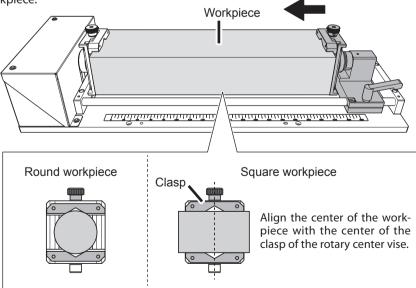


Loosen the movable clamp retaining lever, and then move the movable clamp to the right edge.



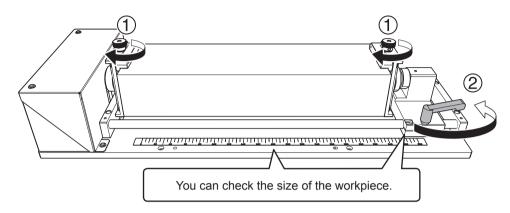
6 Load the workpiece.

Press the workpiece against the left-side vise, and then move the movable clamp to the left to grasp the workpiece.



- 6 Secure the workpiece in place.
 - 1 Tighten the vise tightening knobs. (2 locations)
 - 2 Tighten the movable clamp retaining lever.

Secure the workpiece in place firmly so that it doesn't slip or wobble.



- Close the front cover.
- Press [ENTER].

Step 5: Setting the X-axis Origin

When you perform automatic correction with this machine, the center of the A axis is detected. The Y- and Z-axis origins are automatically set to the detected A-axis center. If you set the X-axis origin to match the settings of the software being used, you can perform cutting.

P. 37, "Y- and Z-axis Origins: Concepts and Configuring Settings from This Machine"

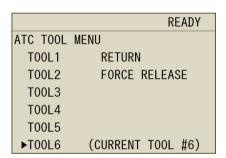
Important

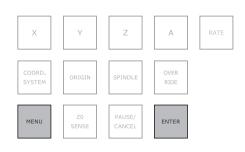
When you are using SRP Player, set the X-axis origin to the right edge of the workpiece as seen from the front.

Procedure

- Select and retain the tool bur.
 - 1 Press [MENU] several times to select "ATC Tool Bur."
 - (2) Turn the hand-wheel to select the tool bur to retain.
 - (3) Press [ENTER].

The machine operates, and the tool bur is retained. Press [MENU] several times to return to the top window.

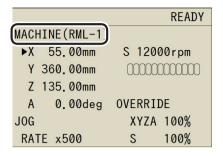


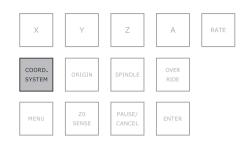


- Move the tool bur to the position where you want to set the origin.
- Press [COORD. SYSTEM] several times to select the coordinate system.
 When using SRP PLAYER, which is included with this machine: Select "Use coordinate system." Check the coordinate system on the screen of the built-in panel.

CAUTION

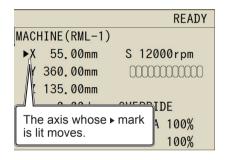
- If you select "Machine coordinate system," you will not be able to set the origins.
- If you are using an application that uses NC codes, switch the command set from "RML-1" to "NC code."
- User's manual, "NC code setting" Dialog Box

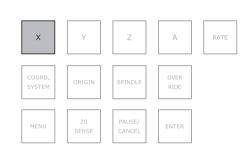




 ${\it Q}$ Press the button corresponding to the axis whose origin you want to set.

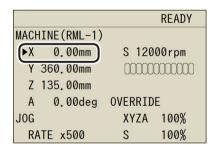
Check that ▶ is displayed next to the axis whose origin you want to set.

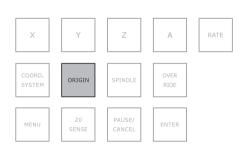




Hold down [ORIGIN].

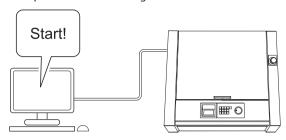
This sets the origin. When the origin is set, its coordinate value becomes "0."





