NATIONAL OPTRONICS

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User Manual

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EDGER
User Manual

September, 2022 Rev. 2.00

Warnings, Cautions, and Notes as Used in this Publication

WARNING  

Warning notices are used in this publication to emphasize that hazardous voltages, sharp edges, or other conditions that could cause personal injury exist in this equipment, or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

CAUTION 

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance.

Safety Reminders

- DO NOT operate this machine until you have read and understood this manual. If operating for the first time, ask your supervisor or a qualified operator for help.
- DO NOT attempt to bypass or circumvent the built-in safety features -- the safety switches on the operator door and hood, and the debris collection adapter. They are in place for operator protection. Any alteration, removal or damage can cause a serious safety hazard. Doing so will void your warranty.
- This product is not intended to be used in an explosive environment.

ROTATING CUTTERS CAN CAUSE SERIOUS INJURY.
USE EXTREME CAUTION WHEN WORKING NEAR THE CUTTERS.

- Plug unit into a grounded receptacle ONLY! Do not cut off the ground prong or use any cord or adapter without a ground prong.
- Use only detachable mains supply cords that are adequately rated for the edger and the installation supply voltage. Do not use inadequately rated detachable mains supply cords.
- Always assume that the power is ON. Do not attempt any cutter change or maintenance until you have verified it is OFF by disconnecting the machine from mains power. Unplug the power cord from the machine to disconnect it from mains power. Do not position the machine in such a way that it is difficult to operate the power switch or unplug the power cord.
- Maintenance and service, with the exception of daily cleaning, must only be performed with the power cord unplugged from the machine to disconnect it from mains power.
- Maintenance and service requiring access to the internal mechanism of the machine, with the exception of daily cleaning, must only be performed by properly trained personnel.
- When changing cutters or tools, always make sure that the clamping screw(s) are tight before starting the machine.
- Never turn the machine or the cutter motor on while someone is performing maintenance or repair.
- Always wear safety glasses with side shields when servicing the machinery.
- Never operate this machine while on medication which may affect sight or coordination.
- Wear appropriate hearing protection while operating the edger. Long term exposure to noise created by the edger and vacuum can cause hearing damage. It is recommended that the user measure the sound pressure level at the operator's position in normal use and at whatever point 1m from the enclosure of the equipment has the highest sound pressure level.
- The edger should be lifted very carefully by two people. Before attempting to move or lift the machine, ensure that all connections (electrical, communications, and vacuum) have been disconnected from the edger. To lift the edger, each person should carefully lift the edger from the bottom of each edge, using both hands. Hand holds are provided in the front corners of the edger base, along with a cutout in the center of the back of the base for ease of gripping.

THINK SAFETY FIRST—ALWAYS PRACTICE SAFE WORK HABITS.

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Content of This Manual

Chapter 1. **Before You Begin:** Includes requirements for use such as electrical supply and operating conditions, and general specifications of the edger system.

Chapter 2. **Getting Started:** Includes instructions on initial installation.

Chapter 3. **Standard Operation:** Includes tasks performed while using the edger in a standard operation, such as pulling down a job, edging (roughing and finishing), polishing, grooving, safety beveling, and drilling.

Chapter 4. **Advanced Operation:** Includes instructions on less commonly performed tasks with the edger, such as saving information to the drill database and changing process parameters.

Chapter 5. **Calibration:** Includes instructions on edger calibration.

Chapter 6. **Advanced Setup:** Materials, tools and processing settings.

Chapter 7. **Maintenance:** Includes instructions for performing daily maintenance tasks, periodic, and on-demand maintenance.

Appendix A. **Diagnostic Screens:** Includes reference information on the tabs in the *Diagnostics* screen

Appendix B. **Reference:** Shows views of the edger with parts labeled.

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Chapter 1 *Before You Begin*

General Description

The edger is an advanced 3-axis edger with a high speed spindle and optional fourth axis for variable angle drilling, shelving, and grooving. Robust industrial components and direct drive motors provide stability and speed to allow it to process all organic lens materials with exceptional accuracy. Its capabilities and reduced footprint make it an excellent fit for any production environment and its dry edging technology allows for quick, easy, and safe disposal of edging debris. In addition to functional excellence, the edger provides ease of maintenance with ready access to all components, online software updates, and remote diagnostic functions for quick and accurate resolution of issues.

Conventions Used in This Manual

The names of screens, fields within screens, and buttons will be placed in italics, for example, the *Setup Screen* or the *Pump On* button. Values in a field will be in quotation marks, as in, the default for the *Frame* field is “Plastic.”

1

Requirements for Use

Electrical Supply

The edger system should be on a dedicated electrical circuit (no other electrical loads connected to the same circuit) to ensure a uniform, consistent power supply. For a 100-120V supply, use a 20 amp circuit. For a 220-240V supply, use a 10 amp circuit. The edger must be properly grounded—do not use any adapter that will bypass the grounding plug.

Power fluctuations can adversely affect production and machine integrity. Please contact Technical Support if you have power glitches or questions about the power requirements. The edger is rated to operate safely with mains supply voltage fluctuations of +/- 10% of nominal voltage. The edger is rated to operate safely with transient overvoltages up to the levels of Overvoltage Category II (300 V). The edger is rated to operate safely with temporary overvoltages up to 300V.

Operating Conditions

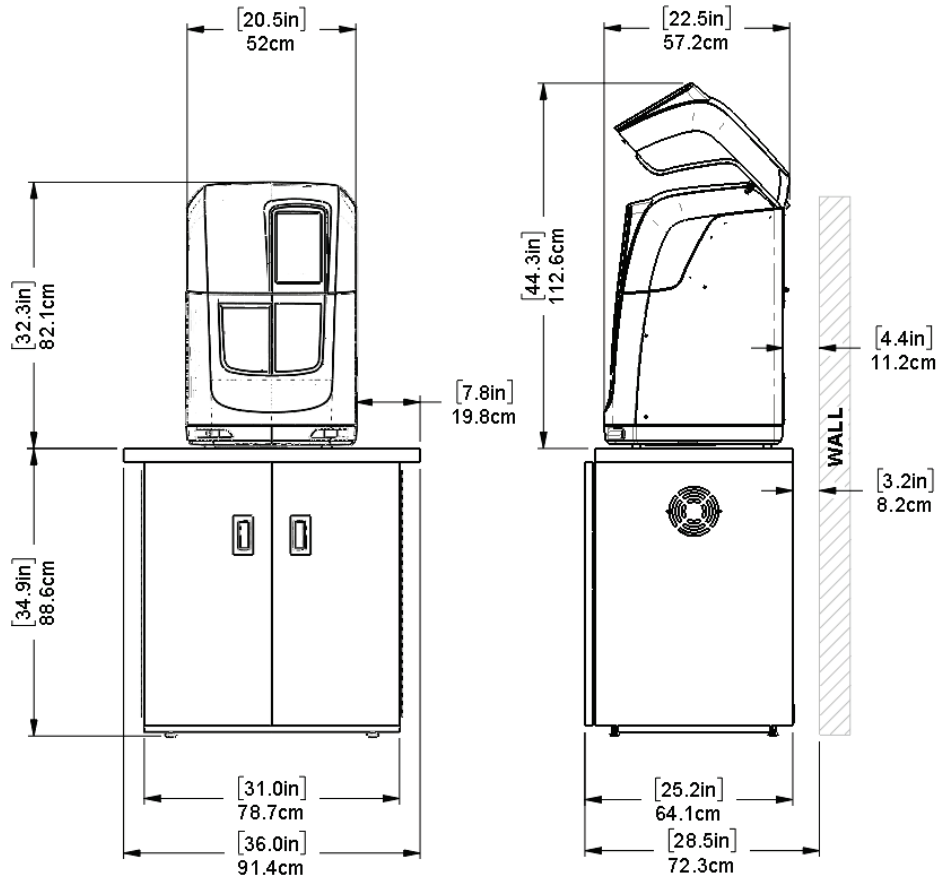
The edger is designed for indoor use only, and is designed to operate safely at a temperature range of 5° C to 30° C, at altitudes up to 2000 meters. Allowable relative humidity is 50% - 90% (non-condensing)

The edger is classified as IPX0, ordinary equipment enclosed without protection against ingress of water and dust. The edger is rated to operate safely in a Pollution Degree 2 environment.

The edger should be isolated from external sources of vibration which may affect lens finish.

General Specifications

The following drawing illustrates the general size of the edger system:



Dimensions (Edger Only)

Height: 32.3 inches/82.1 cm (lid closed), 44.3 inches/112.6 cm (lid open)
Width: 20.5 inches/52 cm
Depth: 22.5 inches/57.2 cm
Weight: 180 lb (82 kg)

Dimensions (Edger on Cabinet)

Height: 67.2 inches/170.7 cm (lid closed), 79.2 inches/201.1 cm (lid open)
Width: 36 inches/91.4 cm
Depth: 25.2 inches/61.4 cm
Weight: 280 lb (127 kg)

Electrical Ratings

Edger Input:

100 - 240 VAC, 50/60 Hz, 350 Watts

Edger Output:

Vacuum: 24 VDC, 250 mA used to power external relay for vacuum
Mister: 24 VDC, 250 mA used to power external water pump

Vacuum (powered through external relay):

120/240 VAC, 50/60 Hz, 1100 - 1300 Watts (independent of Edger)

Standard Tools

20mm multi-flute poly-crystalline diamond (PCD) cutters, Polish, Safety Bevel, 20mm Groove wheel.

Optional Tools – Auxiliary Spindle

1mm Drill, 15mm Groove wheel, 2.4mm Mill, 20mm Shelf tool

Cutter Motor

Adjustable speed (up to 20,000 RPM) DC Brushless, 450W max

Bevel Placement

3-Axis Numerical Control; 7 bevel selections

Lens Materials

CR-39, Polycarbonate, All High Index, Trivex, NO GLASS.

Manufacturer

Satisloh Zhongshan Ltd.
G/F and 1/F, Building A, No.28 West JianYe Road,
Torch Development Zone, Zhongshan, Guangdong,
528437, China

Statement Against Misuse

The edger is designed to edge **plastic lenses only**. Any other use of the machine will compromise its safety protection features.

CAUTION

This machine is designed to edge ONLY PLASTIC LENSES. Under no circumstances should any attempt be made to process a glass lens on this unit!

Symbols Used

This symbol denotes a warning or caution.

This symbol denotes shock hazard or high voltage.

This symbol denotes a cutting hazard.

This symbol denotes a protective conductor terminal.

This symbol denotes AC voltage.

Certifications

Conforms to IEC 61010-1

Conforms to CAN/CSA-C22.2 No. 61010-1

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Chapter 2 *Getting Started*

Installation Requirements

Install the edger only on a stable flat surface capable of supporting the full weight of the edger. Install only in indoor locations where the Operating Conditions specified in **Chapter 1** can be maintained. Operation of the edger does not require any special ventilation beyond what is required to maintain the Operating Conditions. Be sure that the vacuum is properly vented beneath the edger.

Initial Installation

There are several steps required to set up the edger:

1. Setting up the cabinet (skip if you already have one) or preparing the work bench
2. Placing the edger on the cabinet
3. Removing the shipping brackets
4. Installing the cutting tool
5. Connecting the edger to an electric outlet
6. Filling the coolant reservoir
7. Setting up the vacuum unit
8. Connecting the edger to other devices for communication
9. Powering up the edger
10. Setting up communications for job information

Note

These procedures should be followed in sequence;
the completion of one step may depend on the one previous to it.

Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

It is strongly recommended to install the vacuum in an enclosure or cabinet to reduce the operator's exposure to vacuum noise. Any such enclosure must be properly ventilated to prevent the vacuum from overheating and to promote good vacuum performance.

Setting Up the Workspace and Edger

Preparing the Cabinet

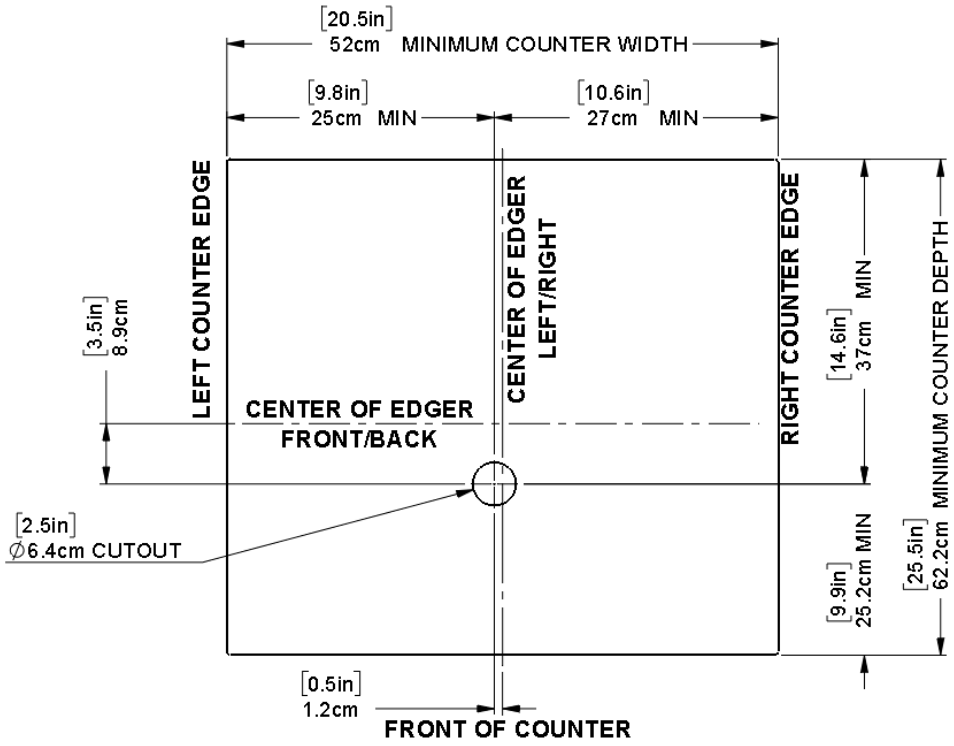
The edger can be shipped with a cabinet, which is custom designed for the application. You can choose either to use the custom cabinet, or mount the edger on a standard workbench. If you want to install the edger on a workbench already present in the lab, proceed to "Preparing the Workbench" below for making the necessary cutouts.

To set up the cabinet, follow these steps:

1. Remove the cabinet and cabinet top from the box.
2. Place the cabinet on a stable surface with the feet on the floor and the open top facing up.
3. Place the cabinet top on top of the cabinet with the unfinished face of the cabinet top facing down. Make sure the hole in the cabinet top is closer to the front of the cabinet. Align the cabinet top centered on the cabinet left/right. Align the back of the cabinet top to the back of the cabinet. The cabinet top will not cover the tops of the cabinet doors – this is by design.
4. From below, mark four convenient corner holes using the slotted holes in the cabinet as a guide and clearly marking on the unfinished face of the cabinet top.
5. Remove the cabinet top, and drill pilot holes in the marked areas. Drill diameter for the pilot holes is 2mm (5/64"). Drill the holes at least 32mm (1-1/4") deep.
6. Replace the cabinet top on the cabinet, finished side down, aligning the pilot holes with the appropriate slots.
7. Attach cabinet top to cabinet with screws provided using a Philips #2 driver.

Preparing the Workbench

If you are not using the supplied cabinet, ensure that the position you select has easy access to an electric outlet and communication cables; then prepare the bench surface to be used by cutting an opening for the debris collection as shown below:



Placing the Edger on the Cabinet

To place the edger on the cabinet and connect the vacuum correctly, follow these steps:

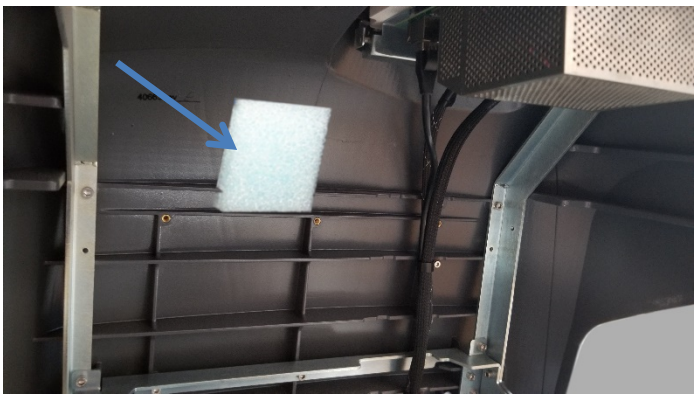
1. Remove the unit from its shipping foam and place it on the cabinet with all four feet on the bench top, and the debris collection cutout in the base aligned with the cutout in the bench top.
2. Screw the grey PVC debris collection pipe into the aluminum plate from below. Thread it into place until the slots in the pipe are visible above the plate. These slots are to collect any water that pools on the debris collection plate.
3. Screw the 45 degree angle adapter onto the top of the PVC pipe from above, aligning the machined collar on that adapter to point towards the internal debris collection chute. Do not screw it down flush with the debris collection plate, as this would cover the slots in the pipe.
4. Connect the debris collection chute to the 45 degree angle adapter with the provided short length of clear tubing.
5. Install the vacuum coupler onto the bottom of the PVC debris collection pipe by pressing it firmly onto the bottom end of the pipe.

Removing the Shipping Brackets

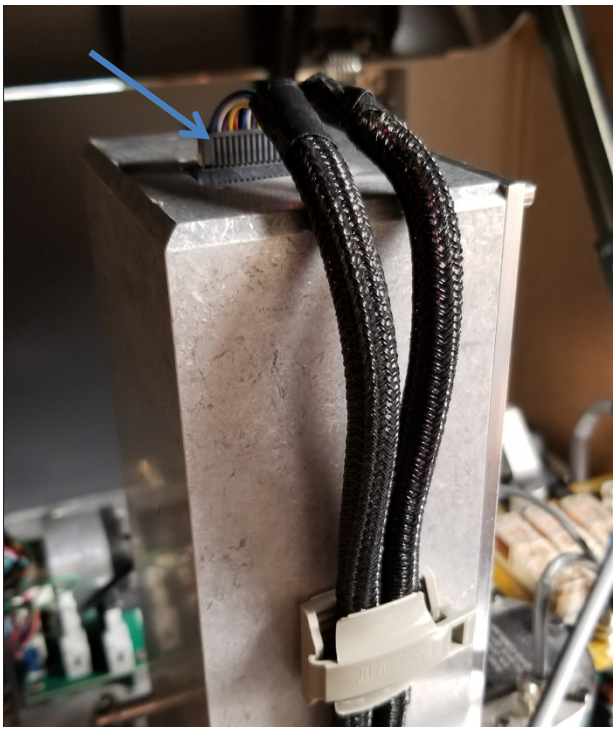
Removing the shipping brackets requires opening the edger. If necessary, refer to **Chapter 7 – Opening and Closing the Edger for Cleaning and Maintenance.**

Remove the shipping brackets marked with the yellow tags using the metric hex wrenches found in the edger's accessory kit. Each item to be removed is identified with a yellow tag. There is one shipping bracket each for the X axis, Z axis, Probe, and Auxiliary Spindle (if equipped). There is also a piece of shipping foam installed above the probe inside the machine lid; remove this foam, and connect the ribbon cable to the top of the probe.

1. Disengage the lid latch inside the edger. Open the machine lid and lift it into its highest locking position.
2. Remove the foam block inside the machine lid above the probe.

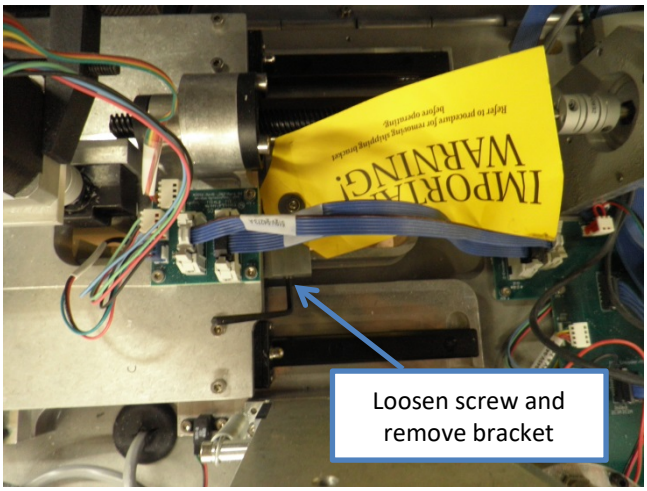


3. Plug the unplugged cable into the top of the probe.



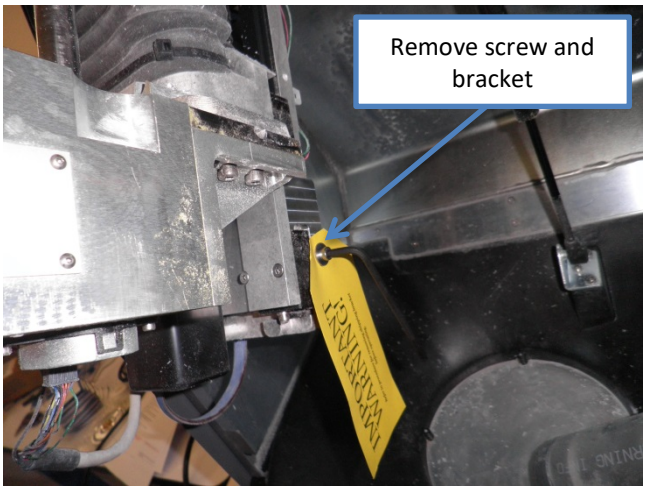
4. Remove the X shipping bracket by loosening the set screw holding it in place. Use the 3mm hex key from the accessory kit to loosen this screw. Slide the bracket to the right, and remove it from the machine.

5. Rotate the X axis coupling approximately 2 full rotations by hand to make sure that the X axis carriage is not locked against the hard stop on the left side. Move the X axis carriage approximately 20mm to the right from the hard stop.

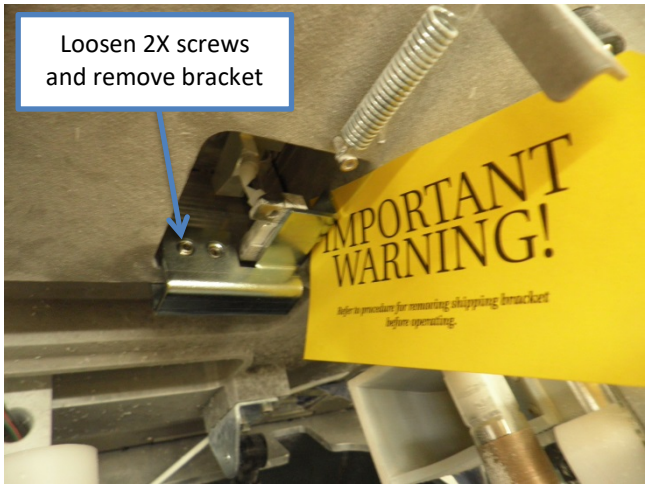


6. Remove the Z axis shipping bracket from the lower right side of the Z axis carriage. Do this by using a 4mm hex key wrench to remove the M5 screw holding it in place.

7. Rotate the Z axis coupling one full rotation by hand to make sure that the Z axis is not locked against the lower Z axis hard stop.