Step 6: Starting Cutting

Check that all the preparations and origin settings required for cutting have been completed, and then send the cutting data from the computer and start cutting.



* For details on how to create cutting data, see the user's manual of the application used to create the cutting data.

Resuming Operation after an Emergency Stop

When the operation resumes, the initial operations are performed on the cutting machine. At this time, the tool bur and the workpiece may collide depending on the positions in which the tool bur and workpiece stopped, which can cause damage to the machine while restarting.

For information on how to resume operation, see the user's manual of the cutting machine and the details displayed with the error message on the built-in panel or in VPanel.

Y- and Z-axis Origins: Concepts and Fine-tuning

Y- and Z-axis Origins: Concepts and Configuring Settings from This Machine

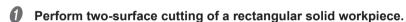
When cutting with the rotary axis, it is common to set the Y- and Z-axis origins to the center of the A axis (the center of the rotary axis). This is because rotating the A axis changes the positional relationship between the workpiece and the origins, making it impossible to know the reference position for cutting.

On this machine, the center of the A axis is detected when the jig (rotary center vise) position is detected. The machine is also designed to set the origins for the Y and Z axes at the detected center of the A axis. You can set the Y- and Z-axis origins to the center of the A axis by configuring the settings according to the procedure described in P. 43, "Rotary Axis Position Correction".

Fine-tuning the Y- and Z-axis Origins

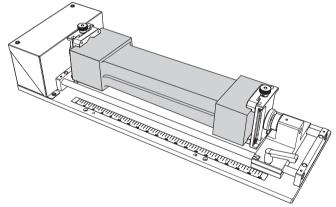
Use the method described below to make even more precise adjustments to the center position of the A axis.

Procedure

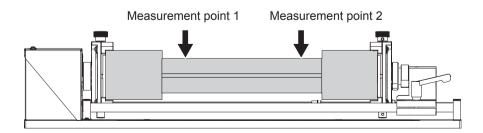


The purpose of the cut object to be created is to check the amount of Y-axis and Z-axis coordinate displacement. Instead of using a workpiece with a complicated shape, it is better to use a workpiece with a simple shape, with which can be cut from both the upper and lower surfaces as shown in the following diagram.

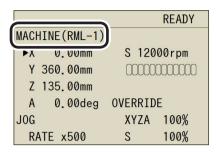
After cutting is finished, do not detach the workpiece from the rotary center vise.

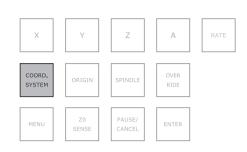


As shown in the following diagram, determine and mark two arbitrary measurement points on the same surface of the workpiece.

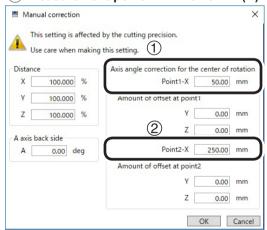


- 3 Set the coordinate system to "MACHINE."
 - 1 Press [MENU] several times to display the following screen.
 - (2) Press [COORD.SYSTEM] to select "MACHINE."





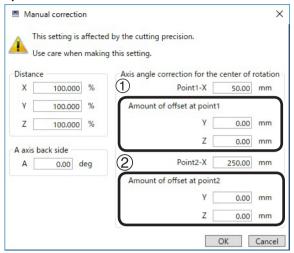
- Move the tool bur above measurement point 1, and then record the value of the X-axis coordinate. Move the tool bur above measurement point 2, and then record the value of the X-axis coordinate.
- 6 Remove the workpiece.
- In VPanel, click, the [Correction] tab, and then click [Manual correction].
 The "Manual correction" dialog box appears.
- Enter the X-axis coordinates at measurement points 1 and 2 that you recorded in step 4.
 - ① Measurement point 1 → "Point1-X" (A)
 - (2) Measurement point 2 → "Point2-X" (D)



Measure how much the Y- and Z-axis coordinates are displaced at measurement points 1 and 2, which you marked in step 2.

For details on how to measure the displacement amount, see P. 40, "How to Obtain the "Displacement Amount" of the Y- and Z-axis Coordinates".

Enter the displacement amounts of the Y- and Z-axis coordinates at measurement points 1 and 2.

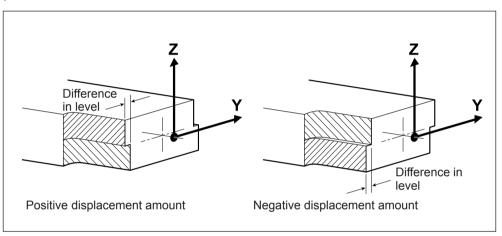


Click [OK].

How to Obtain the "Displacement Amount" of the Y- and Z-axis Coordinates

Y-axis Origin Displacement Amount

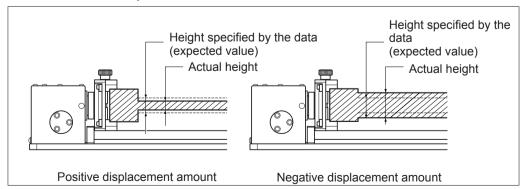
You determine the displacement amount from the difference in levels at the seam produced between the first and second surfaces in two-surface cutting. The estimated displacement amount is one-half the difference in levels. However, be careful to note the sign of the value (plus or minus). As the figure shows, the sign of the displacement amount (positive or negative) changes depending on the direction of the misalignment. As an example, when the difference in levels is 0.2 millimeters (0.008 in.) with the upper level misaligned in the positive direction and the lower level misaligned in the negative direction along the Y axis, the estimated displacement amount is -0.1 millimeters (0.004 in.).



Z-axis Origin Displacement Amount

You determine the displacement amount from the discrepancy between the expected (the height specified by the data) and actual values for the thickness of the finished result of two-surface cutting. The estimated displacement amount is one-half the difference. However, be careful to note the sign of the value (plus or minus). When the actual value is larger than the expected value (the height specified by the data), the displacement amount is negative.

As an example, if data for a height of 50 millimeters (1.97 in.) yields cutting results that are 50.1 millimeters (1.97 in.), the estimated displacement amount is -0.05 millimeters (0.002 in.).



Maintenance and Troubleshooting

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Daily Maintenance

Maintenance Precautions

∴WARNING Never use a pneumatic blower.

This machine is not compatible with pneumatic blowers. Cutting waste may

get inside the machine and cause fire or electrical shock.

∴WARNING Never use a solvent such as gasoline, alcohol, or thinner to perform

cleaning.

Doing so may cause fire.

∴WARNING Always unplug the power cord when attaching or removing parts and

optional parts and when performing maintenance that does not require

the machine to be connected to a power source.

Attempting such operations while the machine is connected to a power source

may result in injury or electrical shock.

. WARNING When using a vacuum cleaner to take up cutting waste, exercise caution

to prevent fire and explosions of dust.

Taking up fine cuttings using an ordinary vacuum cleaner may result in fire or explosion. Check with the manufacturer of the vacuum cleaner. When the safety of use cannot be determined, clean the machine using a brush or the

like, without using a vacuum cleaner.

ACAUTION Caution: High Temperature

The cutting tool and spindle motor become hot. Exercise caution to avoid fire

or burns.

ACAUTION Be sure to remove the cutting tool before performing maintenance.

Contact with the blade may result in injury.

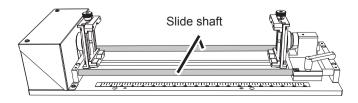
- This machine is a precision device. Carry out daily care and maintenance.
- Carefully clean away cutting waste. Operating the machine with a large amount of cutting waste present may cause malfunctions.
- Never use oils, greases, sprays, or similar substances that contain silicone. Doing so may cause poor switch contact.
- Never apply lubrication.