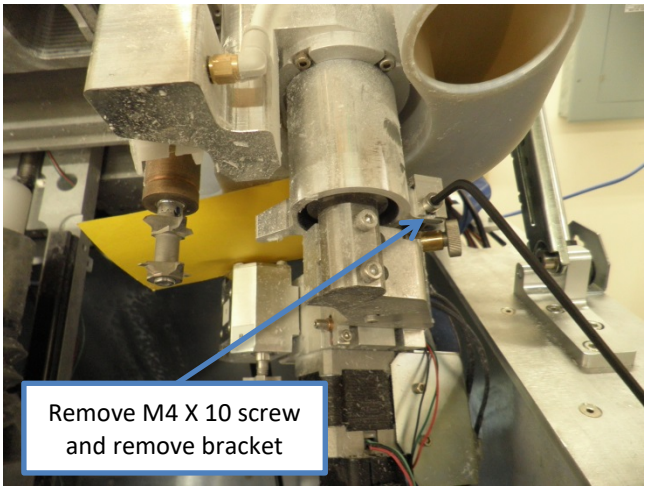


8. Remove the probe shipping bracket. Do this by using a 3mm hex key wrench to loosen the two set screws clamping it in place.



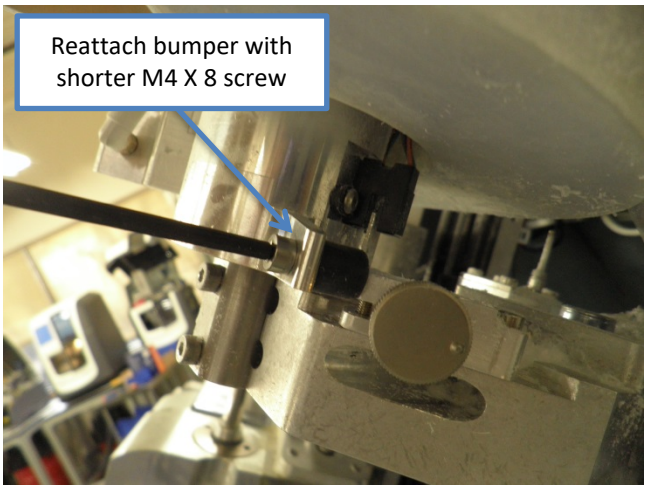
9. If the edger is equipped with a drill, it will be secured in one of two different ways.
   - If secured with a tie-wrap, simply cut and remove.
   - If secured with a screw and bracket, follow steps 10-12.

10. use an M3 hex key to remove the M4 X 10 screw holding the shipping bracket in place.



11. Remove the M4 X 8 screw that is taped to the yellow warning tag.

12. Reattach the rubber bumper using the M4 X 8 screw from the yellow tag.



Installing the Cutting Tool

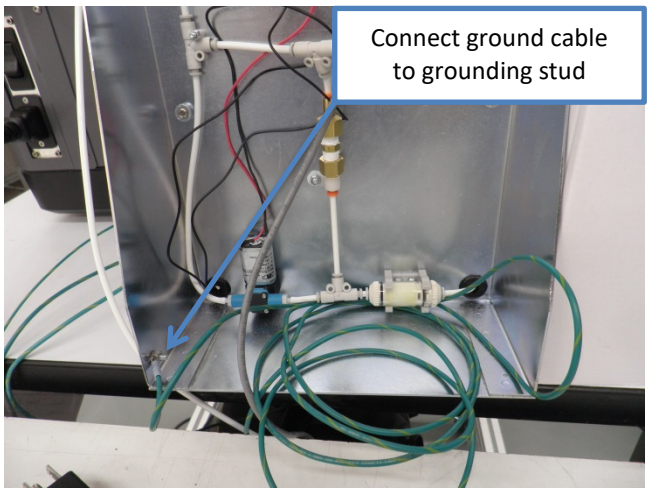
To install the cutting tool in the edger spindle for the first time, follow the steps in **Chapter 7 – Changing the Cutter Body**. Note and follow all safety procedures.

Installing Auxiliary Tools

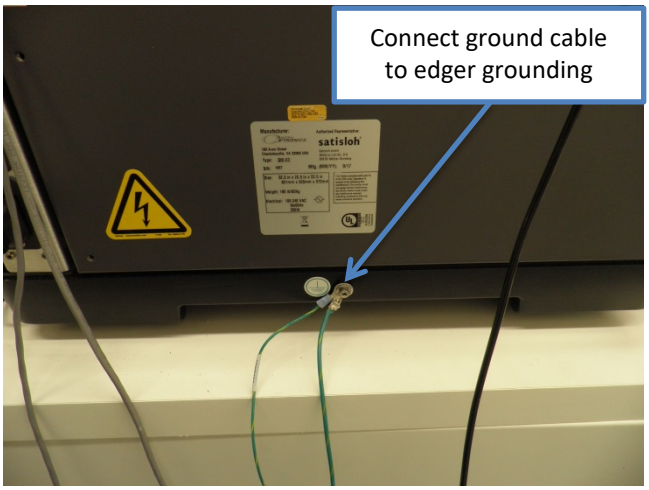
To install the auxiliary tools in the edger spindle for the first time, follow the steps in **Chapter 7 – Changing the Drill, Shelf Tool, and Mill** and **Chapter 7 – Changing the Groover on the Auxiliary Spindle**. Note and follow all safety procedures.

Filling the Coolant Reservoir (the Water Bottle)

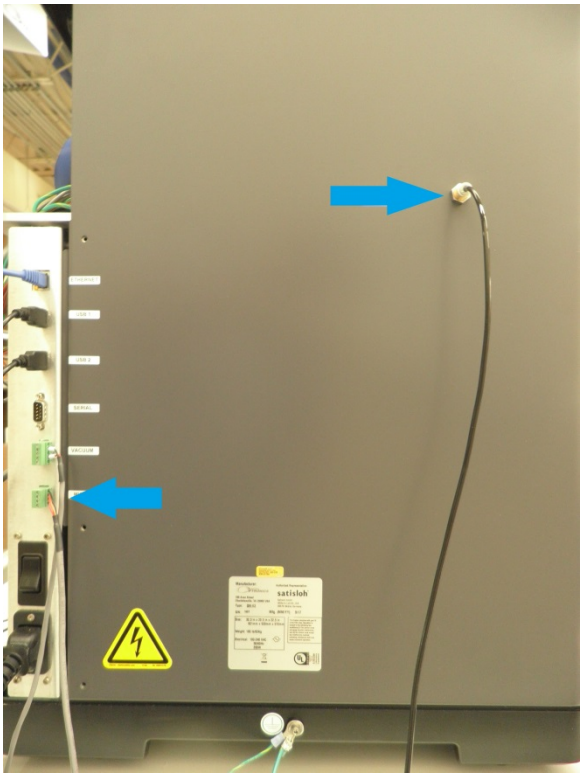
1. Place the Fluid Delivery System inside the cabinet or under the table that the machine rests on. The fluid delivery system can be located in any convenient location.
2. Connect the fluid delivery system grounding cable to the ground stud on the fluid delivery system



3. Connect the other ring lug to the grounding screw on the back of the machine base.



4. Feed the fluid delivery system cable and 4mm water tube out through the back of the cabinet. Plug the water tube and the electric cable into the back of the edger as shown.
5. Pour 1.5 gallons (6 liters) of **distilled water** into the coolant reservoir.
6. If the coolant reservoir is totally empty, you will need to prime the pump before it will flow properly. The easiest way to do this is to follow Steps 7 through 9 after powering up the edger.
7. From the *Diagnostics* menu, select the *Mister* tab. Select *Close Door*, and then touch *Water On.*
8. Let the water run until water sprays continuously and evenly from the sprayer nozzle.
9. Select *Water Off* or *Stop* from the *Mister t*ab.



Setting up the Vacuum Unit

1. Remove the vacuum unit from its packaging.
2. Remove the top of the vacuum from the housing. Install the vacuum bag in the vacuum if not already installed.
3. Install the small paper filter bag around the vacuum's filter if not already installed and secure with the provided locking clamp or removable zip tie. Reinstall the top of the vacuum onto the housing.
4. Connect the grounded vacuum hose to the grey PVC debris collection vacuum adapter on the edger and plug the vacuum hose into the inlet connection on the vacuum. Connect the ring lug on the vacuum hose grounding wire to the grounding screw on the back of the edger base.
5. Connect the vacuum housing grounding wire to the spade terminal on the vacuum. Connect the ring lug on the vacuum housing grounding wire to the grounding screw on the back of the edger base.
6. Plug the vacuum power cord into the vacuum power relay outlet and turn the vacuum power switch on.
7. Plug the vacuum power relay power supply cord into the mains supply. The green "OK" light will illuminate on the power relay, but the vacuum will not turn on.
8. Plug the vacuum signal cable into the vacuum power relay signal connector and plug the other end of the cable into the edger VACUUM connector. The cable will only fit in one orientation – do not force either plug into either connector.
9. Be sure the vacuum exhaust is properly vented, so that the heated air is not trapped.

Connecting the edger to other devices for communication

The edger is provided with two USB ports, one Ethernet port, and one serial port, all located on the back of the edger above the power switch.

1. Connect any communications cables (Ethernet, serial) that will be used for job acquisition.
2. Connect the bar code reader (if provided) to either USB port. Consult Technical Service for proper barcode part number and configuration.

Connecting the Edger to an Electric Outlet

As with all electrical equipment, you must ensure proper power connection for proper functionality.

Note

The edger and vacuum should be connected to a dedicated 115V 20A or 230V 10A circuit.

Connect the edger to power following these steps:

1. Before connecting power, make sure that the edger ON/OFF switch is "OFF" (ON/OFF may be labelled as I/0)
2. Plug the female end of the power cord into the lower-back-corner of the unit and the male end into the wall outlet, making sure that the connections are secure.

Powering Up the Edger

1. Power on the edger using the edger power switch.
2. Follow the on-screen prompts to initialize the machine. See **Chapter 3** sections on the **Graphical User Interface**, **Machine Initialization**, and **Warmup Cycle**.

Do not operate the spindle without the tool installed. Operating the spindle without the tool installed may cause excessive vibration and spindle damage.

Do not begin the warmup cycle with a lens present in the chuck. Failure to remove the lens prior to warmup will result in a serious machine crash that may damage the tool and spindle.

Setting Up Communications for Job Information

The edger is generally connected to another device or host computer to receive shape data and other information. In addition, you can attach a barcode reader to scan the job number.

Use the *Menu* button in the upper right hand corner of the screen to access the *Preferences* menu. Select the *DCS* tab to begin communication setup. See **Chapter 6 – Preferences DCS** section for information on configuring communications.

Setting Up Materials / LMATID

Each lab environment has its own values for LMATID to transmit lens material information from the host to the edger. It is important for proper operation of the equipment that the host and the edger use consistent LMATID values for the lens materials. See **Chapter 6 – Material** screen for information on configuring the LMATID for each material.

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Chapter 3 *Standard Operation*

This chapter includes directions for standard tasks performed while using the edger in a standard operation, such as calling a job, edging (roughing, finishing, and grooving), polishing, safety beveling, and drilling. For calibration instructions, refer to **Chapter 5**.

Note

Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

Graphical User Interface (GUI)

Tap the screen lightly with the fingertip or a stylus designed for touch screen use. Do not use sharp objects such as pencil/pen points, paper clips, etc. on the touch screen. Do not clean the screen with the machine turned on, as the display will register any touch as a button press and may start a cycle or do other unexpected activities.

The *Menu* button in the upper right of the display is used to navigate between the main function screens of the edger (*Job*, *Diagnostics*, etc) Tap this button to navigate between screens. Many screens have multiple tabs along the top, bottom or sides of the display. Tapping an individual tab displays information relating to that tab.

Many screens include a keypad that is used to enter numeric values. To enter a number, first tap the field that is to receive the input value; a window will open with a keypad for entering a new value. Press the *Clear* control to erase any existing entry. A newly-entered value may be made effective by tapping *Enter*. Press *Default* to populate the entry with the factory default value. The previous value can be restored by tapping *Cancel*.

Some screen controls open lists; tapping the control opens a list of available values for that screen control. Select a value to close the list or select the *X* at the top of the list to exit the screen control without making changes.

Tapping a check box enables or disables the associated option. Navigation between screens is accomplished via control buttons on the left side of the screen, or across the top.

Machine Initialization

When the machine is started or reset, it will prompt the user to begin an initialization and homing routine. This routine must be completed before the machine can run a job. When prompted, press *OK* to begin the initialization routine or *Cancel* to enter the Diagnostics screens.

Warmup Cycle

When the machine is started or reset, it may prompt the user to commence a warmup cycle. This cycle exercises the machine and warms up the spindle prior to cutting lenses. Warming up the spindle increases spindle life, and failure to warm up the machine properly will reduce spindle life. Before starting the warmup cycle, ensure that the tool is properly installed in the spindle and that there is not a lens in the machine.

Do not operate the spindle without the tool installed. Operating the spindle without the tool installed may cause excessive vibration and spindle damage.

Do not begin the warmup cycle with a lens present in the chuck. Failure to remove the lens prior to warmup will result in a serious machine crash that may damage the tool and spindle.

Shutting Down

To shut down the edger, first select *Shut Down* from the *Menu*. Wait for the display to turn off before turning off the edger using the switch on the back.

Note

Failure to properly shut down can result in loss of data! Use the *Shut Down* function every time you turn off the edger

Calling a Job

1. Go to the *Job* screen, which is where the edger will go automatically if you just started it up.
2. Select the *Job* source (Local, Host, Recut, Frame, or Chemistrie) if it is not already correctly selected.
3. Select the *Job* field at the top of the screen.
4. When prompted, enter the number of the job to call from a Tracer, Blocker, or Host computer; or select the Local, Recut, Frame, or Chemistrie job from the list.

Edging a Lens

1. After calling a job and setting relevant parameters, put the lens in and press the *START* button to begin the process.
2. Wait until the process finishes and the operator door opens. Remove the lens.
3. To stop the cycle, press the *STOP* button.

Recutting a Lens

1. Make any adjustments on the *Job, Drill, or Shelf* screens from the first cut such as reducing the shape or shelf *Box Offset,* or drill hole diameters.
2. Put the edged lens back in the machine and press the *RECUT* button to begin the process.
3. Wait until the process finishes and the operator door opens. Remove the lens
   - To prevent a particular phase from being recut, go to the *Tools* screen and select "NONE" for that phase. Phases that can be skipped include *Polishing*, *Drilling*, *Shelving*, *Grooving*, *Back Safety Bevel*, and *Front Safety Bevel*.
   - To prevent non-edited drill holes from being recut, go to the *Drill* screen and select "Modified Features" for *Recut*.

Make sure only the originally cut lens is loaded for recut. Loading a full-size lens blank will result in a lens/cutter crash and has the potential to damage the tool and spindle.

Cutting a Duplicate Lens (With or Without Drill Holes)

You can cut a duplicate of a lens without pulling the job information back up. This is most useful after cutting a test lens with a shelf or drill holes – once you've tuned shelf or drill holes to your satisfaction, you can then cut the actual customer lens using the geometry that you developed on the test lens.

1. Clear Recut mode by pressing the *X* in the small orange box labeled *RECUT* at the top of the screen.
2. If the new lens blank is not identical to the first, go to the *RX* screen and enter the correct data or clear the fields so the edger will automatically detect the lens geometry. Put the lens blank into the edger and press *START* as usual.

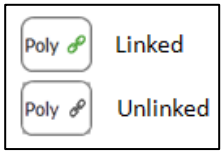
Make sure the first lens and second lens blanks are identical (or nearly identical) before starting the second cycle. Failure to check the Generator data may result in a lens/cutter crash and has the potential to damage the tool and spindle.

The edger will keep the generator data from the last job cut, including lens diameter and whether or not the lens blank measured as *Thick*, and will use this data for roughing the lens. If the first lens you cut was very different from the next lens that you cut using this feature, the edger may perform poorly, including any of the following:

- Trying to cut a thick lens using standard parameters (if the first lens was thin and the second lens is thick)
- Trying to cut the lens using the polish rimless portion of the polish wheel (if the first lens had a high curve on the front and the second lens has a flat curve)
- Trying to cut the lens above the cutter blades (if the first lens had a flat front curve and the second lens has a high front curve)
- Feeding into the lens very quickly (if the first lens blank had a small diameter and the second lens has a large diameter)

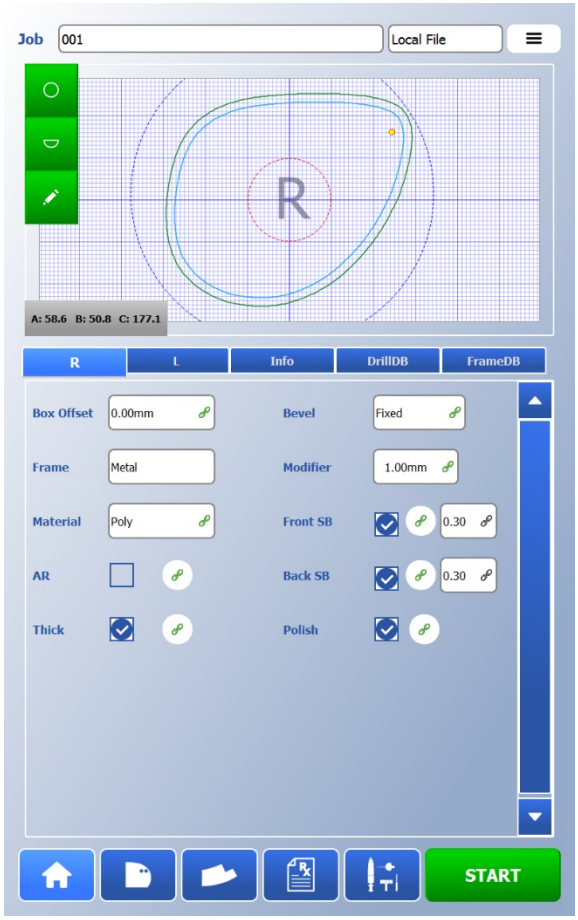
Editing Job Information

Below is a sample *Job* screen. Depending on the materials and the job, there might be a few differences. The green chain icon next to any available field can be selected to apply the field data to both right and left eyes of a job. A black chain icon indicates that the data for right and left eyes is not linked.



Home Screen

This screen contains key information related to edging standard work. It is only available when the *R* or *L* tab is selected.



Box/Circum. Offset: Modify this field to make a size adjustment, for example, if the size of the frame to be used is different from the traced frame. This offset can be set to "Box" or "Circumference" based on *Preferred box sizing method* on the *UI Preference* tab. If set to "Box", a value greater than 65 will be interpreted as the desired C-size rather than a box offset. If set to "Circumference", a value less than 65 will be interpreted as a box offset rather than the desired C-size.

Frame: Select the frame type from the *Frame* field. To perform grooving, choose "Groove" or for rimless choose "Rimless," etc.

Material: Select the lens material to be used from the list of available materials.

AR: Check this field to use process settings for anti-reflective coatings.

Thick: Check this field to use process settings for thick lenses.

Bevel: Select the bevel placement from the list of available bevel placement types (Automatic, Fixed, etc.) See Chapter 4 for details of each of these placement options.

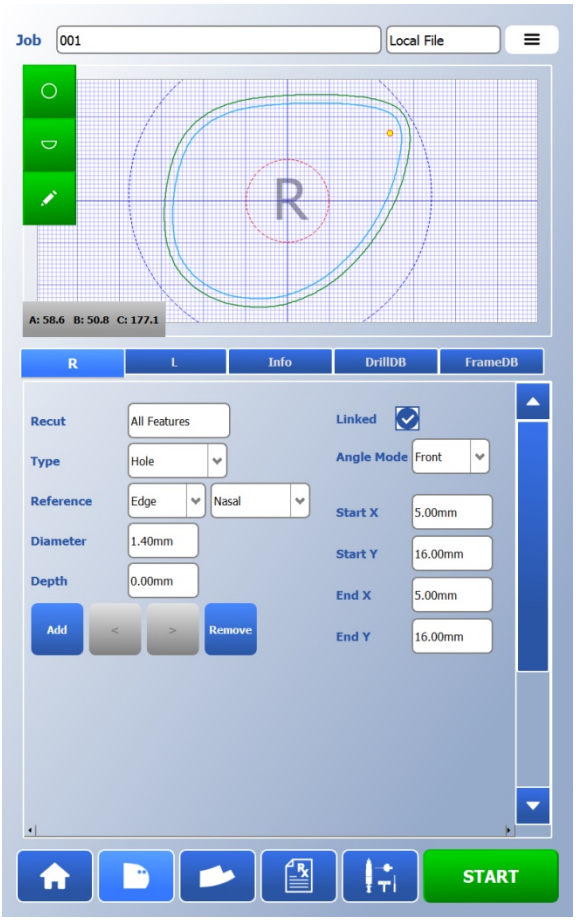
Front SB: Check this field to add a front safety bevel to the lens. When checked, specify the desired safety bevel width.

Back SB: Check this field to add a front safety bevel to the lens. When checked, specify the desired safety bevel width.

Polish: Check this field to polish the lens or uncheck it to skip the polishing.

Drill Screen

This screen contains key information related to drill work. It is only available when the *R* or *L* tab is selected.



Recut: Select "All Features" to recut all drill features during recut. Select "Modified Features" to only recut drill features that have been modified between the first cut and the recut.

Type: Select the desired feature type, "Hole," "Slot," or "Rectangle."

Reference: Select the reference from which the X values are measured. Y values are always measured from the center of the lens, with positive values being above center, and negative being below center.

"Center" measures the X from the center of the lens. Positive X values are to the right of center regardless of whether the lens is a Right or Left lens.

"Box" measures the X from the maximum limits of the lens.

"Edge" measures the X from the edge of the lens at the given Y.

If "Box" or Edge" are selected, "Temporal" measures from the temporal side of the lens, and "Nasal" measures from the nasal side of the lens. Positive X values are inside the lens perimeter. Negative X values are outside the lens perimeter.

Diameter: Enter the desired feature diameter for Hole or Slot features.

Depth: Enter the desired feature depth, measured from the front of the lens.

A value of 0 in this field indicates a through hole.

A negative value in this field indicates how much material to leave, measured from the back of the lens.

Add: Add a drill feature. The added feature will have default properties and locations which you can then modify.

<: Selects the previous feature

>: Selects the next feature

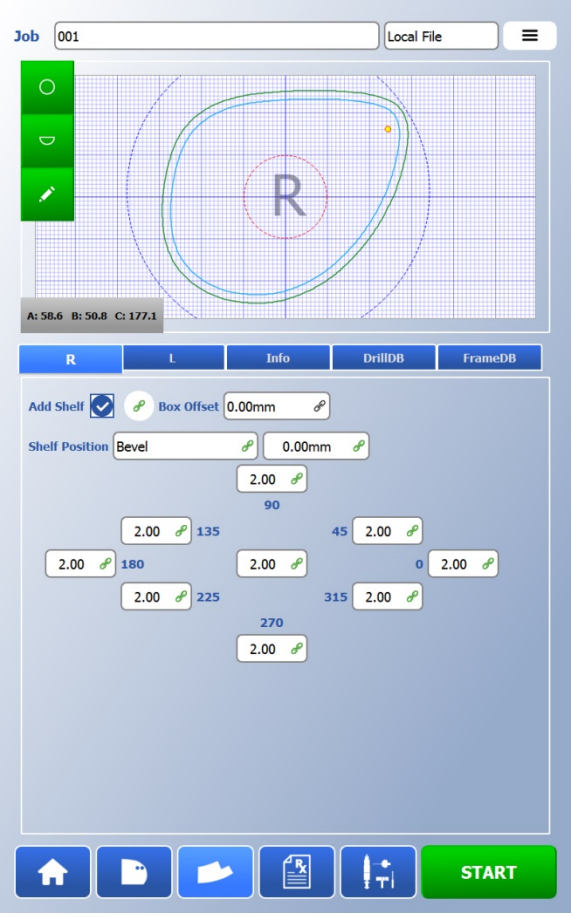
Remove: Delete the selected drill feature.

Linked: Select this check box to link the drill feature from the right lens to the left lens.

Angle Mode:	Select the drill angle mode for the selected feature. Select “Front” to tilt the drill to match the front curve of the lens. Select “Angle” to drill at a specified angle. Select “Back” to tilt the drill to match the back curve of the lens
Start X:	The starting X position of the feature, measured according to the selected Reference.
Start Y:	The starting Y position of the feature, measured according to the selected Reference.
End X:	The ending X position of the feature, measured according to the selected Reference.
End Y:	The ending Y position of the feature, measured according to the selected Reference.

Shelf Screen

This screen contains key information related to shelf work. It is only available when the *R* or *L* tab is selected.



Add Shelf: Check this field to add a shelf to the lens (if a shelving tool is available)

Box Offset: Modify this field to make a size adjustment to the shelf. A value greater than 65 will be interpreted as the desired C-size rather than a box offset. This is typically used in recut mode to affect all shelf insets equally.

Shelf Position: Select the desired shelf position type, “Base” “Fixed” or “Bevel” and enter the information (base curve or offset or both) required for that shelf type. See **Chapter 4** for details of these placement options.

Shelf Insets: Enter the shelf inset (distance from the lens edge to the shelf base) for the four primary positions: top of the lens (90°) and bottom of the lens (270°); right side of the lens (0°) and left side of the lens (180°). These insets can be the same or they can vary. Shelf insets are from the perimeter of the lens for both rimless and bevel lenses.

When these numbers are entered, the intermediate shelf widths for 45 °, 135°, 225°, and 315° will be automatically filled in. The automatic values are the averages of the points on either side (e.g. the 45° field will be populated with a number half way between what was entered in the 0° field and the 90° field). The intermediate values can be changed to suit the frame if needed.

If the center value is edited, all 8 insets will be populated with that value.

Rx Screen

This screen contains lens blank generator data for the lens to be edged. It is only available when the *R* or *L* tab is selected. If this information is downloaded or manually entered prior to starting a cycle, initial probing will be skipped which will shorten the cycle time.

Base Curve: Enter the back base curve in diopters

Cross Curve: Enter the back cross curve in diopters

Center Thickness: Enter the lens blank center thickness in millimeters

Diameter: Enter the actual blank diameter in millimeters

Blank to Block X: Enter the X blocking offset in millimeters

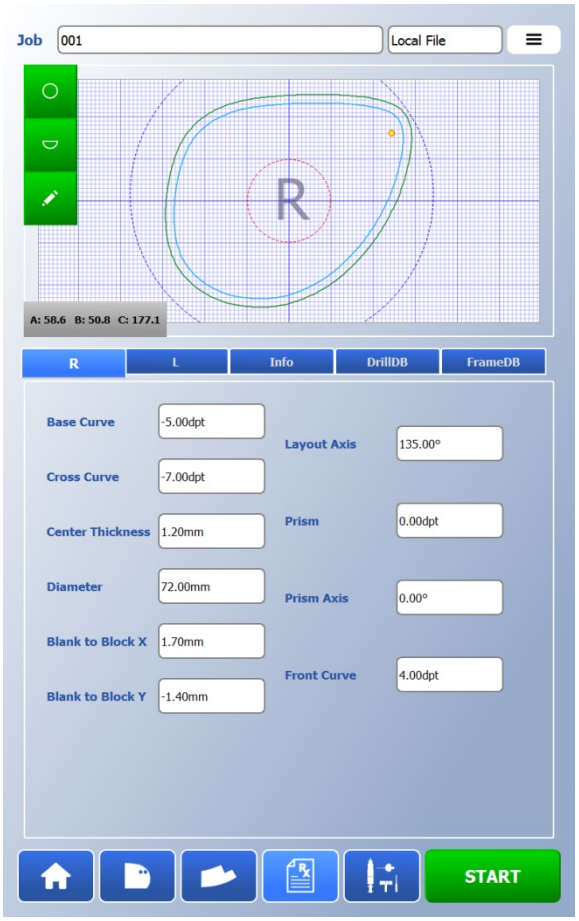
Blank to Block Y: Enter the Y blocking offset in millimeters

Layout Axis: Enter the cross curve layout axis in degrees

Prism: Enter the lens prism in diopters

Prism Axis: Enter the lens prism axis in degrees

Front Curve: Enter the front curve in diopters

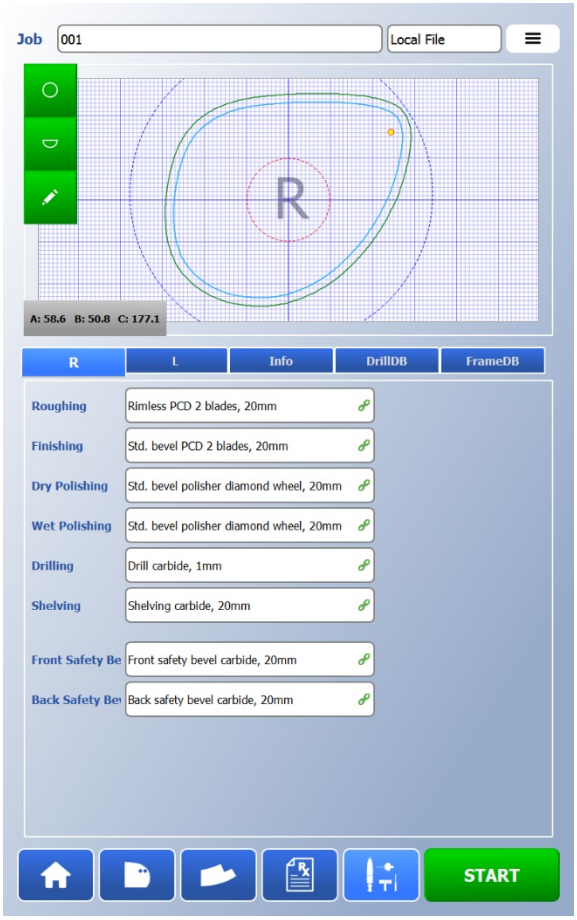


Tools Screen

This screen contains the tool processing information. It is only available when the *R* or *L* tab is selected. Select which tool to use for each phase from the list of available tools. Only valid tools for each phase are displayed. Only phases that apply to the current lens will be displayed.

Available phases are:

Roughing, Finishing, Dry Polishing, Wet Polishing, Drilling, Shelving, Grooving, Front Safety Bevel, and Back Safety Bevel



DrillDB Tab

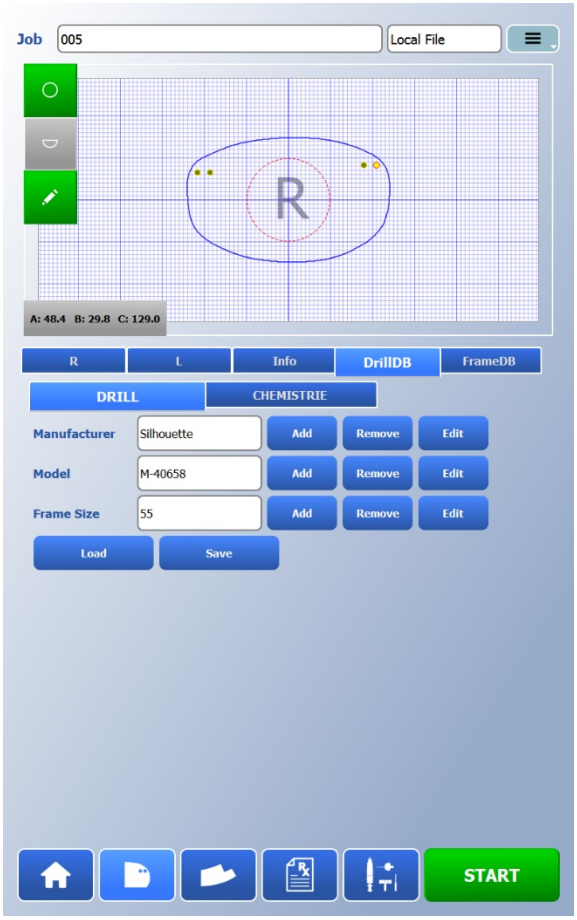
This tab allows the user to add drill data to an existing job. **For advanced operations, such as the *Save, Add, Remove, Edit, and Chemistrie* buttons, see Chapter 4.**

Manufacturer: Select the frame manufacturer for the drill job that you wish to load. All available manufacturers are listed when you select the *Manufacturer* field.

Model: Select the frame model for the drill job that you wish to load. All available frame models from the selected manufacturer are listed when you select the *Model* field.

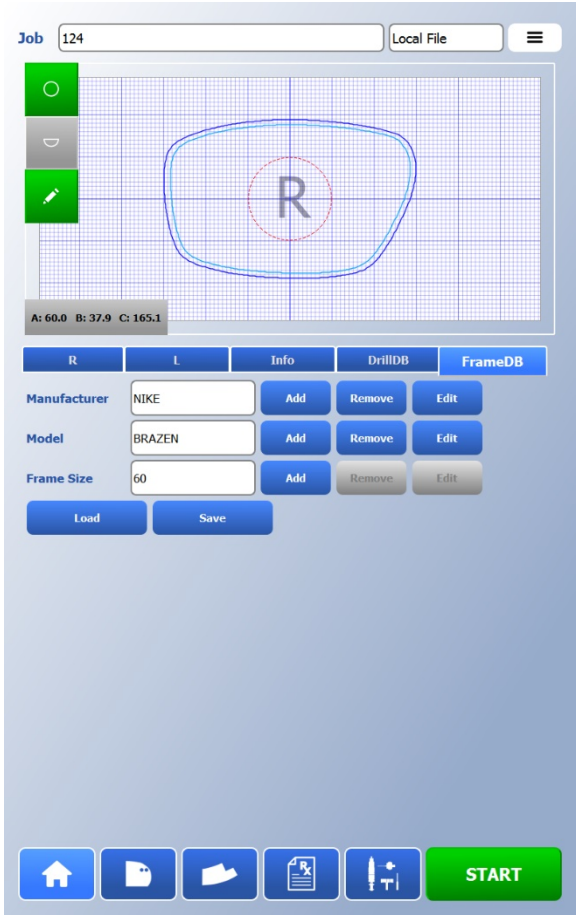
Frame Size: Select the frame size for the drill job that you wish to load. All available sizes from the selected model are listed when you select the *Frame Size* field.

Load: After selecting the *Manufacturer*, *Model*, and *Frame Size*, select *Load* to load the drill data for the selected frame. The drill data will be added to the current job.



FrameDB Tab

This tab allows the user to add frame data to an existing job. **For advanced operations, such as the *Save, Add, Remove, and Edit* buttons, see Chapter 4.**



Manufacturer: Select the frame manufacturer for the frame that you wish to load. All available manufacturers are listed when you select the *Manufacturer* field.

Model: Select the frame model for the frame that you wish to load. All available frame models from the selected manufacturer are listed when you select the *Model* field.

Frame Size: Select the frame size for the frame that you wish to load. All available sizes from the selected model are listed when you select the *Frame Size* field.

Load: After selecting the *Manufacturer*, *Model*, and *Frame Size*, select *Load* to load the shape and shelf data for the selected frame. All data records contained in the frame file will overwrite any job records. Job specific data, such as the downloaded lens blank information will be merged with the frame file data.

R/L Tab: Select the *R* tab to display/process the right eye lens, and the *L* tab for the left eye lens.

Info Tab: Select the *Info* tab to display job information such as manufacturer, eye size, and frame curve.

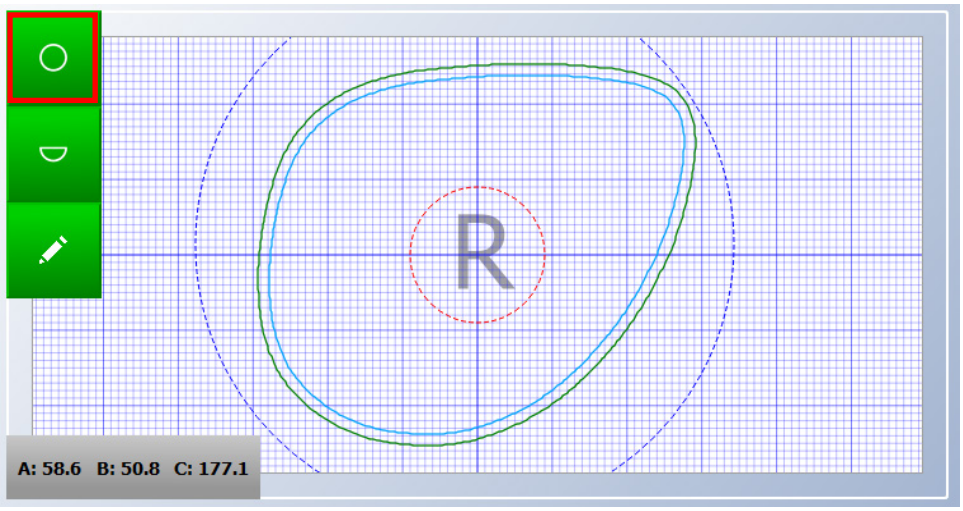
DrillDB Tab: Select the *DrillDB* tab to load drill points from a saved drill database file.

FrameDB Tab: Select the FrameDB tab to load frame and shelf information from a saved frame file.

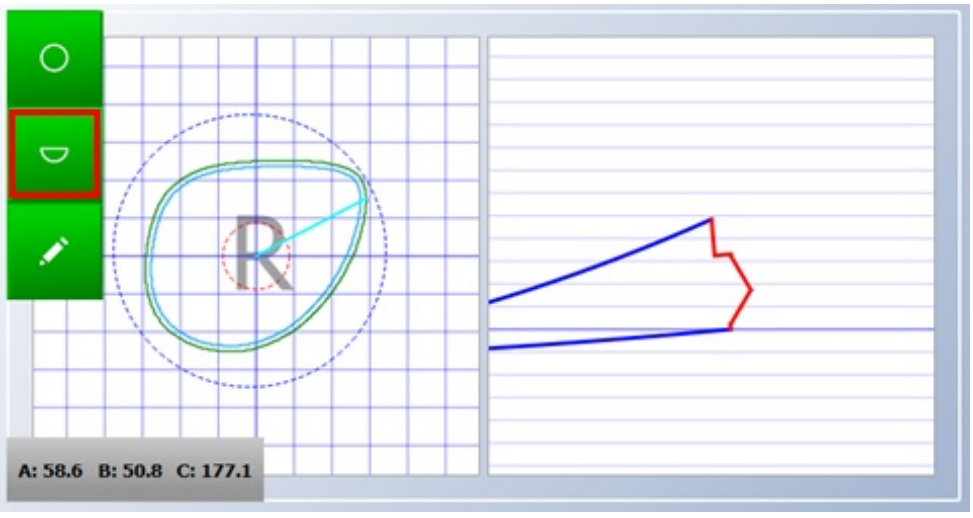
Previewing a Lens Bevel, Groove, or Shelf

The *Job* screen provides options for previewing and editing a lens. An accurate preview of the lens requires correct generator and blocking information. Drills features are not represented in the preview.

Standard Preview Press the top button to show the lens trace data and location of the block on the lens blank.



Section Preview Press the middle button to show the lens trace data on the left side of the screen and show the bevel, groove, or shelf placement on the right side of the screen. The cyan arrow on the left side of the screen can be rotated and indicates what portion of the section view is shown on the right.



Edit Mode Press the lower button to enter the shape editing screen. **For details about these advanced operations, see Chapter 4.**

Chapter 4 *Advanced Operation*

Note

Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

Bevel / Groove Placement Options

The edger has many options for bevel and groove placement on the lens edge. The available options are listed below. Bevel location refers to the apex of the bevel. Groove location refers to the center of the groove.

Fixed Specifies the location of the bevel or groove from the lens front as a fixed distance. The adjacent modifier specifies the distance in millimeters.

Percent Specifies the location of the bevel or groove from the lens front as a percentage of the finished edge thickness. The adjacent modifier specifies the percentage.

Automatic Bevel Specifies the location of the bevel from the lens front as a percentage of the finished edge thickness. The *Default percentage bevel placement* on the *Preference* menu *Frame - Metal/Plastic* tab specifies the percentage for beveled lenses. If the *Center automatic bevel on thin edge* checkbox on the *Preferences* menu *Lens Profile* tab is checked, automatic bevels will be centered in areas of the lens that are less than the width of the bevel.

Automatic Groove Specifies the location of the groove from the lens front as a percentage of the finished edge thickness. The *Default percentage groove placement* on the *Preference* menu *Frame - Groove* tab specifies the percentage for grooved lenses. If the *Center automatic groove on thin edge* checkbox on the *Preferences* menu *Lens Profile* tab is checked, automatic grooves will be centered in areas of the lens that are less than the value entered in *Automatic centering groove on thin edge*.

Back Specifies the location of the bevel or groove from the lens back as a fixed distance. The adjacent modifier specifies the distance in millimeters.

Center Specifies the location of the bevel or groove to be equidistant from the lens front and back.

Base Specifies the bevel or groove to follow a curve that is placed a fixed distance from the lens front. The adjacent modifier specifies the curve to follow in diopters based on an index of 1.53. The second modifier specifies the minimum distance from the lens front in millimeters.

Base% Specifies the bevel or groove to follow a curve that is placed as a percentage of the finished edge thickness. The adjacent modifier specifies the curve to follow in diopters based on an index of 1.53. The second modifier specifies the minimum distance from the lens front as a percentage. This option will minimize the front shelf

Shelf Placement Options

The edger has three options for shelf placement on the lens. The available options are listed below.

Base Specifies the shelf to follow a curve at a fixed distance from the lens front. The adjacent modifier specifies the curve to follow in diopters based on an index of 1.53. The second modifier specifies the minimum shelf thickness in millimeters.

Fixed Specifies the shelf to follow the lens front at a fixed distance. The adjacent modifier specifies the distance in millimeters.

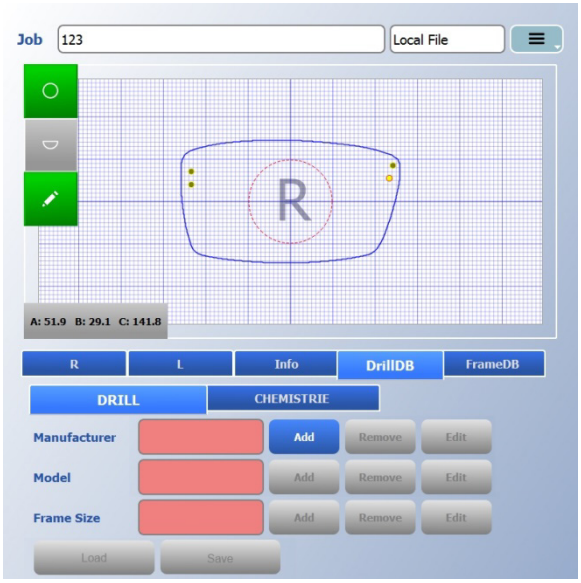
Bevel Specifies the shelf to follow the bevel at a fixed distance from the backside base of the bevel. The adjacent modifier specifies the distance in millimeters. A negative number in this field will place the shelf forward of the backside base of the bevel, cutting into the bevel. A positive number in this field will leave a rear rimless section behind the backside base of the bevel.

DrillDB Tab

Adding Drill Jobs to the Database

Once drill features have been edited for a specific job, these details can be saved locally for future use. Use the *DrillDB* tab to do this.

Add (Manufacturer): Click *Add* next to *Manufacturer* to open a dialog window to allow entry of the frame manufacturer name. If the job packet contained the FMFR record, this will already be populated in the dialog window. Press "Accept" to keep this name, or touch the text box to edit.

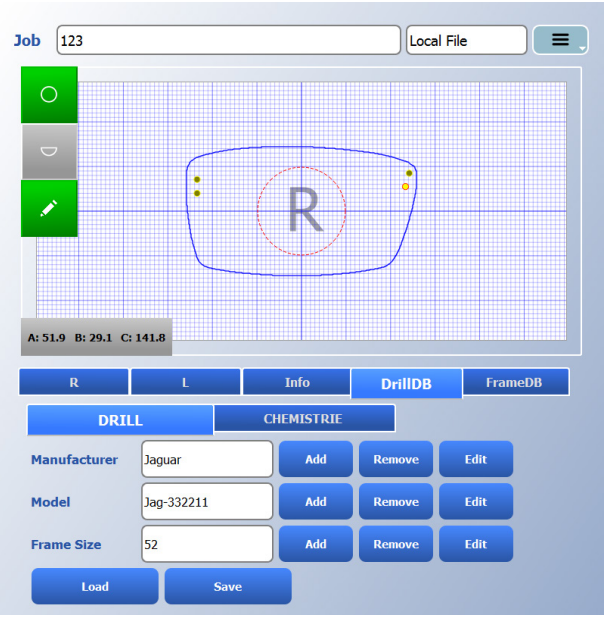


Add (Model): Click *Add* next to *Model* to open a dialog window to allow entry of the frame model name. If the job packet contained the FRAM record, this will already be populated in the dialog window. Press "Accept" to keep this name, or touch the text box to edit.

Add (Frame Size): Click *Add* next to *Frame Size* to open a dialog window to allow entry of the frame eye size. If the job packet contained the EYESIZ record, this will already be populated in the dialog window. Press "Accept" to keep this number, or touch the text box to edit.

Save: Once the required names and eye size are populated, select *Save* to save the drill file locally.

Load: Once saved, the drill data will automatically be merged with a downloaded shape if the job packet contains matching FMFR, FRAM, and EYESIZ records. If these records are not contained in the job packet, the drill data can be added manually; first select the three fields and then press *Load*.



Edit: Once saved, the database record names may be edited at any time by selecting *Edit* next to the name/size to be edited.

Remove: If *Remove* is pressed next to *Manufacturer*, ***all*** drill files for this manufacturer will be deleted. If *Remove* is pressed next to *Model*, ***all*** drill files for this manufacturer and model will be deleted. If *Remove* is pressed next to *Frame Size*, this single drill file with manufacturer, model and frame size will be deleted.