Cleaning after Cutting Finishes

After cutting finishes, clean the machine using a commercially available brush or dust collector. Slide shaft

Care of the Slide Shaft, Detection Pin, and Detection Bar

Use the cloth for care (included with the cutting machine) to carry out daily care for the detection pin. The presence of rust or grime on the detection pin or detection bar makes accurate detection impossible, which in turn may make it impossible to perform cutting as intended, and may even damage the machine.





Periodic Maintenance

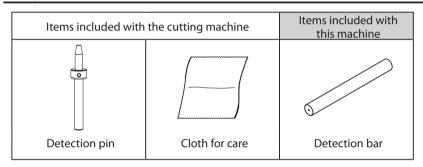
Rotary Axis Position Correction

The accuracy of the cutting machine may change if it is used for a long period of time or the surrounding environment changes. Performing automatic correction will correct the rotary axis position.

Situations in Which to Perform This Work

- > When using this machine for the first time
- ➤ When reattaching the rotary axis unit
- > Performing this work periodically as maintenance (due to mechanical misalignment being caused by factors such as temperature changes)

Required Items



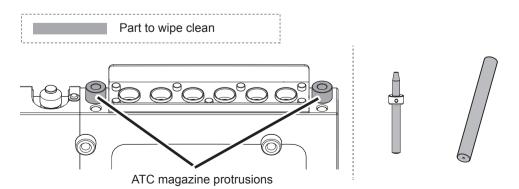
∴WARNING

Do not inadvertently touch the computer or the operating panel while performing this task.

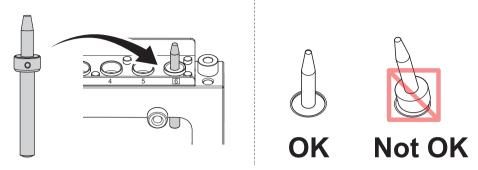
Unintended operation of the machine may lead to you being caught in the machine.

- 1. Install the detection pin.
- Clean off any cutting waste from inside the cutting machine.
- 2 Use the cloth for care to wipe clean the ATC magazine protrusions (see the following figure), the detection pin, and the detection bar.

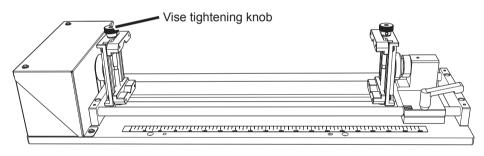
If any dirt is present in these locations, it may not be possible to perform the correction properly.



Load the detection pin in the ATC magazine's number 6 position.

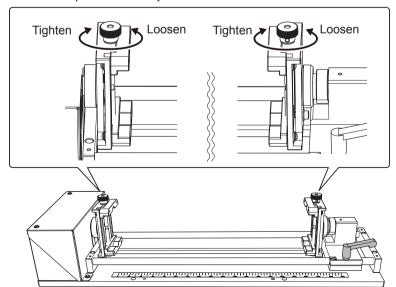


- 2. Attach the detection bar to the rotary center vise.
- Use manual feeding to move the tightening knob of the rotary center vise to the upper surface.
 - P. 24, "Manual Feed of the A Axis (Built-in Panel)"

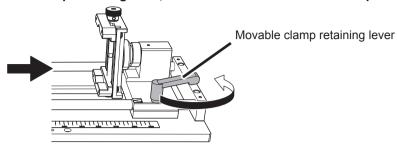


- Open the front cover.
- **3** Loosen the vise tightening knobs. (2 locations)

 Loosen the vises to a position where you can load the detection bar.

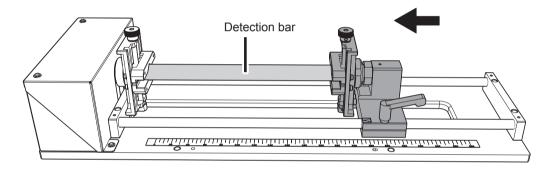


Loosen the movable clamp retaining lever, and then move the movable clamp.