Note

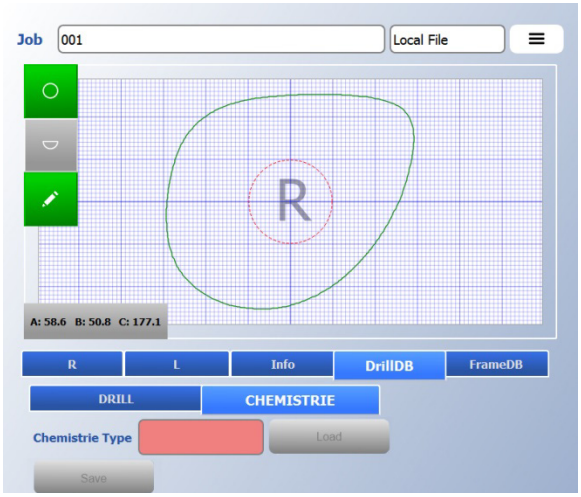
Use caution when using the *Remove* button. Once a manufacturer is removed, the edger will delete ***ALL*** drill records for that *Manufacturer, and they cannot be recovered*.

Adding Chemistrie Drill Jobs to the Database

Chemistrie® is a patented magnetic lens layering technology that allows creating sun lenses for virtually any frame. The edger has a convenient method of creating and storing these specialized drill records for future use. Once the desired shape is downloaded, select the *DrillDB* tab, and then select the *CHEMISTRIE* button.

Chemistrie Type: Select "Reader" or "Sun" depending on the type of clip to be edged.

Load: Once the *Chemistrie Type* is selected, press *Load* to populate the default clip sizing and drill features for the Chemistrie® clips. Depending on the specific frame, these values may need to be edited on the Drill screen by selecting the *R* or *L* tabs. Consult documentation from Chemistrie® for detailed guidelines.



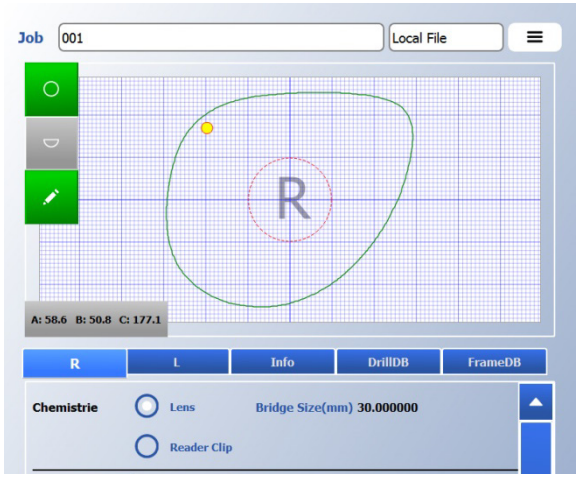
Save: Once the Chemistrie® job is finalized (see next section for editing), it can be saved locally for future use. This is convenient if a patient returns and wants a new clip color, for instance. Press *Save*, and then enter the *Name* and *Eye Size* to correlate with the customer. To load Chemistrie® jobs from the *Job* screen, set the *Job* source to "Chemistrie", and then choose the desired job from the list.

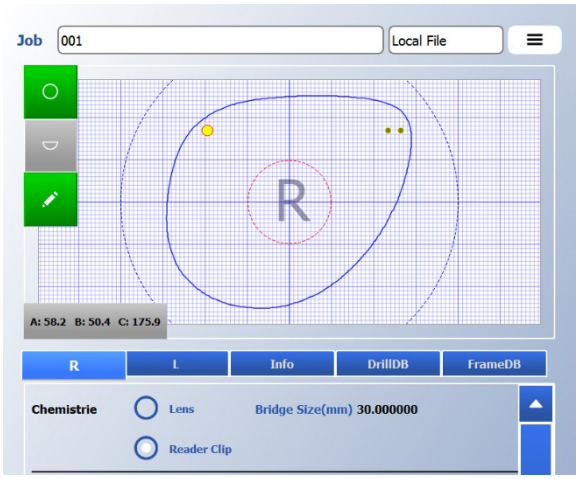
Editing Chemistrie Drill Jobs

After adding the Chemistrie clip to a job, select the *Drill* screen, and then the *R* or *L* tab.

Chemistrie: Select "Lens" or "Reader Clip / Sun Clip" depending on which lens needs to be viewed, edited, or edged. The clip lens will show the additional two bridge holes.

Bridge Size(mm): This is the suggested bridge size based on the Lens size, patient PD, and Chemistrie recommendations. This information is for reference only.





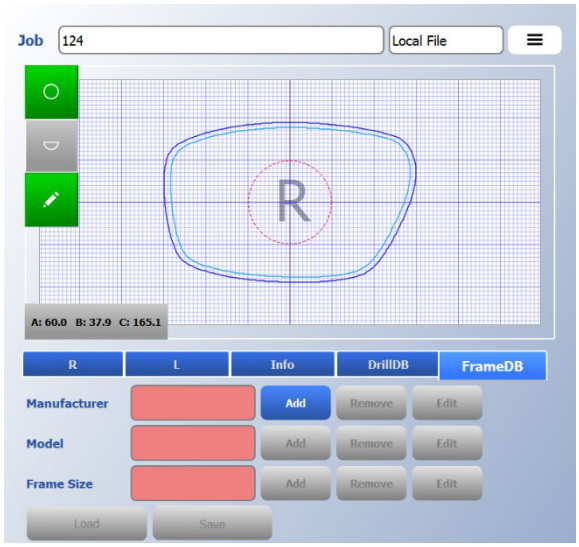
Note

Bridge holes on a clip move together. If the X-coordinate of one hole is edited, the adjacent hole will change by the same amount to maintain the proper spacing. If the Y-coordinate of one hole is edited, the adjacent hole will change to the same Y-coordinate.

FrameDB Tab

Adding frame files to the Database

Once shape, shelf, and drill features have been edited for a specific job, these details can be saved locally for future use. Use the *FrameDB* tab to do this.

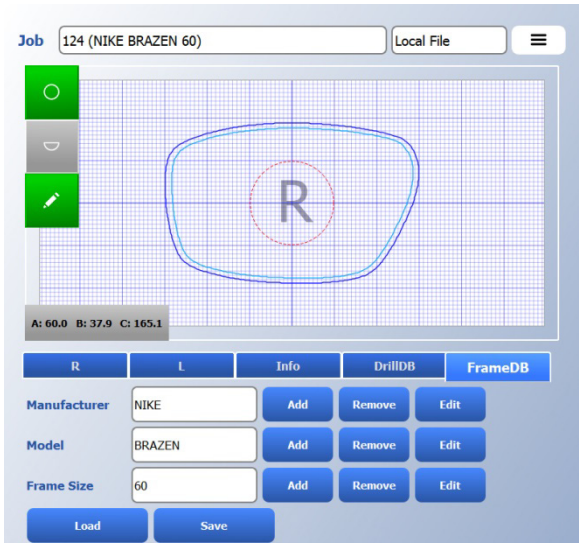


Add (Manufacturer): Click *Add* next to *Manufacturer* to open a dialog window to allow entry of the frame manufacturer name. If the job packet contained the FMFR record, this will already be populated in the dialog window. Press "Accept" to keep this name, or touch the text box to edit.

Add (Model): Click *Add* next to *Model* to open a dialog window to allow entry of the frame model name. If the job packet contained the FRAM record, this will already be populated in the dialog window. Press "Accept" to keep this name, or touch the text box to edit.

Add (Frame Size): Click *Add* next to *Frame Size* to open a dialog window to allow entry of the frame eye size. If the job packet contained the EYESIZ record, this will already be populated in the dialog window. Press "Accept" to keep this name, or touch the text box to edit.

Save: Once the required names are populated, select *Save* to save the frame file locally.



Load: Once saved, the frame data will automatically be merged with a downloaded shape if the job packet contains matching FMFR, FRAM, and EYESIZ records. If these records are not contained in the job packet, the frame data can be manually merged with the current job; first select the three fields and then press *Load*. To load frame jobs from the *Job* screen without patient information, set the *Job* source to "Frame", and then choose the desired frame from the list.

Edit: Once saved, the database record names may be edited at any time by selecting *Edit* next to the name to be edited.

Remove: If *Remove* is pressed next to *Manufacturer*, ***all*** frame files for this manufacturer will be deleted. If *Remove* is pressed next to *Model*, ***all*** frame files for this manufacturer and model will be deleted. If *Remove* is pressed next to *Frame Size*, this single frame file with manufacturer, model and frame size will be deleted.

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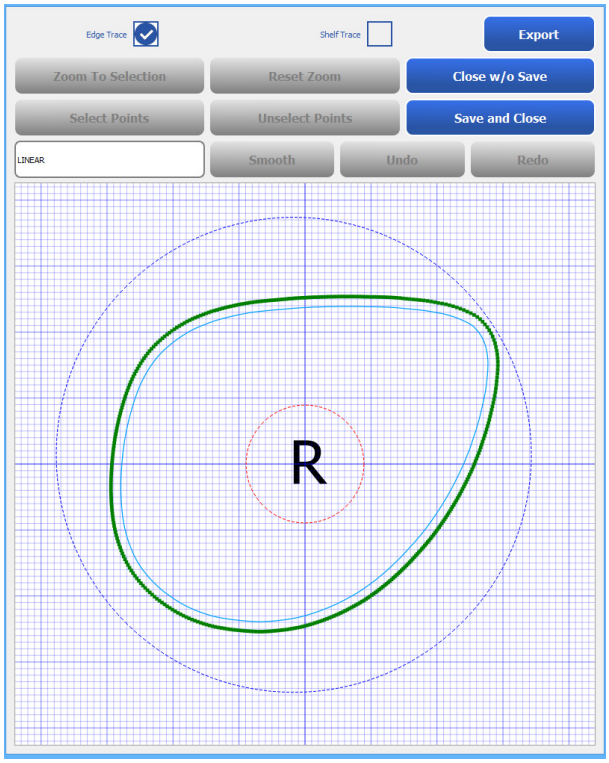
Note

Use caution when using the *Remove* button. If you *Remove* a *Manufacturer* entry, the edger will delete ***ALL*** frame records for that *Manufacturer, and they cannot be recovered*.

Editing a Job or frame File

Press the Edit button below the Section Preview button on the *Job* screen to enter the shape editing mode. The edits performed here can be limited to the specific job in process, or can be saved as frame files for future use.



Edge Trace: Check this to have subsequent edits affect the edge data.

Shelf Trace: Check this to have subsequent edits affect the shelf data.

Zoom To Selection: Touch the screen and highlight a rectangular region of the shape and then press this to zoom to the selected area. This button is only available when a region is highlighted.

Reset Zoom: Select this to return to full view. This button is only available when editing a zoomed region.

Select Points: Touch the screen and highlight a rectangular region of the shape and then press this to highlight the data points within the selected area. This button is only available when a region is highlighted.

Unselect Points: Select this to return to the previously highlighted rectangular region. This button is only available when data points are highlighted.

Linear / Weighted: Choose "Linear" to move all selected points by the same magnitude regardless of the drag-point. Choose "Weighted" to move the selected points based on their position relative to the drag-point. Points closer to the drag-point will be moved by a higher magnitude than points farther away.

Smooth: Select this to smooth the highlighted data points. This button is only available when data points are selected.

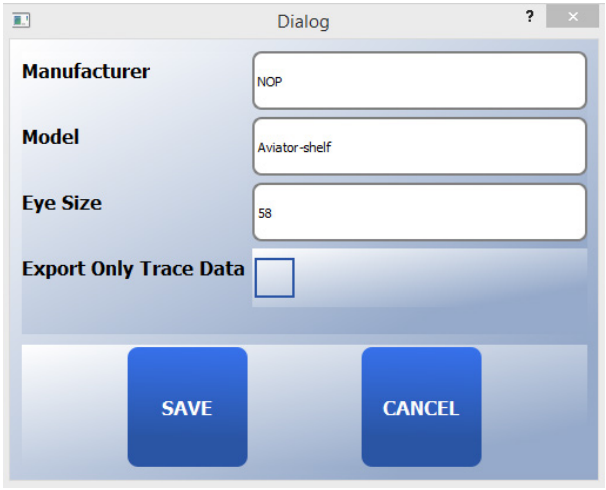
Undo: Select this to undo the previous change. This button remains available as long as there are previous changes that can be undone.

Redo: Select this to redo the last change that was undone be pressing *Undo*. This button remains available as long as there are previous changes that can be redone.

Close w/o Save: Select to discard all changes and return to the Job screen.

Save and Close: Select to save changes for this specific job. **Changes will not be saved to disk.**

Export:



Select this to save changes to an internal frame file. If the downloaded shape is populated with the manufacturer, model, and eye size DCS labels (FMFR, FRAM, EYESIZ), or if editing an existing frame file, the Manufacturer, Model and Eye Size will be displayed in the Dialog window. These fields can be left as-is, or be edited to create a new frame file. Check *Export Only Trace Data* to omit patient specific information from the saved file. In this case, only shape, shelf, and drill data is saved. This allows for merging with a variety of future patient jobs.

Chapter 5 *Calibrating the Edger*

The edger provides step by step guided calibration for all required calibration values. Gather the required materials and tools and then follow the on-screen instructions for each required calibration step.

The edger arrives from the factory already tuned and calibrated; however, small adjustments may be necessary after shipment. In normal operation, calibration should be checked daily and adjusted if needed.

Note

Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

Calibration requires various lenses and tools. The following table lists the key items.

PN	Description
90-055-474	Calibration kit (Clamp Centering Tool and Bushing, X-calibration Fixture, X-calibration Gauge and Holder)
60-053-313	Digital calipers (Accessory kit item)
05-074-971	Probe calibration smart disk (Accessory kit item)
05-057-833	PDA (Vario, Accessory kit item)
60-053-122	Lens angle axis gauge (Vario, Accessory kit item)
05-076-872	D-Axis calibration fixture (Vario, Accessory kit item)
60-054-971	3mm, 3.8 N-m Torque driver (Accessory kit item)
90-053-801	0-base plano CR-39 lenses with 4mm center thickness
60-053-023	6-base plano Poly lens with 3mm center thickness
92-009-360	8-base plano Poly lens with 4mm center thickness

Maintenance – Calibration Tab

To begin calibration of the machine, go to the *Maintenanc*e menu *Calibration* tab. There are typically two sub-tabs *Tier 1* and *Tier 2*. There is third *Advanced* tab that can be invoked by going to the Remote Support tab and initiating *Switch to Technician Mode* (see **Chapter 7 - Maintenance**). Select the check-box for the calibration step you wish to perform, and then tap the *Start Calibration* button to begin the selected calibration.

Note

The calibrations available on this screen are all basic calibrations relating to the physical location of components of the machine. To calibrate individual tools, refer to the next section on **Tool Calibration.**

Clamp Arm to Lens Shaft Alignment

Purpose

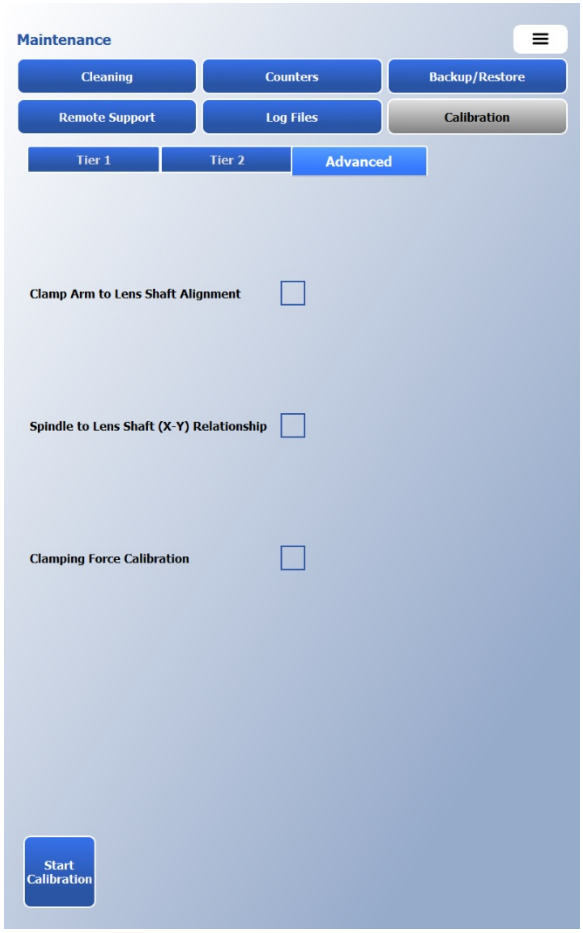
This calibration step manually aligns the lens holder shaft axis with the lens clamp axis using a mechanical fixture. Good clamp alignment is required for the highest shape accuracy. Follow the on-screen prompts to complete this calibration.

Materials Required

- Clamp alignment kit (clamp centering tool with wing nut and sliding bushing)
- 3/32” T-handle hex driver

Calibration Required When…

- The lens axis gearbox or lens clamp arm has been replaced



Spindle to Lens Shaft (X-Y) Relationship

Purpose

This calibration step sets the spindle *X calibration* and *Y calibration* values by establishing the exact center distance between the lens axis shaft and the spindle axis in both the X (left-right) and Y (front-back) directions. This ensures proper lens size and shape. Follow the on-screen prompts to complete this calibration.

Materials Required

- X axis calibration fixture with calibration value printed or engraved on it
- X axis calibration Indicator and holder
- Various metric hex drivers
- 3/32” T-handle hex driver
- 3mm hex torque driver set to 3.8 N-m torque

Calibration Required When…

- The X axis lead screw, motor, or coupling has been replaced or loosened
- Clamp alignment has been changed
- The spindle has been removed and reinstalled or the spindle has been replaced

Clamping Force Calibration

Purpose

This calibration step sets the *Clamp Lbs per Amp Ratio* and *Clamp Lbs Offset* values. This ensures the proper lens clamping force as set on the *Material* screen. Follow the on-screen prompts to complete this calibration.

Materials Required

- Force gauge with specialized block sensor force clamp (Factory only)

Calibration Required When…

- The clamp lead screw or motor has been replaced
- The clamp lead screw has been lubricated

Spindle to Chuck (Z) Relationship

Purpose

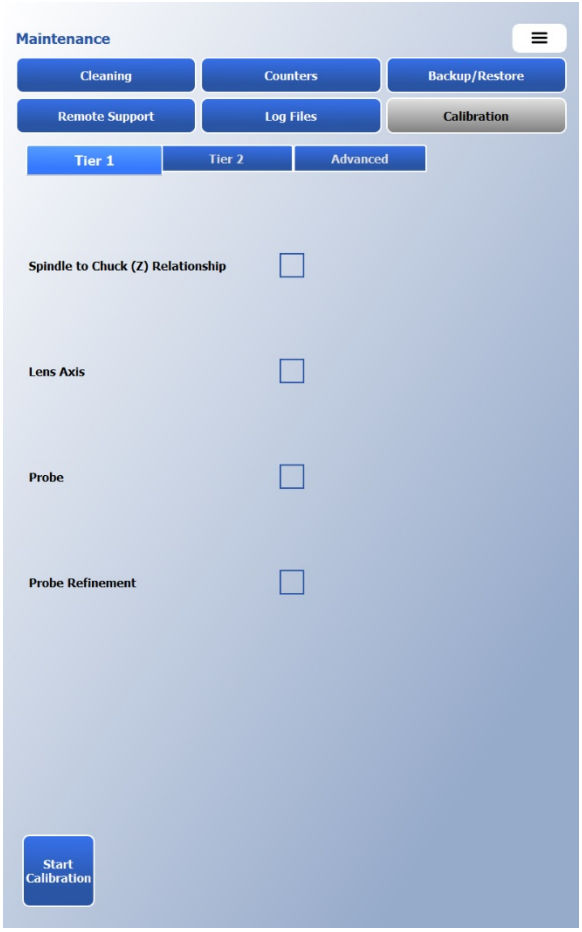
This calibration step sets the initial spindle *Z calibration* value by establishing the approximate height of the chuck with respect to the spindle tool. This roughly sets the proper bevel placement and will be refined in a subsequent calibration step. Follow the on screen prompts to complete this calibration.

Materials Required

- The probe calibration smart disk with PDA

Calibration Required When…

- The Z axis lead screw, motor, or coupling has been replaced or loosened
- The chucking system for the edger has been changed from one style of block to another



Lens Axis

Purpose

This calibration step sets the spindle *C calibration* value by establishing the rotational orientation of the chuck with respect to the center of the spindle. This ensures proper lens axis. Follow the on-screen prompts to complete this calibration.

Materials Required:

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

Calibration Required When…

- The chuck has been replaced
- The C-axis encoder has been replaced
- Lens axis is not satisfactory

Probe

Purpose

This calibration step sets the probe *Upper-Lower X-Y-Z calibration* values by establishing the location of the upper and lower probe tips with respect to the chuck. This ensures proper probing for bevel/groove placement among other things. Follow the on-screen prompts to complete this calibration.

Materials Required

- Probe calibration smart disk with PDA

Calibration Required When…

- Probe tips, probe arms, or probe assembly has been replaced.

Probe Refinement

Purpose

This calibration refines the probe *Upper-Lower X-Y-Z calibration* values. This ensures proper probing for bevel/groove placement over the full range of lens curves. Follow the on-screen prompts to complete this calibration.

Materials Required

- 8-base plano Poly lens with 4mm center thickness

Calibration Required When…

- After probe calibration. Both Rimless and Bevel tool calibrations must also be performed first.

Auxiliary Spindle to Chuck(XZD) Relationship

Purpose

This calibration step sets the initial auxiliary spindle *A-B X-Z-D calibration* values by establishing the approximate location of the auxiliary spindle with respect to the chuck. These values will be refined in subsequent calibration steps. Follow the on-screen prompts to complete this calibration.

Materials Required

- 1.5mm hex key driver
- 9/32” open end wrenches, quantity 2
- 0-base plano CR-39 lenses with 4mm center thickness

Calibration Required When…

- A new auxiliary spindle assembly has been installed.

Auxiliary Spindle C Axis

Purpose

This calibration step sets the auxiliary spindle *C calibration* so that the auxiliary spindle is parallel to the X-axis. **This calibration step**

only operates on Auxiliary Spindle A, and requires a drill tool to be installed in that position.

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

Calibration Required When…

- A new auxiliary spindle assembly has been installed

Auxiliary Spindle Mechanical Hard Stop

Purpose

This calibration and adjustment step sets the hard stop on the auxiliary spindle so that it pivots to the correct angle when it engages. **This calibration step only operates on Auxiliary Spindle A, and requires a drill tool to be installed in that position.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge
- 2.5mm hex key driver

Calibration Required When…

- A new auxiliary spindle assembly has been installed
- The auxiliary spindle assembly hard stop has moved, creating a sudden C offset on mill, drill, and shelf features.

Auxiliary Spindle Mechanical Y-Offset

Purpose

This calibration and adjustment step sets the auxiliary spindle forward and backward in the machine so that the center of the auxiliary spindle lines up with the center of the chuck. **This calibration step only operates on Auxiliary Spindle A, and requires a drill tool to be installed in that position.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

- 2mm hex key driver

Calibration Required When…

- A new auxiliary spindle assembly has been installed

Auxiliary Spindle D Angle

Purpose

This calibration step sets the auxiliary spindle *D calibration* so that the mill tool is exactly vertical. **This calibration step only operates on Auxiliary Spindle A, and requires a Mill tool to be installed in that position.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- D-Axis calibration fixture

Calibration Required When…

- A new auxiliary spindle assembly has been installed
- The milling tool is cutting lenses that are tapered front-to-back

Auxiliary Spindle (Pos A/B) Rough X and Z Offset

Purpose

This calibration step sets the auxiliary spindle *X calibration* and *Shelf Y calibration* values by establishing the pivot center and distance between the lens axis and the auxiliary spindle. This ensures proper tilting for the auxiliary spindle. Follow the on-screen prompts to complete this calibration. **It needs to be run once for Auxiliary Spindle A, and once for Auxiliary Spindle B.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Digital calipers

Calibration Required When…

- A new auxiliary spindle assembly has been installed
- Shelf size or thickness is incorrect or inconsistent
- Drill points are correct for flat lenses but incorrect for high base curve lenses
- Mill size is correct for flat lenses but incorrect for high base curve lenses

Auxiliary Spindle (Pos A/B) X and Z Offset Refinement

Purpose

This calibration step refines the auxiliary spindle *X calibration* and *Shelf Y calibration* values. This ensures proper tilting across the full range of lens curves. Follow the on-screen prompts to complete this calibration. **It needs to be run once for Auxiliary Spindle A, and once for Auxiliary Spindle B.**

Materials Required

- 8-base plano Poly lens with 4mm center thickness
- Digital calipers

Calibration Required When…

- After Auxiliary Spindle (Pos A/B) X and Z Offset

Auxiliary Spindle (Pos A/B) Shelf Y Offset

Purpose

This calibration step sets the auxiliary spindle *Shelf Y calibration* value to ensure the shelf is on-axis with the shape. **It needs to be run once for Auxiliary Spindle A, and once for Auxiliary Spindle B.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

Calibration Required When…

- A new auxiliary spindle assembly has been installed
- The shelf shape appears twisted with respect to the edged shape

Auxiliary Spindle (Pos A/B) Mill Y Offset

Purpose

This calibration step measures and sets the auxiliary spindle *Mill Y calibration* value to ensure the mill is on-axis with the shape. **It needs to be run once for Auxiliary Spindle A, and once for Auxiliary Spindle B.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

Calibration Required When…

- A new auxiliary spindle assembly has been installed
- Milled edge shapes appear to be twisted with respect to the shelf or main tool shapes

Auxiliary Spindle (Pos A/B) Drill Y Offset

Purpose

This calibration step sets the auxiliary spindle *Drill Y calibration* to ensure the drill features are on-axis with the shape. **It needs to be run once for Auxiliary Spindle A, and once for Auxiliary Spindle B.**

Materials Required

- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

Calibration Required When…

- A new auxiliary spindle assembly has been installed
- Drill holes appear to be off axis or different heights between right and left eyes

Auxiliary Spindle (Pos A/B) Groove Y Offset

Purpose

This calibration step sets the auxiliary spindle *Groove Y calibration* to ensure the groove is on-axis with the shape. **It needs to be run once for Auxiliary Spindle A, and once for Auxiliary Spindle B.**

Materials Required

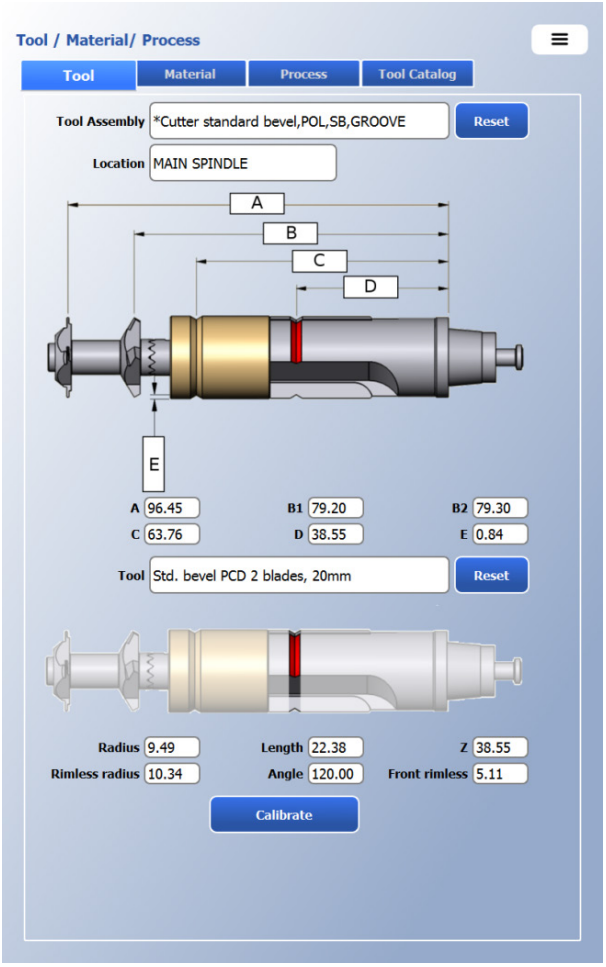
- 0-base plano CR-39 lenses with 4mm center thickness
- Lens angle axis gauge

Calibration Required When…

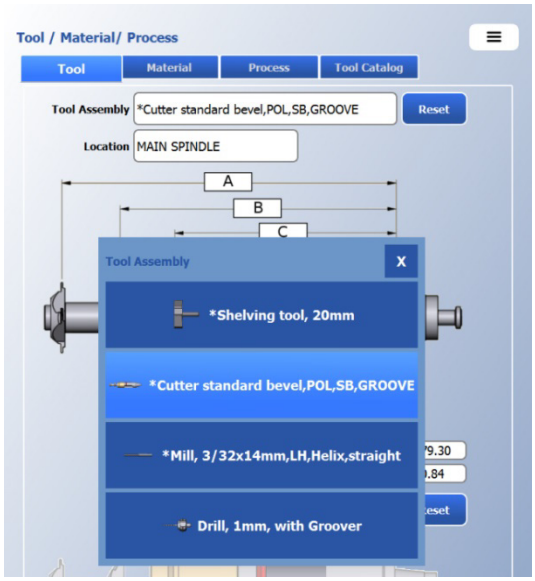
- A new auxiliary spindle assembly has been installed
- The groove appears twisted with respect to the edged shape

Tool Calibration

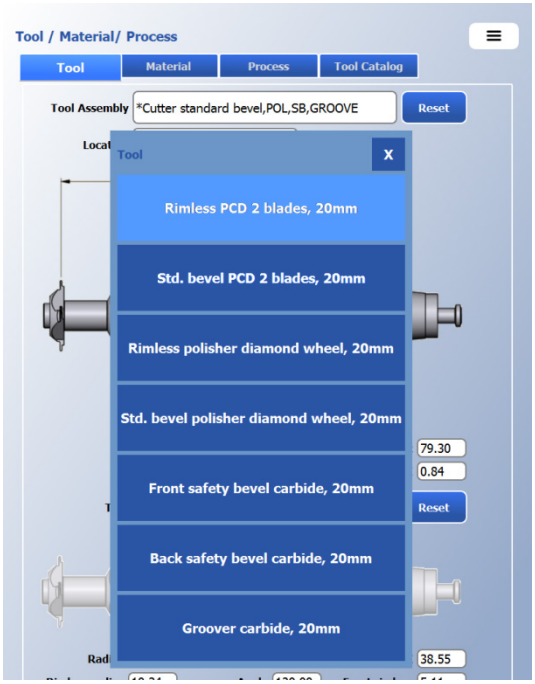
Each tool available in the edger must be calibrated in order to produce lenses of the highest quality. To begin a tool calibration, go to the *Tool / Material / Process / Tool Catalog* menu and select the *Tool* tab. The main cutter tool needs to be calibrated prior to the auxiliary spindle tools.



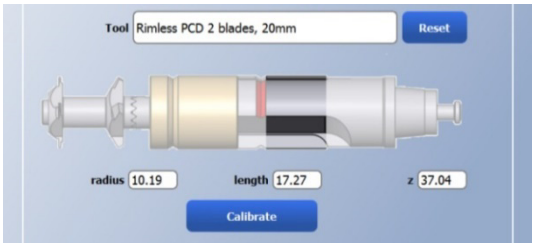
Select the tool assembly that you wish to calibrate from the available tool assemblies in the *Tool Assembly* menu.



The “Rimless PCD 2 blades, 20mm” section of the “Cutter standard bevel, POL, SB, GROOVE” tool should be calibrated before any other tool.



The portion of the tool that you have selected will be highlighted, and the calibration values for that tool will be listed in text boxes below the tool for direct editing. For guided calibration of a tool section, press the *Calibrate* button.



Calibrating Cutting Tools – Rimless, Bevel, Groove, Shelf, Mill, and Safety Bevel

Purpose

Cutting tool calibrations change the radius, width, and axial position of various cutting features.

Materials Required for Calibration

- 0-base plano CR-39 lenses with 4mm center thickness
- Digital calipers
- Eye loupe with graduations for feature placement

Calibration Required When…

- Lenses are not correctly sized off of a cutting tool or section of a cutting tool
- A new cutting tool is installed

Procedure

Calibration of each cutting tool is slightly different. Calibrating tool radius requires cutting a lens and measuring the final diameter. Calibrating feature position requires cutting the feature on a lens (a bevel, for example) and measuring that feature's actual position on the lens with a graduated eye loupe or digital calipers.

Each calibration is guided – follow the prompts on the screen and enter the required values to complete the calibration. Initiating calibration of either the Front or Back Safety Bevel, will actually calibrate both.

Calibrating Polishing Tools – Rimless and Bevel

Purpose

Polishing tool calibrations change the radius, width, and axial position of various polishing features.

Materials Required for Calibration

- 6-base plano Poly lenses with 3mm center thickness
- Digital calipers
- Eye loupe

Calibration Required When…

- Lenses are not correctly sized off of a polishing tool or portion of a polishing tool
- Front or back of the bevel is not being completely polished
- A new polishing tool is installed

Procedure

Calibrating the rimless tool radius requires polishing a rimless lens and measuring the final diameter. Calibrating the bevel tool radius and position requires polishing a beveled lens and first assessing the bevel position and second measuring the final size with digital calipers.

Each calibration is guided – follow the prompts on the screen and enter the required values to complete the calibration. Initiating front or back safety beveling will

Calibration Order

Some calibrations are dependent on others. Use the following guidelines to calibrate items in order.

Tier 1 calibration:

- Calibrate all items in order on the *Advanced* tab.
- Calibrate *Spindle to Chuck (Z) Relationship* through *Probe* in order on the *Tier 1* tab.
- Calibrate the rimless cutter ("Rimless PCD 2 blades, 20mm") on the *Tool/Material/Process* menu *Tool* tab.
- Calibrate the bevel cutter ("Std. bevel PCD 2 blades, 20mm") on the *Tool/Material/Process* menu *Tool* tab.
- Calibrate the *Probe Refinement* on the *Tier 1* tab.

Main Tool Assembly: POL, SB, GROOVE calibration

- Calibrate Tier 1 as described above.
- Calibrate Polish, Safety Bevel, and 20mm groove on the main cutter assembly in any order desired.

Tier 2 calibration:

- Calibrate Tier 1 as described above.
- Calibrate *Auxiliary Spindle to Chuck (XZD) Relationship* through *Auxiliary Spindle D Angle* in order.
- Calibrate *Auxiliary Spindle (Pos A/B) Rough X and Z Offset.*
- Calibrate *Auxiliary Spindle (Pos A/B) X and Z Offset Refinement.*
- Calibrate *Auxiliary Spindle (Pos A/B) Shelf/Mill/Drill/Groove Y Offset* calibrations in any order desired.

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Chapter 6 *Advanced Setup*

Note

Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

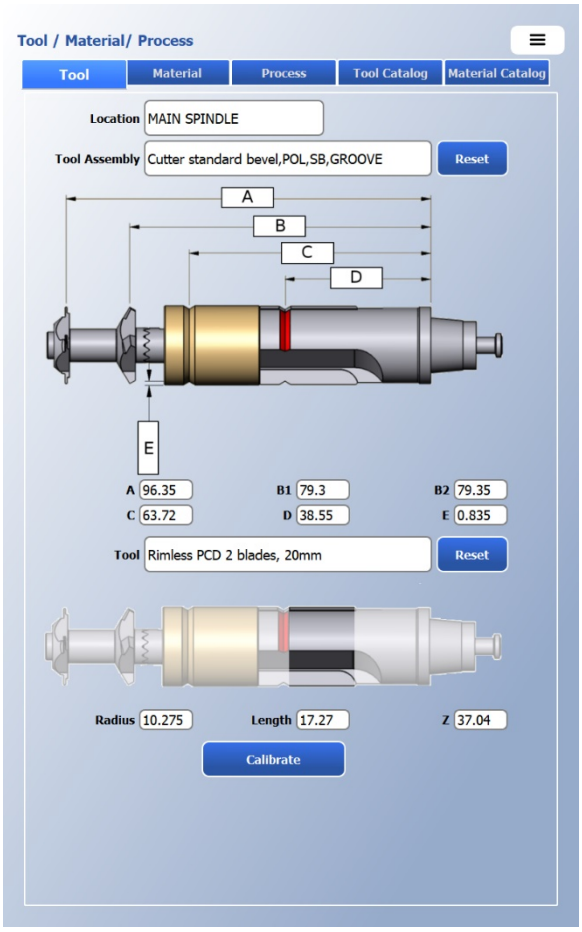
Tool / Material / Process – Tool Tab

The edger is capable of using a number of tools in different tool positions. Geometry and installation location for each tool is available in the *Tool / Material / Process* menu under the *Tool* tab.

Location Select the desired tool location. Selections are “MAIN SPINDLE”, “AUX SPINDLE A”, or AUX SPINDLE B”

Tool Assembly Select the tool assembly that you wish to view, modify, or calibrate. Press the *Reset* button next to this field to set all tool calibration values to the factory defaults.

Tool Select the portion of the tool assembly that you wish to modify. Most tool assemblies in the Auxiliary Spindles have one tool only. All tools installed in the Main Spindle have multiple Tools to select. Press the *Reset* button next to this field to set the tool calibration values for the specified tool to the factory defaults.



In the image on the right, the selected tool assembly is “Cutter Standard Bevel,POL,SB,GROOVE” which is the standard cutter assembly provided with every edger. It is installed in the Main Spindle position.

The selected Tool is “Rimless PCD 2 Blades, 20mm” and the data that is displayed below is tool geometry specific to that section of the cutter assembly. Press the *Calibrate* button on this screen to calibrate the selected portion of the cutter. Each tool section on the cutter assembly must be calibrated separately, and each tool section must be calibrated before it will perform correctly.

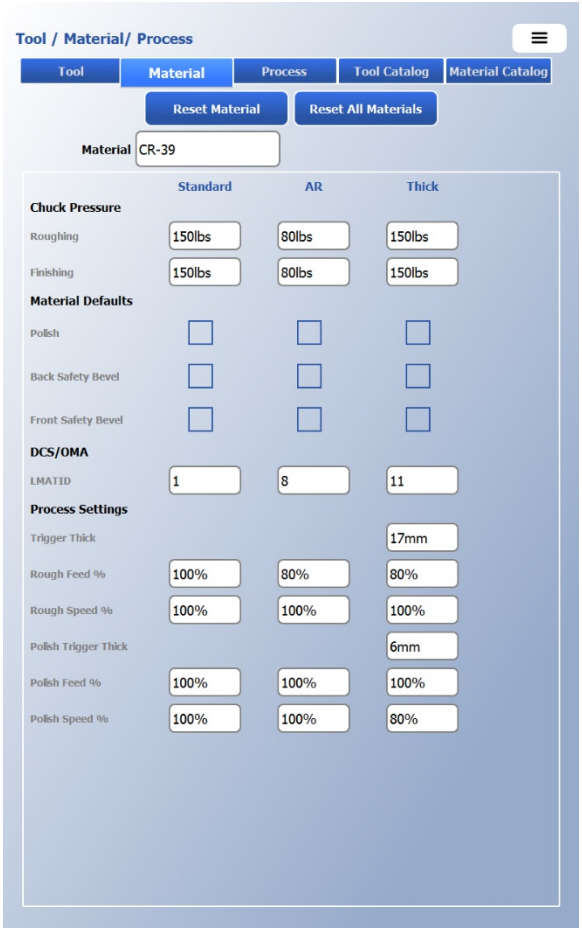
Tool / Material / Process – Material Tab

The edger is provided from the factory with default settings for many materials. These are the recommended settings and should be altered only by qualified personnel. Changes to these material settings will change the machine throughput and lens quality. Each parameter on the *Material* screen can be configured independently for *Standard*, *AR*, and *Thick* lenses. Material settings are available in the *Tool / Material / Process* menu under the *Material* tab.

Chuck Pressure

Roughing The force the machine exerts in clamping the lens during roughing, specified in pounds. For lenses with Anti-reflective Coatings (AR), the pressure can be reduced to prevent cracking or crazing of the lens.

Finishing The force the machine exerts in clamping the lens during finishing, specified in pounds. For lenses with Anti-reflective Coatings (AR), the pressure can be reduced to prevent cracking or crazing of the lens.



Material Defaults

Polish If checked, jobs with the indicated material will be polished by default if no preference (POLISH) is indicated in the job packet.

Back Safety Bevel If checked, jobs with the indicated material will be back safety beveled by default if no preference (PINB) is indicated in the job packet.

Front Safety Bevel If checked, jobs with the indicated material will be front safety beveled by default if no preference (FPINB) is indicated in the job packet.

DCS/OMA

LMATID Enter the LMATID value that correlates with the value defined by the Host. This will ensure the correct material is downloaded for each job.

Process Settings

Trigger Thick Specifies the lens blank thickness in millimeters above which the machine will automatically use the *Thick* processing parameters for roughing.

Use the following parameters to alter the Roughing feeds and speeds based on thickness and AR coatings.

Rough Feed % Enter the feed percentage to be applied for this material against the normal feed during a regular cycle.

Rough Speed % Enter the speed percentage to be applied for this material against the normal speed during a regular cycle.

Polish Trigger Thick Specifies the finished lens thickness in millimeters above which the machine will automatically use the *Thick* processing parameters for Polishing.

Use the following parameters to alter the polishing feeds and speeds based on thickness and AR coatings.

Polish Feed % Enter the feed percentage to be applied for this material against the normal polish feed during a regular cycle.

Polish Speed % Enter the speed percentage to be applied for this material against the normal polish speed during a regular cycle.

Tool / Material / Process – Process Tab

For each tool type, material, and phase the user can specify a number of parameters for how the tool feeds through the lens to remove material. A brief explanation of those parameters follows. Some parameters are available only for certain phases – these parameters will only be displayed when those phases are selected. Process settings are available in the *Tool / Material / Process* menu under the *Process* tab.

There are three *Reset* buttons present, each of which restores default values for the process parameters.

Tool Type Select the desired tool type. Press the *Reset* button to set ALL process settings for ALL materials and ALL phases for the selected *Tool Type* to the factory defaults.

Material Select the desired material. Press the *Reset* button to set ALL process settings for ALL phases for the selected *Tool Type* and *Material* to the factory defaults.

Phase Select the desired phase. Press the *Reset* button to set ALL process settings for the selected *Tool Type*, *Material*, and *Phase* to the factory defaults. (i.e. only the displayed settings).

Note

An individual parameter can also be restored to its default value. Touch the desired text box and select *Default* on the on-screen keypad. Press *Enter* to save or *Cancel* to restore the current value.

Phases

Tool Type: Cutter, Polish, Safety Bevel, Groove, Mill, Shelf
Phase: Roughing, Finishing, Dry Polishing, Wet Polishing

The following parameters are common to all **Phases** except for Drilling. However, the **Spindle Speed** does apply to Drilling too.

General

Spindle Speed Specifies the rotational speed of the tool, in 1,000's of RPM

Spiral-In

The Start Point is defined as the first position of the lens during the cutting phase prior to touching the tool. The Contact Point is defined as the first contact between tool and lens.

Distance	Specifies the radial offset (mm) between the Start Point and the Contact Point.
Speed	Specifies the speed (m/min) between the Start Point and the Contact Point. If Zero, the Spiral Speed will be applied.
Angle	Specifies the angular offset (degrees) between the Start Point and the Contact Point.
Contact Angle	Specifies the shape angle of the Contact Point.

Spiral-Out

The Exit Point is defined as the last contact point between the tool and lens during the cutting phase. The End Point is defined as the last position of the lens during the cutting phase.

Distance	Specifies the radial offset (mm) between the Exit Point and the End Point.
Speed	Specifies the speed (m/min) between the Exit Point and the End Point. If Zero, the Spiral Speed will be applied.
Angle	Specifies the angular offset (degrees) between the Exit Point and the End Point.

Spiral

Feed	Specifies the maximum radial amount of material (mm) to be removed per revolution of the lens. (Only visible if Method is set to “Standard” or “Stepping”)
Speed	Specifies the linear speed (m/min) of the tool on the lens. (Only visible if Method is set to “Standard” or “Stepping”)

Method

Standard	The tool is continually moved toward the lens a specific amount per revolution of the lens.
2 Phase	The tool is continually moved toward the lens a specified amount per revolution of the lens but is divided in two independently controlled phases of a First Cut and Skim Cut.

2 Phase Spiral Options (only visible if Method is set to 2 Phase)

First Cut Feed	Specifies the maximum radial amount of material (mm) to be removed per revolution of the lens during the First Cut.
First Cut Speed	Specifies the Linear Speed (m/min) of the tool on the lens for the First Cut.
Skim Cut Take-Off (X)	Specifies the radial amount of material (mm) that will be removed during the Skim Cut, and cannot exceed the total *Take Off*.
Skim Cut Feed	Specifies the maximum radial amount of material (mm) to be removed per revolution of the lens during the Skim Cut.
Skim Cut Speed	Specifies the Linear Speed (m/min) of the Tool on the lens for the Skim Cut.

Tool Type: Mill
Phase: Advanced Roughing

The following parameters are unique to Advanced Roughing for Milling. The Segmented cycle is designed to identify and remove excess material that was not possible to remove with the larger tool radius during roughing. This ensures an even amount of material is left for the mill during the Finishing phase. Advanced Roughing is automatically invoked for shapes that have special features such as hooks at the nasal or temple.

Segmented

CW Feed — Specifies the maximum radial amount (mm) of material to be removed per pass of the lens during the clockwise cut.

CW Speed — Specifies the Linear Speed (mm/s) of the tool on the lens for the clockwise cut.

CCW Feed — Specifies the maximum radial amount (mm) of material to be removed per pass of the lens during the counter clockwise cut. A negative number will move the tool away by that radial amount from the previous clockwise tool path.

CCW Speed — Specifies the linear speed (mm/s) of the tool on the lens for the counter clockwise cut.

Tool Type: Cutter, Polish, Mill
Phase: Finishing, Dry Polishing, Wet Polishing

The following parameters are unique to Finishing, Dry Polishing, and Wet Polishing for Cutting, Polishing, and Milling.

General

Take off — The total radial amount (mm) of material removed from the lens by the phase.

Tool Type: Groove
Phase: Grooving

The following parameters are unique to Grooving.

Widening

Widening Feed — Specifies how much to widen (mm) the groove per lens revolution when a groove is specified that is wider than the grooving tool.

Tool Type: Shelf
Phase: Shelving

The following parameters are unique to Segmented Shelving which is defined as shelving that doesn't go all the way around the lens. The segmented cycle rotates the lens in both the CW and CCW directions, but typically only cuts in the CW direction (negative CCW Feed).