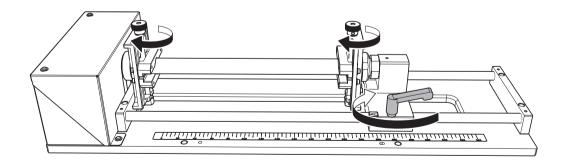
6 Attach the detection bar to the rotary center vise.

Press the detection bar against the left-side vise, and then move the movable clamp to the left to grasp the detection bar.



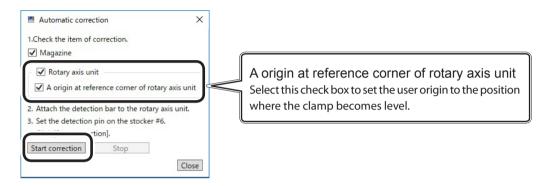
- 6 Secure the detection bar in place.
 - 1) Tighten the vise tightening knobs. (2 locations)
 - 2 Press the movable clamp against the detection bar, and then tighten the movable clamp retaining lever.

Secure the detection bar in place firmly so that it doesn't slip or wobble.



- Close the front cover.
- Press [ENTER].

- 3. Perform automatic correction.
 - Start VPanel.
 - Click, the [Correction] tab, and then click [Automatic correction].
 The VPanel "Automatic correction" dialog box appears.
 - Select the [Rotary axis unit] check box, and then click [Start Correction].



Automatic correction starts.

When the window shown in the figure appears, click [OK].



- **3** Return the detection pin to the ATC magazine.
- 6 Remove the detection bar.

The Machine Doesn't Run

Is the cable connected correctly?



Make sure the cable is connected securely. Also, be sure to make the cable connection while the cutting machine power is switched off. Turn off this machine, and then make sure the cable is connected securely.

The Cutting Position Is Not as Intended/Differences in Levels Occur at Seams in Multiple-surface Cutting

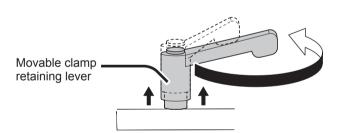
Have the origins been set correctly?



When you perform automatic correction, the Y- and Z-axis origins are automatically set to the center of the A axis. If you change the origins from this point, the cutting position will be displaced in multiple-surface cutting.

The Movable Clamp Retaining Lever Interferes with the Rotary Center Vise

You can move the lever position by rotating the lever while lifting it up.



4

Troubleshoot

Specifications

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NC Code Specifications

Items Related to the Machine's Mechanical Specifications

This section describes the NC codes that are dependent on the machine's mechanical specifications.

"NC Code Reference Manual"

Dimension word (A)

Dimension word A becomes available when this machine is installed. You can also specify all four dimensions (X, Y, Z, and A) in a single block (simultaneous four-axis feed).

A-axis coordinate range (a)

The range for parameter a is as follows. Parameter a is used for positioning (G00), linear interpolation (G01), data setting (G10), and the coordinate system (G92). The unit of measurement for angles is 0.001 degrees when no decimal point is used and is degrees when a decimal point is used.

Parameter: a

Acceptable range: ±2146680.000 Valid range: Maximum cutting area

A-axis feeding speed (F)

The valid parameter range for F is 7 to 3000 mm/min (0.28 to 118 in./min) regardless of whether the A axis is present. Note that the feeding speed for the A axis is also specified as millimeters (or inches) per minute. The actual speed of rotation is determined by the specified F code and the tool bur position, but cannot exceed the machine's operating speed (15 rpm).

A-axis Movement Commands and Actual Operation

The A-axis operating range is $\pm 2146680.000^\circ$. Angles of 360° or higher are recognized during execution of a single NC program. For example, executing an absolute specification of G01A720.0 performs two full rotations. Also, executing G01A0.0 performs two rotations in reverse. Note, however, that the coordinate display in VPanel is from 0 to 359.99°. The display of any angle of 360° or higher is truncated.