Segmented

CW Feed	Specifies the maximum radial amount (mm) of material to be removed per revolution of the lens during the clockwise cut.
CW Speed	Specifies the Linear Speed (mm/s) of the tool on the lens for the clockwise cut.
Feed Z Offset	Specifies an offset (mm) to the tool's Z-Axis-Position above the desired shelf. A positive value will offset the tool position only in the clockwise direction. A negative value will offset the tool position only in the counter clockwise direction.
CCW Feed	Specifies the maximum radial amount (mm) of material to be removed per revolution of the lens during the counter clockwise cut. A negative number will move the tool away by that radial amount from the previous clockwise tool path.
CCW Speed	Specifies the linear speed (mm/s) of the tool on the lens for the counter clockwise cut.
Path Extension	Specifies the distance (mm) to extend the Shelf toolpath beyond the shape.

Tool Type: Drill
Phase: Drilling

The following parameters are unique to Drilling.

Entry

Safety Distance	Specifies the gap (mm) between the tip of the drill and the front of the lens at the beginning of the drill operation.
Total Distance	Specifies the total distance (mm, including Safety Distance) over which the Entry drilling parameters are applied.
Tool RPM	Specifies the Rotational Speed of the Tool, in 1,000's of RPM during entry.
Speed	Specifies the plunge speed (mm/s) of the drill during entry.

Drill

Tool RPM	Specifies the Rotational Speed of the Tool, in 1,000's of RPM during drilling.
Speed	Specifies the plunge speed (mm/s) of the drill during drilling.

Pullback	Select “Yes” to have the drill periodically pull slightly out of the hole to clear drilling debris. Select “No” to plunge straight through in a single motion.
Bite Depth	Specifies how deep (mm) into the lens to plunge before pulling back.
Pullback Speed	Specifies the speed (mm/s) to pull back between plunges.

Exit

Safety Distance	Specifies how far (mm) beyond the back of the lens the drill travels after it has pierced through the lens.
Total Distance	Specifies the total distance (mm, including Safety Distance) over which the Exit drilling parameters are applied.
Tool RPM	Specifies the Rotational Speed of the Tool, in 1,000’s of RPM during exit.
Speed	Specifies the plunge speed (mm/s) of the drill during exit.

Widening

Slot Entry Speed	Specifies the speed (mm/s) applied for the first cut on slots.
Method	“CCW” means that the drill feeds counterclockwise (when viewed from the back of the lens) around the hole during widening. “CW” means that the feed is clockwise around the hole.
Feed	Specifies the maximum feed per pass during widening as a percentage of the drill diameter.
Speed	Specifies the linear speed (mm/s) of the drill during widening.
Skim Cut Takeoff	Specifies the widening takeoff (mm) on the final pass of widening.
Skim Cut Speed	Specifies the linear speed (mm/s) of the drill during the final pass of widening.
Pullback	Select “Yes” to have the drill periodically pull slightly out of the hole to clear drilling debris during widening. Select “No” to widen the entire hole or slot depth without pulling back.
Bite Depth	Specifies the depth of cut during widening as a percentage of the drill diameter.
Pullback Speed	Specifies the speed (mm/s) to pull back between plunges.

Tool / Material / Process – Tool Catalog Tab

Tool availability can be managed in the *Tool / Material / Process* menu under the *Tool Catalog* tab. This is typically used when replacing tools.

Available Assembly Types Select this to view a list that contains all the tool assembly types compatible with the edger.

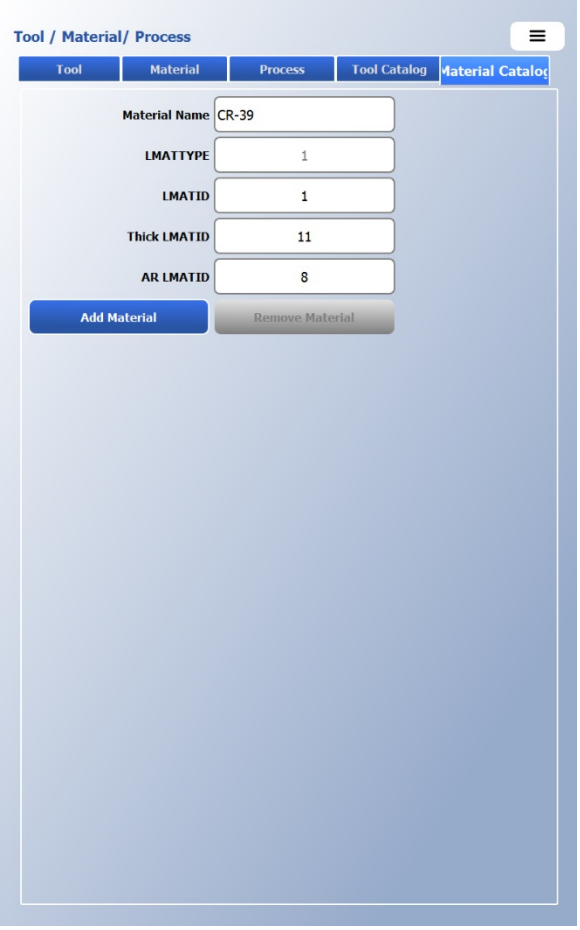
Generated Assembly List This displays a unique identifier of the installed assembly type. The date the tool assembly was added to the edger is displayed below the text box. If the selected assembly type has not been installed, then this text box displays “NONE AVAILABLE”.

Add Press this to make the selected *Available Assembly Types* tool accessible to the edger. The unique identifier and current date will be displayed indicating this tool can be selected on the *Tool* screen. This is typically done when a new tool is installed.

Remove Press this to delete the selected *Generated Assembly List* tool assembly so that it is not accessible to the edger. Once removed, this tool cannot be selected on the *Tool* screen. This is typically done when an old tool is discarded.

Tool / Material / Process – Material Catalog Tab

Lens materials can be managed in the *Tool / Material / Process* menu under the *Material Catalog* tab. This is typically used when matching local DCS material definitions with the lab Host system, or adding / removing lens material types.



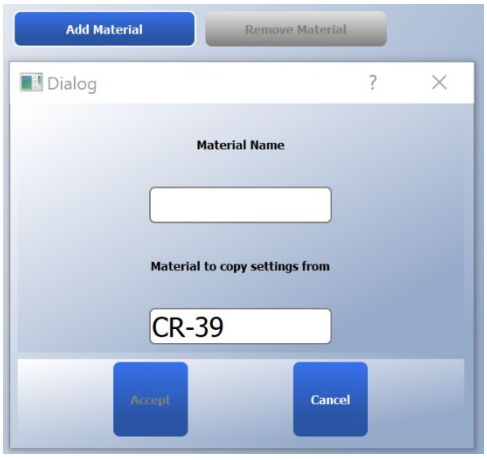
Material Name Select the desired lens material from the currently defined list of lens materials.

LMATTYPE Set to the desired value to match the lab Host system. Pre-defined DCS values may not be edited.

LMATID Set to the desired value to match the lab Host system. If both LMATTYPE and LMATID are present in the DCS packet, LMATID will be used.

Thick LMATID Set to the desired value to match the lab Host system.

AR LMATID Set to the desired value to match the lab Host system.

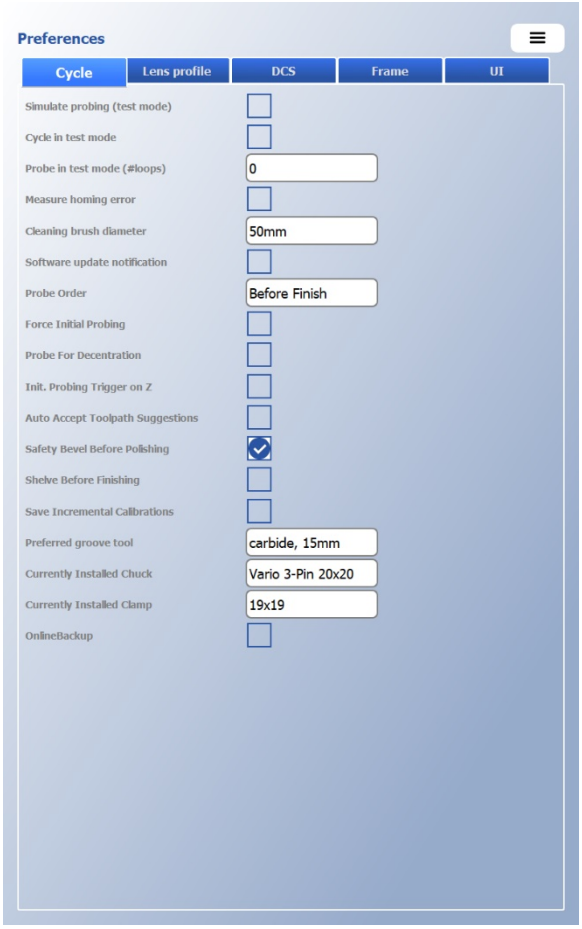


ADD MATERIAL Select to define a new material type. A pop-up box will appear; touch the *Material Name* text box to access the on-screen keyboard and enter the desired new name. All default settings will be based on the selected *Material to copy settings from*, which is an existing material of your choice. Once added, a machine restart is required.

REMOVE MATERIAL Select to remove the material displayed in *Material Name*. Only operator-added materials can be removed. Once removed, a machine restart is required.

Preferences – Cycle Tab

Various setup preferences related to machine cycle behavior are available in the *Preferences* menu under the *Cycle* tab. Some settings are normally hidden, but can be enabled by going to the *Remote Support* tab and initiating *Switch to Technician Mode* (see Chapter 7, Maintenance). "*" indicates a hidden preference that is generally only used for initial setup or diagnostic troubleshooting.



***Simulate probing (test mode)** If checked, the roughing position and feature placement will be based on generator data instead of probe data.

***Cycle in test mode** If checked, the next job will continuously run with a 10 second pause between each cycle until *STOP* is pressed.

***Probe in Test Mode (#loops)** If non-zero, the lens for the next job will be re-probed based on this counter.

***Measure homing error** If checked, the edger will log the homing positions for each cycle compared to the initial homing on boot-up.

Cleaning brush diameter The diameter (mm) of the polish wheel cleaning brush.

Software Update Notification If checked, a notification at machine startup will appear when a new software version is available.

Probe Order Set to *Before Finish* to maximize the accuracy of the bevel/groove placement. Set to *Before Rough* to check for lens cutout before edging. Set to *Both* for both benefits at the cost of extra cycle time.

Force Initial Probing If checked, the edger will perform the Initial Probing phase even if generator data is present. Select this if Host generator data is not trusted.

Probe For Decentration If checked, the edger will perform an extended initial probing where it will determine the block offset relative to the lens center. This helps to minimize the risk of axis slippage on heavily decentered lenses, so it is recommended if generator data is unknown or unreliable.

***Init. Probing Trigger on Z** For internal use only.

Auto Accept Toolpath Suggestions If checked, the edger will suppress operator prompts, and automatically proceed with the suggested modification. For example, if a Base Curve request of 6.0 will not fit on the lens, but 5.5 will, the edger will proceed with the modified toolpath without cycle interruption.

Safety Bevel Before Polishing If checked, the safety bevel phase will precede the polishing phase. This is particularly important for film laminated lenses.

Shelve Before Finishing If checked, the shelving phase will precede the finishing phase. This will limit the edge debris on the lens that comes from shelving, so there is less manual cleanup after edging. However, this will also slightly limit the thickness of a lens that can be shelved, so it may not be appropriate for thicker lenses.

Save Incremental Calibrations Most calibration steps use the currently populated calibration values as a starting point. Some calibrations require multiple steps and set multiple values. If checked, these intermediate values will be saved even if the full calibration step is not completed.

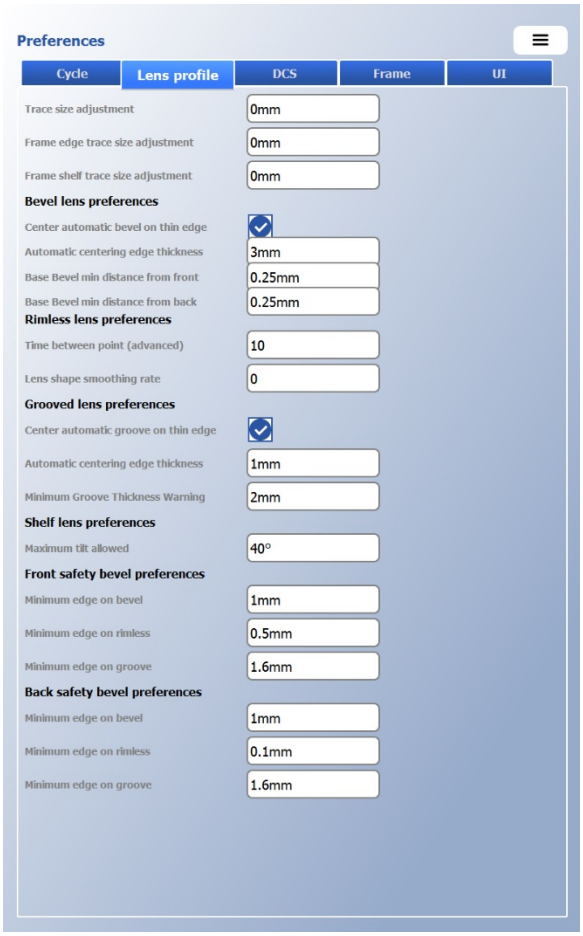
Preferred groove tool Select which grooving tool to use by default. The grooving tool on the main spindle, “carbide 20mm”, or the grooving tool on the auxiliary spindle, “carbide 15mm”. If “None” is selected as the default, the 15mm wheel will be used if installed in the machine. If “carbide 15mm” is selected as the default, but not installed, the *Grooving* phase will appear red on the *Tool* screen.

***Currently Installed Chuck** Select from the list which chuck is currently installed in the edger. This ensures proper tool clearance.

***Top Side Clamp** Select from the list which clamp is currently installed in the edger. This ensures proper tool clearance.

Preferences – Lens Profile Tab

Various setup preferences related to bevel, groove, and safety bevel behavior are available in the *Preferences* menu under the *Lens Profile* tab



Trace Size Adjustment Enter the box size in mm to add to the shape of every job pulled from the Host. Positive numbers increase size, and negative numbers decrease size.

Frame Edge Trace Size Adj Enter the box size in mm to add to the shape of every frame job pulled from the internal frame database. Positive numbers increase size, and negative numbers decrease size.

Frame Shelf Trace Size Adj Enter the box size in mm to add to the shelf of every frame job pulled from the internal frame database. Positive numbers increase size, and negative numbers decrease size.

Bevel lens preferences

Center automatic bevel on thin edge If checked, automatic bevels will be centered in areas of the lens that are less than the *Automatic centering edge thickness*.

Automatic centering edge thickness Specifies the lens edge thickness (mm) to trigger centering for automatic bevels if *Center automatic bevel on thin edge* is checked.

Base Bevel min distance from front Specifies the minimum allowed distance (mm) from the front of the lens to the apex of the bevel when *Bevel* is set to “Base” or “Base %”. Bevels closer than this to the front will be moved back to this value.

Base Bevel min distance from back Specifies the minimum allowed distance (mm) from the back of the lens to the apex of the bevel when *Bevel* is set to “Base” or “Base %”. Bevels closer than this to the back will be moved forward to this value.

Rimless lens preferences

Time between points For internal use only.

Lens shape smoothing rate For internal use only.

Grooved lens preferences

Center automatic groove on thin edge If checked, automatic grooves will be centered in areas of the lens that are less than the *Automatic centering edge thickness*.

Automatic centering edge thickness Specifies the lens edge thickness (mm) to trigger centering for automatic grooves if *Center automatic groove on thin edge* is checked.

Minimum Groove Thickness Warning Specifies the edge thickness (mm) that will trigger a warning to the operator that the lens may be too thin to groove.

Shelf lens preferences

Maximum tilt allowed Specifies the maximum tilt (degrees) of the shelving tool when cutting a shelf.

Front safety bevel preferences

Minimum edge on bevel Specifies the edge thickness (mm) below which no safety bevel will be applied to the front of a beveled lens.

Minimum edge on rimless Specifies the edge thickness (mm) below which no safety bevel will be applied to the front of a rimless lens.

Minimum edge on groove Specifies the edge thickness(mm) below which no safety bevel will be applied to the front of a grooved lens.

Back safety bevel preferences

Minimum edge on bevel Specifies the edge thickness (mm) below which no safety bevel will be applied to the back of a beveled lens.

Minimum edge on rimless Specifies the edge thickness (mm) below which no safety bevel will be applied to the back of a rimless lens.

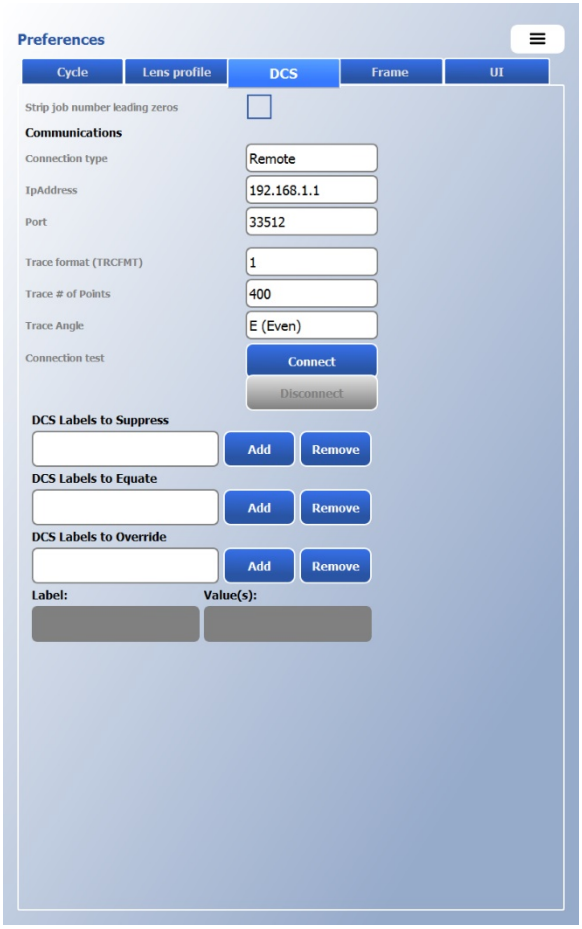
Minimum edge on groove Specifies the edge thickness(mm) below which no safety bevel will be applied to the back of a grooved lens.

Preferences – DCS Tab

The edger utilizes the Vision Council Data Communication Standard, or DCS, to download data from a job server. The job server may be a Host PC or tracer/blocker device. Various setup parameters related to DCS communication are available in the *Preferences* menu under the *DCS* tab

Communications

Strip job number leading zeros Select to strip leading zeros from the job number.



These fields are related to the hardware connection:

Connection Type Select how the machine is connected to a PC, Tracer, or Blocker. Select "None" if there is no connection to a PC or device.

If connected to a PC via Ethernet:

If "Auto-Connect" is selected, the IP address negotiation between the edger and PC will happen automatically.

If "Local" is selected, the displayed *IP Address* and *Port* must be entered on the PC.

If "Remote" is selected, the PC's *IP Address* and *Port* must be entered on the edger.

If connected via Serial:

Select "Serial" if connected to a PC.

Select "Serial-(3B)" if connected to a 3B blocker.

Select "Serial-(4T)" if connected to a 4T tracer.

IP Address This displays the edger IP address as read-only when *Connection type* is set to "Local". This displays the PC IP address as editable when *Connection type* is set to "Remote". Not displayed for any other connections.

Port Defines the port used for Ethernet connections. This is only displayed when *Connection type* is set to "Auto-Connect", "Local", or "Remote".

Baudrate This displays the edger baudrate for all serial connections "Serial", "Serial-(3B)", "Serial-(4T)". This needs to match the baudrate setting on the connected job server. Not displayed for any other connections.

These fields describe the preferences sent during the initialization with a Host.

Trace format (TRCFMT) Select the desired trace radii format for data packets. If set to "1", radii data is requested to be supplied in ASCII format. If set to "2", "3", or "4", the radii data is requested as absolute binary, differential binary, or packed binary format respectively, as defined by the DCS. Set to "1" for packet readability; set to "4" for speed.

Trace # of Points Select the desired number of trace radii to represent the shape. This can be set to "400", "800", or "Both".

Trace Angle Select the desired angle between trace radii. This can be set to Even, Uneven, Creative, or All.

Connection test Press "Connect" to connect to the selected PC or device. Press "Disconnect" to quit the connection.

These fields are used to tailor the initialization process for unique lab situations:

DCS Labels to Suppress For efficient operation or lab integration, it can be convenient to ignore certain DCS labels from the connected PC or device. Press *Add*, and then enter the DCS label to suppress in the dialog window, and press *Accept*. To remove the item from the list, select the DCS label from the list and press *Remove*.

DCS Labels to Equate For efficient operation or lab integration, it can be convenient to equate one DCS label to another from the connected PC or device. Press *Add*, and then enter the DCS label source to equate, and press *Accept*. Then, enter the DCS label to set equal to the source, and press *Accept*. To remove the item from the list, select the DCS label from the list and press *Remove*.

DCS Labels to Override For efficient operation or lab integration, it can be convenient to equate certain DCS labels to a specific value from the connected PC or device. Press *Add*, and then enter the DCS label to override, and press *Accept*. Then, enter the value, and press *Accept*. To remove the item from the list, select the DCS label from the list and press *Remove*.

Label: Displays the current DCS label on the list of *DCS Labels to Override*.

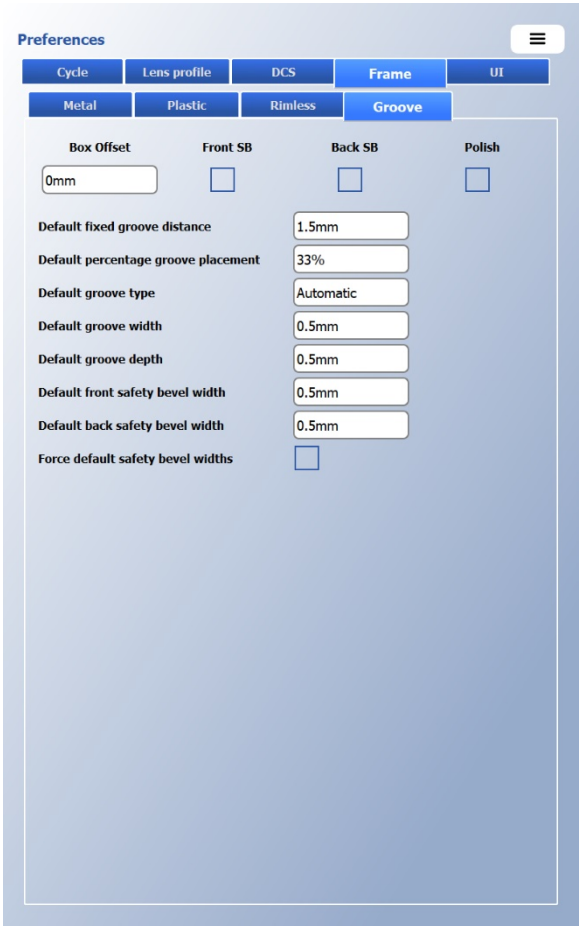
Values: Displays the value of the current DCS label on the list of *DCS Labels to Override*. Touch the text box to edit the value.

Preferences – Frame Tab

Various default preferences related to frame types are available in the *Preferences* menu under the *Frame* tab

Metal, Plastic, Rimless, Groove

The following parameters are common to all frames.



Box Offset Specifies a box offset (mm) to be added to every job with that specific frame type. A positive number will increase the size, a negative number will decrease the size.

Front SB If checked, jobs with the indicated frame type will be front safety beveled by default if not defined (FPINB) in the job packet.

Back SB If checked, jobs with the indicated frame type will be back safety beveled by default if not defined (PINB) in the job packet.

Polish If checked, jobs with the indicated frame type will be polished by default if not defined (POLISH) in the job packet.

Default front safety bevel width Specifies the desired front safety bevel width (mm) for jobs with the indicated frame type if not defined (FPINB) in the job packet.

Default back safety bevel width Specifies the desired back safety bevel width (mm) for jobs with the indicated frame type if not defined (PINB) in the job packet.

Force default safety bevel width If checked, the *Default front/back safety bevel width* will override the values contained in the FPINB or PINB DCS records in the job packet.

Metal, Plastic, Groove

The following parameters are common to Metal, Plastic, and Groove frames.

Default fixed bevel/groove distance Specifies the default distance (mm) from the front of the lens to the bevel-apex/groove-center for jobs with the indicated frame type if not defined (BEVM) in the job packet.

Default percentage bevel/groove placement Specifies the default distance as a percentage (%) from the front of the lens to the bevel-apex/groove-center for jobs with the indicated frame type if not defined (BEVM) in the job packet.

Default bevel/groove type Specifies the default bevel/groove placement selection for jobs with the indicated frame type if not defined (BEVP) in the job packet.

Groove

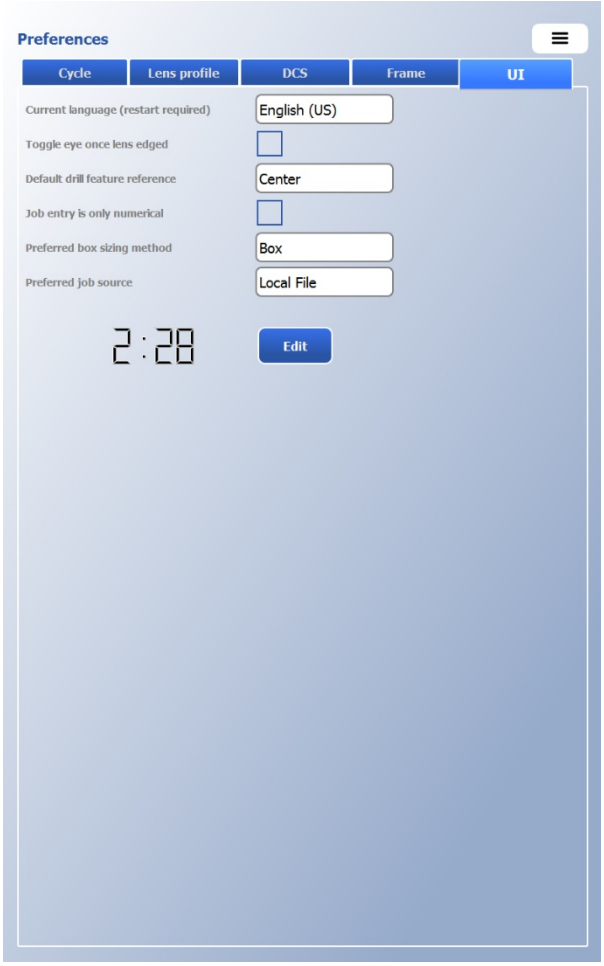
The following parameters are unique to Groove frames.

Default groove width Specifies the default groove width (mm) for jobs with the indicated frame type if not defined (GWIDTH) in the job packet.

Default groove depth Specifies the default groove depth (mm) for jobs with the indicated frame type if not defined (GDEPTH) in the job packet.

Preferences – UI tab

Various setup preferences related to the user interface behavior are available in the *Preferences* menu under the *UI* tab.



Current language (restart required) Select the preferred language for the edger user interface. Choices are “English”, “Deutsch”, “Français”, “Español”, “Português”, "Italiano”, “中國”, “日本語”.

Toggle eye once lens edged If checked, the right eye will automatically toggle to the left eye when the cycle completes.

Default drill feature reference Select from “Center,” “Edge,” or “Box” as the default point of reference to use for drill features.

Job entry is only numerical If checked, job entry will display a keypad with only numbers. When not checked, job entry will display a keyboard with both numbers and letters.

Preferred box sizing method Select from “Box” or “Circumference” to specify the type of size adjustment available on the job screen.

Preferred job source Select from “Local File,” “Host,” “Recut,” “Frame”, or “Chemistrie” to select the default source for job data at boot up.

Edit Select to edit the current time. A dialog window will prompt for both the date and time.

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Chapter 7 *Maintenance*

This chapter includes instructions for daily, periodic, and as-needed maintenance of the edger. A user may safely execute all tasks in this chapter except for those marked as suitable for trained personnel only. Tasks marked as such must only be performed by trained personnel. Before undertaking any maintenance, refer to the Safety Reminders in the front pages of this manual.

Note

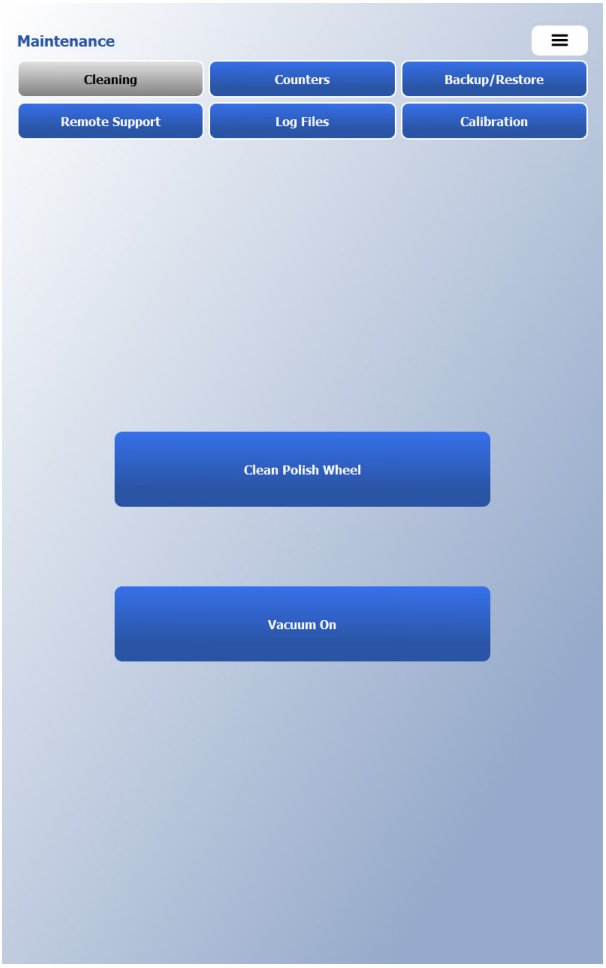
Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

Maintenance – Cleaning Tab

Options for cleaning the machine are available in the *Maintenance* menu under the *Cleaning* tab.

Clean Polish Wheel Select to begin a cleaning cycle for the polish wheel using the abrasive disk provided in your accessory kit.

Vacuum ON/Off Select to turn the vacuum on/off.

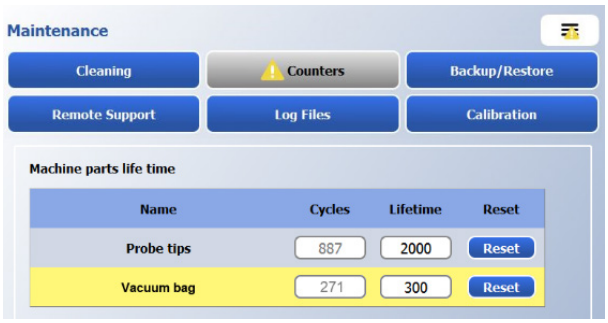


Maintenance – Counters Tab

Various machine counters and material statistics are available in the *Maintenance* menu under the *Counters* tab.

Machine parts / Tool life time

When a part or tool is within 90% of expected life, it will turn yellow and a warning label will appear on the menu directing the user to the *Counters* tab.



When a part or tool exceeds the expected life, it will turn red and a warning label will appear on the menu directing the user to the *Counters* tab.

Material Cycle Counters

The Material Cycle counters keep track of statistics for each material.

Full – Indicates the number of complete cycles.

Recut – Indicates number of multi-cut lenses. Multiple recuts on a single lens counts as 1 Recut.

Stop – Indicates the number of times the STOP button is pressed.

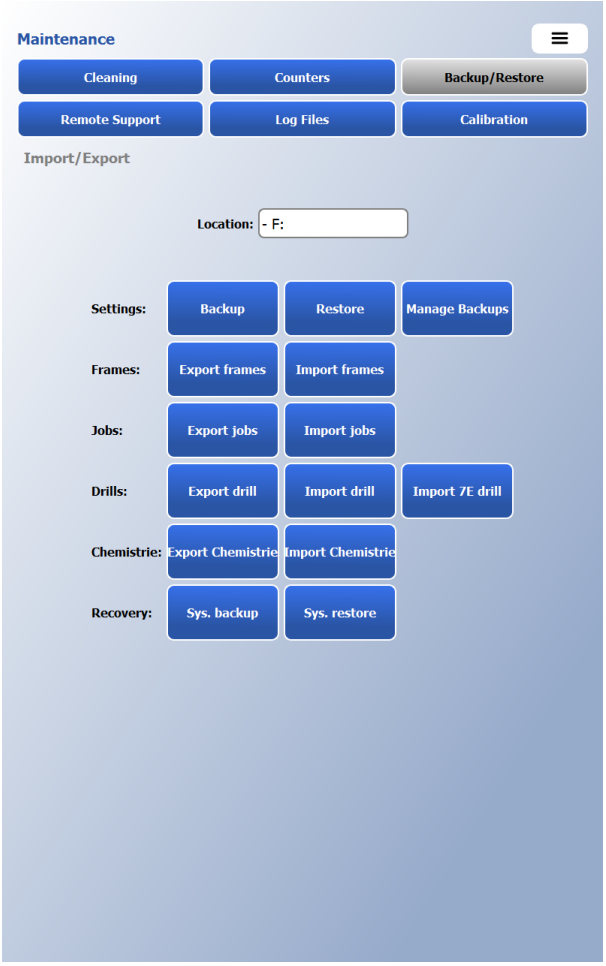
Avg Time – Indicates the average cycle time in seconds.

Press *Reset* next to the given part once it has been replaced to restart the counter at 0.

Each part and tool has a default Lifetime, but this value can be edited by the user to suit the needs and experience of the lab. The default value can always be restored by pressing the *Lifetime* text box and selecting the *Default* button on the keypad. **Extending the life beyond the default lifetime may result in degradation of performance.**

Maintenance - Backup/Restore Tab

Options to backup and restore various machine settings and databases are available in the *Maintenance* menu under the *Backup/Restore* tab.



Locations Select where you want to import or export data from or to. "Local" is the local machine. "F:" is a compatible USB drive plugged into one of the rear ports.

Settings Used to backup the current state of the machine or restore to a previous setup. The file format is 9E_Serial#_Year-Month-Day_Hour-Min-Sec.zip

Backup Settings Select to perform a backup of the current state of the machine to the place selected under locations.

Restore Settings Select to restore settings from the place selected under locations. After pressing the button, select the desired backup to restore.

Manage Backups Select to delete or export saved backups. Exporting backups requires a connected USB device.

Frames Select to Export or Import frame files. This requires a connected USB device. Frame files to be imported should be located in F:\Frames.

Jobs Select to Export or Import job files. This requires a connected USB device. Job files to be imported should be located in F:\Jobs.

Drills Select to Export or Import drill files. This requires a connected USB device. Drill files to be imported should be located in F:\Drills

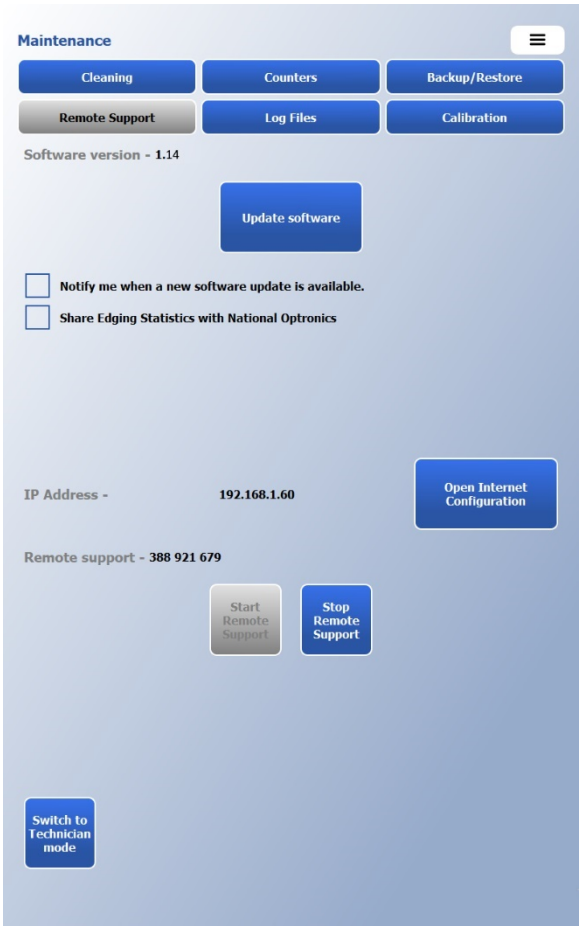
Import 7E Drill Select if importing a drill database that was exported from a 7E. This requires a connected USB device. The DRILLDB.DAT drill database should be located in F:\Data

Chemistrie Select to Export or Import Chemistrie drill files. This requires a connected USB device. Chemistrie files to be imported should be located in F:\Chemistrie

Recovery Select to Backup or Restore the entire system. This requires a connected USB device. The file format is SystemBackup.zip

Maintenance - Remote Support Tab

Software updates and remote service are available in the *Maintenance* menu under the *Remote Support* tab.



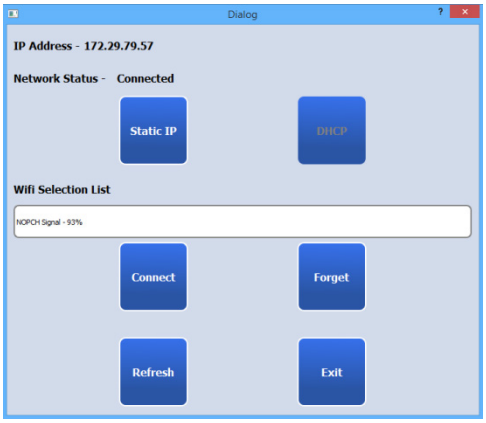
Update Software Select to open a dialog box to display any available software updates in the *Installer File* text box. If the machine is connected to the internet, online software updates will be listed as "[Internet] QM-X3_vX.X.X.X.exe" If a local USB contains an available software update, it will be listed as "[USB] QM-X3_vX.X.X.X.exe" Select the update that you want to apply from the list. If *New Installers Only* is checked in the dialog box, software versions will be restricted to newer versions than the current version.

Notify me when a new software update is available If checked, the user will be prompted at startup to update the software with a new version if one is available. Only works with the machine connected to the internet.

Share Edging Statistics with National Optronics If checked, the latest backup will be uploaded to the manufacturer during machine bootup. This is typically used when beta testing a new feature or upgrade.

Open Internet Configuration Opens a dialog box to allow configuration to a network. The assignment of the IP Address is DHCP by default. To assign a specific IP Address, press *Static IP* and enter the required information. To return to a dynamic IP address assignment, press *DHCP*. When connected to a network, the IP Address will be displayed.

If a USB WIFI adapter is installed, the *Wifi Selection List* text box will be displayed. Select the desired connection. If connecting for the first time, the user may be prompted for a password. Consult local IT personnel for this information.



Remote Support Select the buttons on this screen to *Start Remote Support* and *Stop Remote Support*. An internet connection is required for remote support. Use remote support only as directed by the manufacturer's service personnel. When remote support is active, the remote support ID will be displayed.

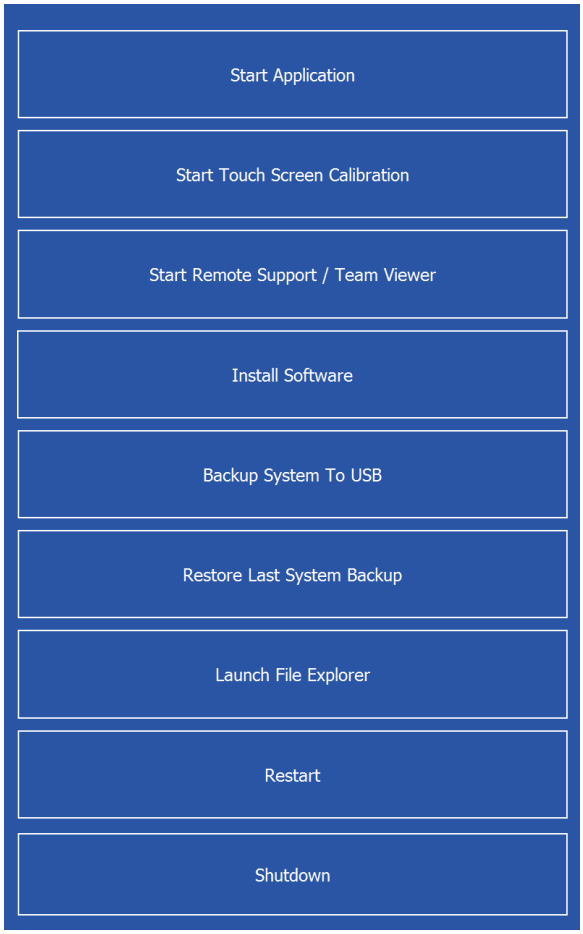
Switch to Technician mode Select this to enable access to additional features. This is typically only required for advanced technical personnel. Once pressed, the user is prompted for a password. Once activated, additional screen settings are available:

- in the *Preferences* menu under the *Cycle* tab
- in the *Maintenance* menu under the *Calibration* tab (*Advanced* sub-tab)
- in the *Maintenance* menu under the *Remote Support* tab (*Exit Application* button)

Exit Technician mode Only visible when in Technician mode. Select to disable access to the additional screen settings.

Exit Application Only visible when in Technician mode. Select to close the software and return to a basic interface, allowing touch screen calibration and other background functions. **Do not select this unless instructed by Technical Services.**

Technician Mode Interface:



Start Application Select to go back to standard interface.

Start Touch Screen Calibration Select to recalibrate the touch screen. Follow on-screen prompts.

Start Remote Support / Team Viewer Select to allow remote connection for external technical support.

Install Software Select to install software that is loaded on an external USB drive.

Backup System to USB Select to backup the entire system to an external USB drive. The file will be saved as SystemBackup.zip.

Restore Last System Backup Select to restore the entire system from an external USB drive. A valid SystemBackup.zip must be present on the USB. **An invalid backup may render the unit inoperable.**

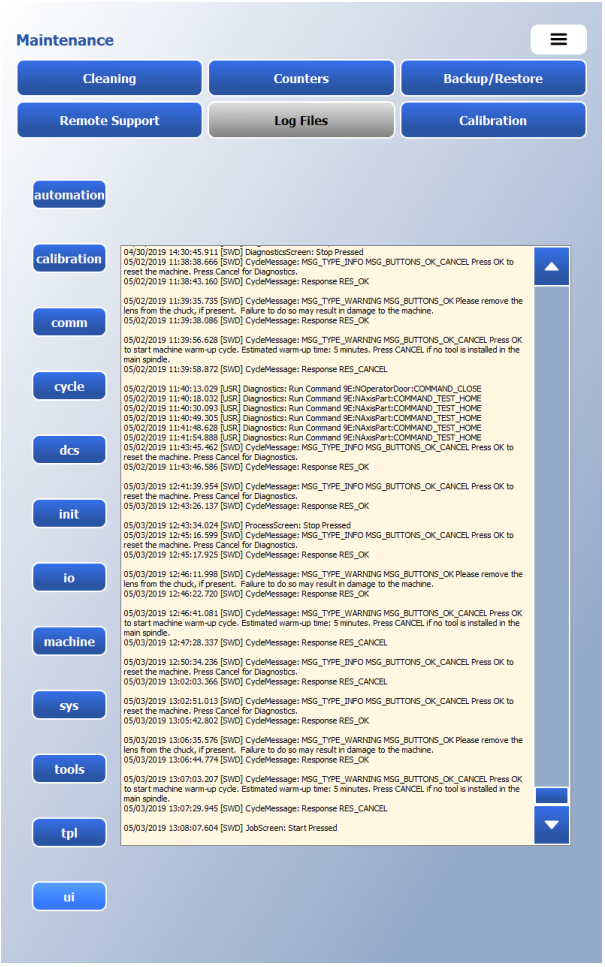
Launch File Explorer Select to gain direct access to the computer file structure. **Improper changes may render the unit inoperable.**

Restart Select to reboot the unit

Shutdown Select to shutdown the unit. Turn off the power switch once the screen shuts down.

Maintenance - Log Files Tab

The edger logs a significant amount of data throughout normal operation, and places this information in various log files. These files are available in the *Maintenance* menu under the *Log Files* tab. Press the button on the left corresponding to the log you wish to view. The log will appear in the window on the right side of the screen and displays the most recent activity at the bottom. Use the scroll bar on the right to move up and down the file. The log window will not refresh automatically. To refresh the window, select another log, and then reselect the desired log.



Maintenance – Calibration Tab

See **Chapter 5** for details about the *Calibration* tab.

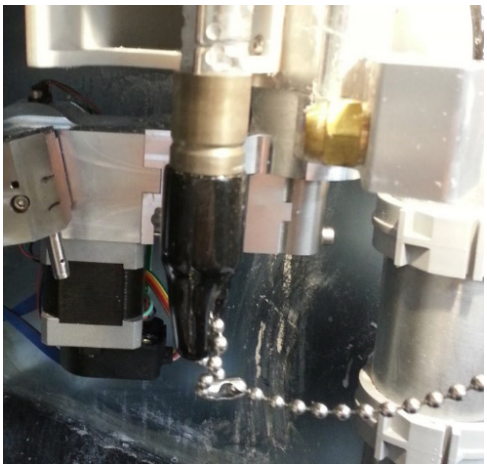
Safety Check After Maintenance

After any edger maintenance, perform a visual inspection to ensure that the machine is in a safe state for operation before powering the edger on. Check the following

1. All maintenance and calibration tools must be removed from the edger, both in the cutting chamber and under the lid.
2. The service door must be closed and latched.
3. The lid must be closed and latched.
4. The electrical cover must be securely installed. All screws for securing the cover must be installed (back of the machine) and all keyhole fasteners must be correctly registered (front of the machine).
5. The tool must be installed in the spindle and free from any obstructions to rotation, packing materials, covers, or other debris. Any safety covers must be removed from the cutter.