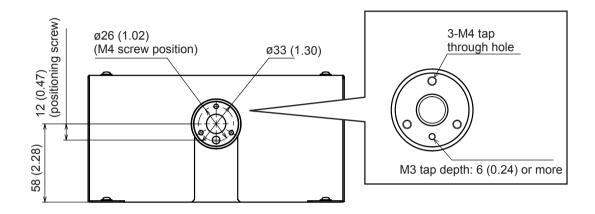
When the execution of the NC program completes and when the machine is on standby (that is, during manual feeding), angles of 360° or higher are truncated. For example, if an NC program completes at an A-axis coordinate position of 750° and then operations are performed to move to the A-axis coordinate of 0° by way of manual feeding, the machine performs a reverse rotation of just 30°, not 750°.

Unit Specifications

Dimensional Drawings

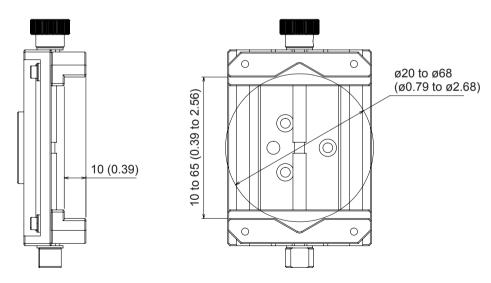
Rotary Axis Unit

Unit: mm (inch)



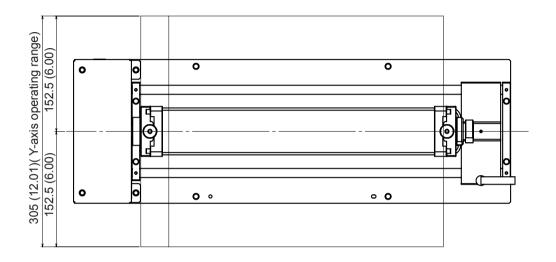
Rotary Center Vise

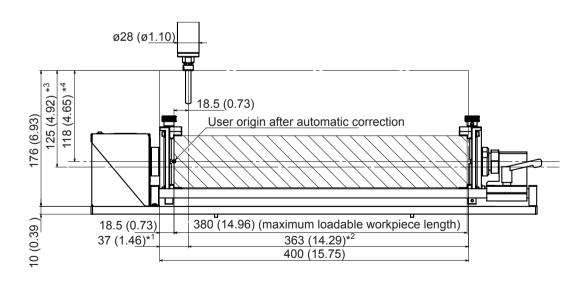
Unit: mm (inch)



MDX-50 Equipped

Unit: mm (inch)





- *1: When using a rotary axis, this cannot be moved to the area up to 37 mm (1.46 in.) from the left in order to prevent interference between the tool bur and vise.
- *2: X-axis operating range when the rotary axis is attached)
- *3:Z-axis operating range
- *4:rotary axis center position

Specifications

	ZCL-50
Cuttable material	Chemical wood and resins such as modeling wax (metal not supported)
Operating range	X, Y, Z: 363 (37 to 400 (1.46 to 15.75 in.) with machine coordinates) \times 305 \times 125 mm (14.29 \times 12.01 \times 4.92 in.) A: \pm 2146680° (approximately \pm 5963 rotations)
Loadable workpiece size	Items within the range of a 60 mm (2.36 in.) radius from the center of rotation by a length of 380 mm (14.96 in.)
Workpieces that can be secured by the rotary center vise	Thickness: 10 to 65 mm (0.39 to 2.56 in.) or diameter of 20 to 68 mm (0.79 to 2.68 in.)
Operating speed	A: Maximum 15 rpm
Mechanical resolution	0.0225°/step (half step)
External dimensions	Width \times depth \times height: 578 \times 190 \times 128 mm (22.76 \times 7.48 \times 5.04 in.)
Weight	7 kg (15.43 lb.)
Included items	Detection bar, cap screws, user's manual, etc.

MEMO