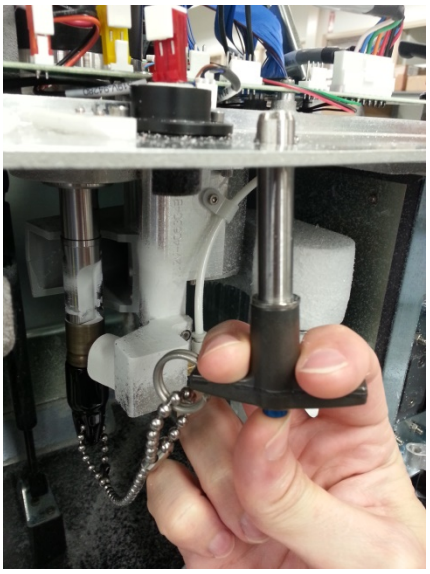
On power on, the edger will reset. If the edger resets without error, it is safe for operation.

Installation and Use of the Cutter Safety Cap



The standard cutter on the edger has sharp edges not only for roughing but for safety beveling and grooving as well. The small points on the safety bevel and grooving tool should be covered with the safety cap provided in the accessory kit before any internal maintenance is performed on the machine.

1. Place the rubber cap over the end of the tool.
2. With the service door and lid both open, install the T-handle plunger into the hole in the main plate. Install with the T-handle facing down. Depress the button in the middle of the T-handle to allow installation.
3. Before attempting to close the service door or lid, remove the T-handle plunger from the main plate by depressing the button in the middle of the T-handle and withdrawing the plunger from the hole. Remove the rubber cap from the end of the tool.



Failure to remove the rubber cap from the end of the tool before running a job or turning on the spindle will result in severe damage to the tool and to the spindle.

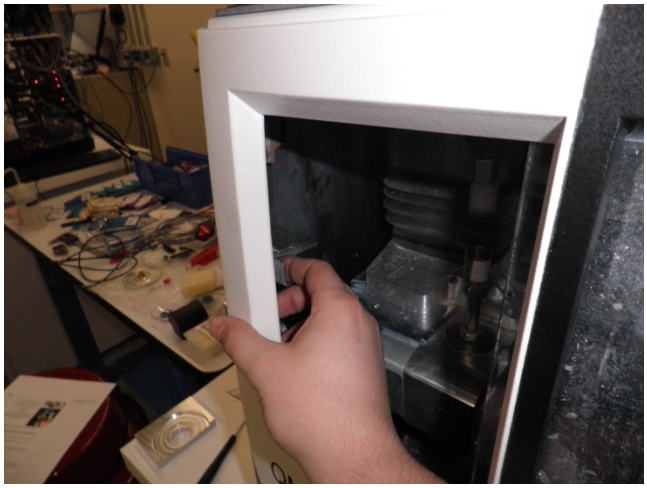
Section 1: Daily Cleaning & Maintenance of the Edger

Opening and Closing the Edger for Cleaning and Maintenance

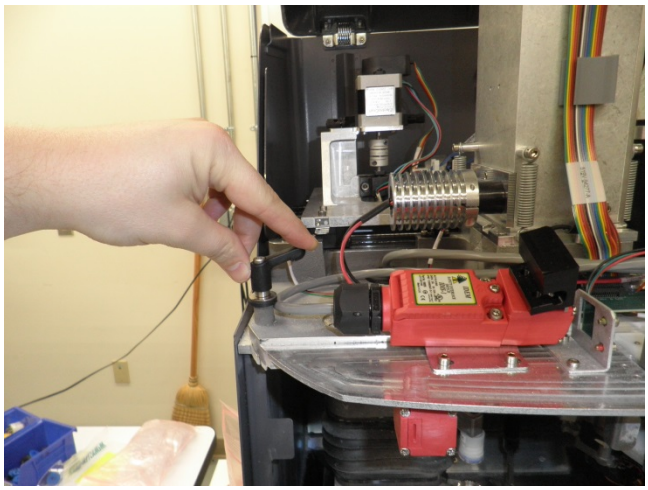
Opening the Edger

1. Disengage the lid latch inside the edger and lift the lid until it is clear of the service door (25mm / 1 in).

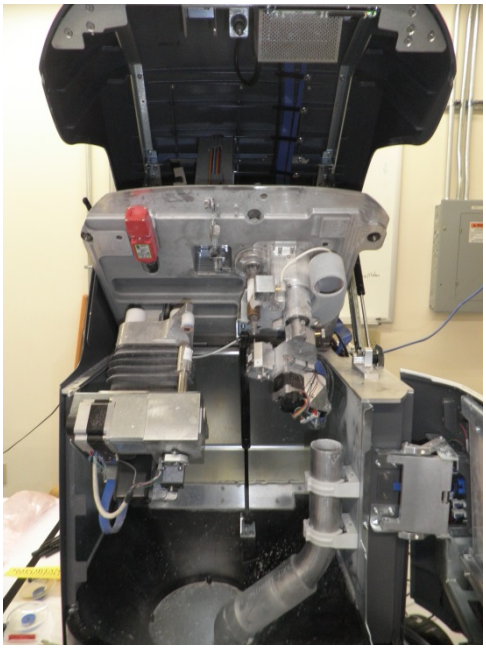
2. Disengage the service door latch and fully open the service door to access to the cutting chamber.
3. Install the cutter safety cap.



4. If full access is desired, fully open the lid and latch it in the highest position and turn the main plate locking handles counter-clockwise until the main plate locking screws disengage.



5. Gently raise the main plate until it stops.



Whenever opening the lid, prior to raising the main plate make sure the lid is latched in the highest position. Latching in any other position could result in damage to the connector and cable on the top of the probe.

Closing the Edger

1. If open and raised, gently close the main plate until it is horizontal.
2. Reinstall both of the main plate locking screws by turning the main plate locking handles clockwise until hand tight. Make sure that the locking handles face directly to the back of the machine.
3. Remove the cutter safety cap.
4. Close the service door, making sure that the service door latch engages.
5. Close the lid, making sure that the lid latch engages.

Cleaning the Edger

Keeping the edger clean is the largest single component in proper maintenance. Thorough daily cleanings are strongly recommended and will both prevent many service problems and greatly extend the service life of the edger.

To clean the interior, follow these steps. Skip steps 2-5 if you do not wish to use the vacuum to clean the inside of the edger.

1. Open the edger.
2. Remove the 1½-inch hose from the vacuum canister's inlet and install the 1½-inch hose fitted with the crevice tool.
3. From the *Maintenance* menu, C*leaning* tab, select *Vacuum On*.
4. Vacuum the debris from the inside of the edger with the crevice tool, being careful not to disturb the control wiring. Use the accessory kit soft-bristle brush to help loosen debris.
5. When you are done vacuuming, from the *Maintenance* menu, *Cleaning* tab, select *Vacuum Off*.
6. Clean around the mister nozzle with a cloth, removing any debris.
7. The interior and exterior may be cleaned with a damp cloth. Do not use abrasives or detergents.
8. Close the edger.

Cleaning the Polishing Wheels

Clean the polishing wheel when experiencing poor polish quality and when there is visual evidence of lens material buildup.

Cleaning the Polishing Wheels with the Brass Cleaning Brush

Use the Brass Cleaning Brush from the Accessory Kit to clean light buildup of material.

Cleaning the Polishing Wheels with the Cleaning Wheel

Use the Brush Wheel from the Accessory Kit to clean heavy buildup of material.

To clean the polishing wheel, follow these steps:

1. Attach the Cleaning Block to the circular Cleaning Wheel (both are in the Accessory Kit); then chuck the Cleaning Wheel.
2. Go to the *Maintenance* menu, *Cleaning* tab. Press the *Clean Polish Wheel* button.
3. Follow the on-screen prompts.
4. Go to the Job screen. Use the internal shape 002 to edge and polish a poly lens.
5. If not satisfied with finish, repeat Steps 1-3 up to four times.

Checking the Probe Tip for Wear

If excessive wear is present, replace the worn item. See **Probe Tip Replacement (Trained Personnel Only)** later in this chapter. For information about calibration, refer to Chapter 5, "Calibrating the Edger."

Checking the Clamp Pad

If the pad is torn or loose, replace with a fresh pad. To replace the pad, apply outward pressure to the edge of the pad and pull the old one out. Press the new one in its place.

Section 1: Commonly Performed Maintenance Tasks

Changing the Cutter Body (Trained Personnel Only)

The cutter body (with blades and polish hub) needs to be changed approximately every 15,000 cycles for the standard 2-flute diamond blade

All of the cutting surfaces of the tool are extremely sharp. Do not hold the tool by these edges with your bare hand or you may be injured. Wear a cut-resistant glove when handling cutters or use other measures to prevent contact with the sharp edges.

Note

We ***strongly*** recommend using only manufacturer approved cutter bodies. These bodies are machined, ground, sharpened and balanced to strict standards. Using alternative cutter bodies may cause size, bevel, and finish problems or may result in permanent damage to the spindle bearings or tool interface.

To change the cutter, follow these steps:

1. Open the edger.
2. Rotate the tool until the small dimples on the spindle and tool are both facing you.
3. With one hand, hold the tool in place to prevent it from falling in the steps below.
4. Using a 3mm hex driver, loosen the screw that holds the cutter body into the spindle. Turn this locking screw counter-clockwise until the tool is loose enough to remove easily.
5. Inspect the inside of the spindle and clean with a soft clean cloth. Ensure that there is no debris in the internal cone or on the flat face of the tool interface.
6. Inspect the tool to be installed and clean the tool interface with a soft clean cloth. Ensure that there is no debris on the external cone or on the flat face of the tool interface.
7. Hold the tool to be installed into the spindle interface, keeping it as straight as possible. Make sure that the small dimples on the spindle and tool are lined up before proceeding.

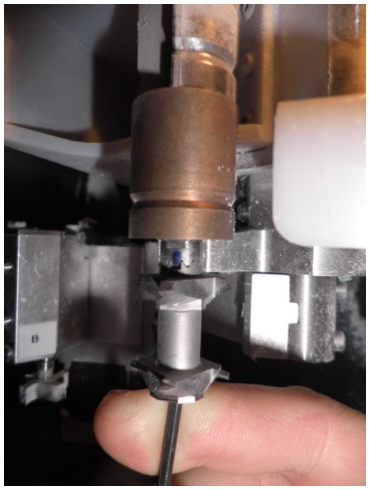
8. Using the torque limited 3mm hex driver provided in the accessory kit, slowly tighten the screw that holds the cutter body into the spindle. Turn this locking screw clockwise until the torque driver clicks indicating that the required 3.8 N-m holding torque has been achieved.

Always use the correct torque driver (provided in the accessory kit) to tighten the tool into the spindle at 3.8 N-m of torque. Do not use a standard T-handle or L-handle hex key to drive the holding screw. Too much or too little torque will disturb the precision balance of the tool and may result in damage to spindle bearings when the tool is used at high speed.

9. Reset the *Cutter*, *Polish Wheel*, *Back Safety bevel*, *Front Safety bevel*, *Groove (20mm)* counters on the *Maintenance* menu *Counters* tab.
10. Perform the required calibrations for the newly installed tool. See **Chapter 5 – Calibration**.

Changing the Grooving and Safety Bevel Cutter on the Tool Body (Trained Personnel Only)

The grooving and safety bevel cutter needs to be changed approximately every 1,000 cycles.

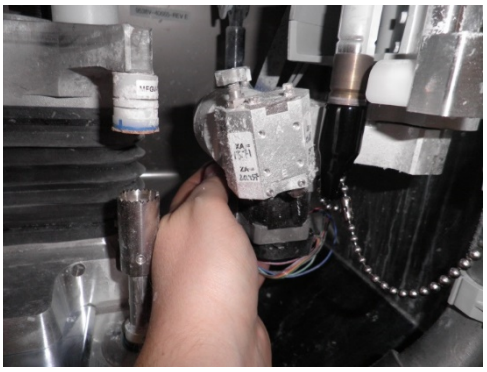


All of the cutting surfaces of the tool are extremely sharp. Do not hold the tool by these edges with your bare hand or you may be injured. Wear a cut-resistant glove when handling cutters or use other measures to prevent contact with the sharp edges.

To change the grooving and safety bevel cutter on the tool body, follow these steps:

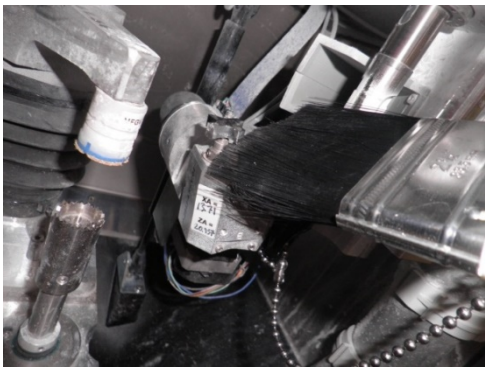
1. Open the edger.
2. Hold the spindle shaft to prevent it from rotating.
3. Remove the axial screw holding the grooving/safety bevel combination cutter by turning it counter-clockwise until it is fully disengaged.
4. Hold a new grooving/safety bevel combination cutter in place. Line up the notch on the combination cutter with the small flat near the end of the cutter body.
5. Install the axial screw to hold the grooving/bevel combination cutter in place. Tighten firmly with a hex driver.
6. Close the edger.
7. Reset the *Back Safety bevel*, *Front Safety bevel*, *Groove (20mm)* counters on the *Maintenance* menu *Counters* tab.
8. Perform the required calibrations for the newly installed tool. See **Chapter 5 – Calibration**.

Changing the Drill, Shelf Tool, and Mill



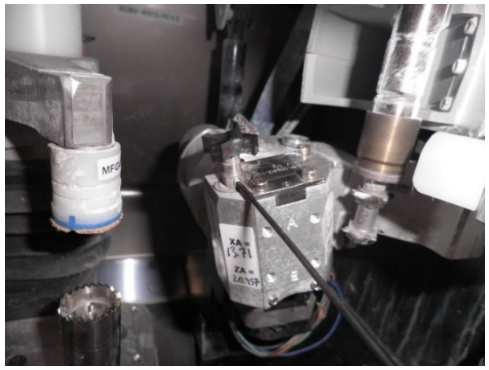
The drill will need to be changed approximately every 500 drill cycles. The shelf tool will need to be changed approximately every 1,000 shelf cycles, and the mill tool will need to be changed approximately every 250 milling cycles.

All of the cutting tools are extremely sharp. Do not hold the tools by these edges with your bare hand or you may be injured. Wear a cut-resistant glove when handling the tools or use other measures to prevent contact with the sharp edges.



To change the drill, mill, or shelving tool, follow these steps:

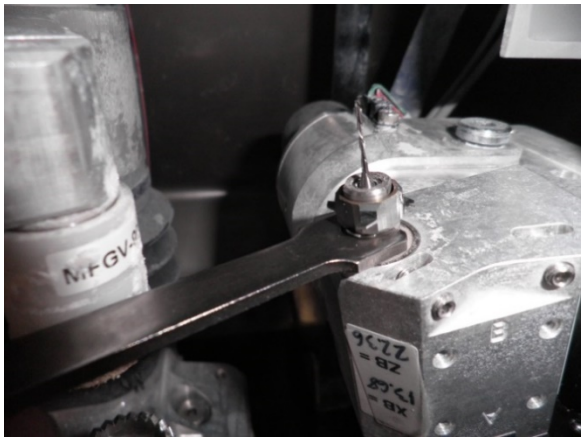
1. Open the edger.
2. Install the cutter safety cap.
3. Pivot the auxiliary spindle assembly forward by hand until it hits the hard stop (shown here with the Shelf tool up).
4. Brush any debris off of the area around the tool to be changed.
5. Loosen the set screw that is holding the tool in place two full turns using a 1.5mm hex key. Do not use ball end hex keys on these set screws when loosening or tightening.
6. Remove the tool by pulling it straight out of the auxiliary spindle shaft.
7. Install a new tool in the auxiliary spindle. Make sure that the flat on the tool shank is oriented towards the set screw in the auxiliary spindle shaft.
8. Tighten the set screw using a 1.5mm hex key. The set screw must be tight and clamped on the flat on the tool shank. Do not overtighten this screw.
9. Push the auxiliary spindle assembly back to the park position by hand.
10. Remove the cutter safety cap.
11. Close the edger.
12. Reset the appropriate *Drill (1mm), Shelf (20mm), or Mill (3/32)* tool counter on the *Maintenance* menu *Counters* tab.
13. Perform the required calibrations for the newly installed tool. See **Chapter 5 – Calibration**.



Changing the Groover on the Auxiliary Spindle

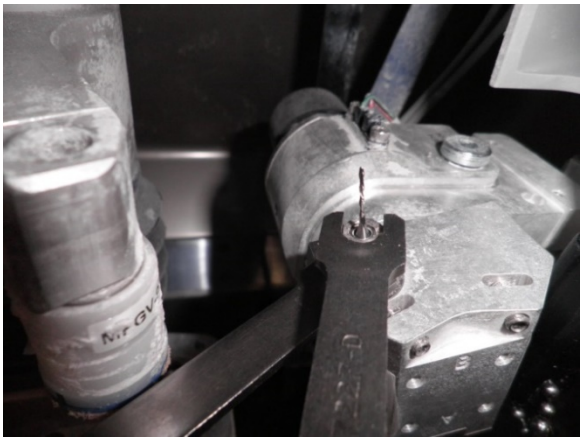
The groover on the auxiliary spindle will need to be changed approximately every 1,000 groove cycles.

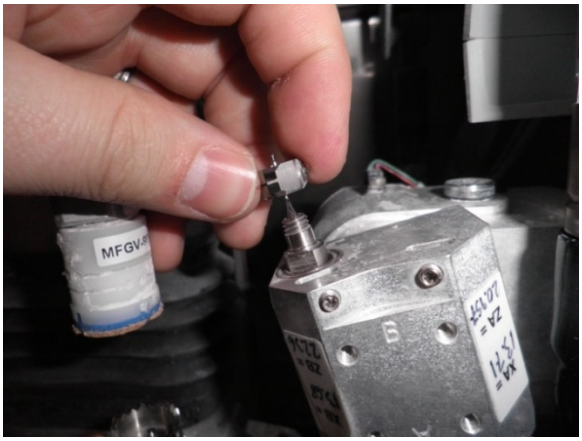
All of the cutting tools are extremely sharp. Do not hold the tools by these edges with your bare hand or you may be injured. Wear a cut-resistant glove when handling the tools or use other measures to prevent contact with the sharp edges.



To change the grooving and safety bevel cutter on the tool body, follow these steps:

1. Open the edger.
2. Install the cutter safety cap.
3. Pivot the auxiliary spindle assembly forward by hand until it hits the hard stop.
4. Brush any debris off of the area around the groove tool to be changed.
5. Using one of the provided wrenches, hold the auxiliary spindle by the flats to prevent it from loosening.
6. Using a second wrench, remove the retaining nut that is holding the groover in place by rotating it counter-clockwise. Remove the nut completely.
7. Carefully remove the old groover from the machine, carefully noting the orientation of the grooving teeth.
8. Install a new groover, making sure that the grooving teeth are oriented the correct direction.
9. Tighten the retaining nut using the two wrenches as above.
10. Reset the *Groove (15mm)* counter on the *Maintenance* menu *Counters* tab.
11. Perform the required calibrations for the newly installed tool. See **Chapter 5 – Calibration**.



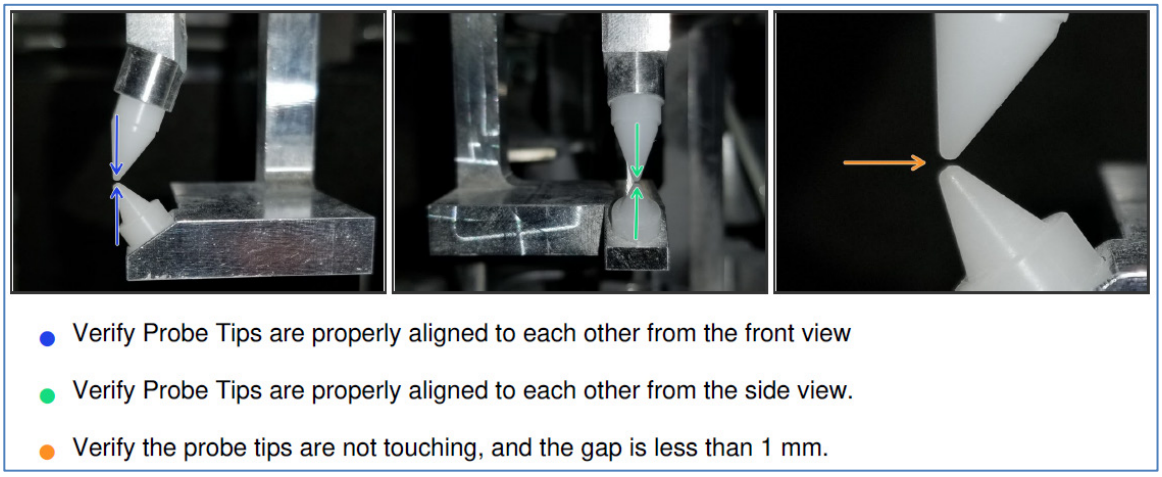


Probe Tip Replacement (Trained Personnel Only)

Replace the probe tips when bevel placement seems erratic and probe calibration does not fully correct the problem. Probe tips should have symmetrical rounded tips with a small radius. Cut or gently rounded tips are a sign for replacement.

Replace the probe tips by following these steps:

1. Through the *Diagnostics* menu, *Probe* tab, press the *Lower* button to lower the probe.
2. Open the edger.
3. Unscrew the tip from the lower probe arm using a 6mm open end wrench.
4. Install a new lower probe tip finger tight, and then fully tighten using the 6mm open end wrench. Note that the upper and lower probe tips are different!
5. Repeat steps 3-4 for the upper probe tip.
6. Verify proper probe tip alignment:



7. Close the edger.
8. Reset the *Probe tips* counter on the *Maintenance* menu *Counters* tab.
9. Perform the required calibrations for the newly installed probe tips. See **Chapter 5 – Calibration.**

Changing the Vacuum Bag

The vacuum bag needs to be changed approximately every 300 cycles.

Wear an appropriate dust mask and eye protection when changing the vacuum bag, especially if you are sensitive to dust particles since the dust is small particles of plastic.

Change the vacuum bag when it gets full by following these steps:

1. Turn the vacuum's power switch off.
2. Disconnect the vacuum hose from the vacuum.
3. Undo the clips holding the vacuum head on the vacuum canister.

4. Lift the vacuum head off the vacuum canister and set it aside.
5. Pull the bag back from the inlet fitting.
6. Lift the large bag out and dispose of it.
7. Replace it with a new bag (60-053-022). [Bag and Filter 10-Pack Set Part 92-008-416, 25-Pack 92-007-959]
8. Examine the vacuum head that you set aside in Step 4 above. There is a steel ring, or removable zip tie securing a paper filter. Remove the steel ring or zip tie. Pull the paper filter off, and dispose of it.
9. Replace it with a new filter (60-053-021), and secure it with the provided means.
10. Reinstall the vacuum head on the canister, aligning the inlet and exhaust holes.
11. Reconnect the vacuum hose.
12. Turn the vacuum's power switch back on and close the cabinet.
13. Reset the *Vacuum bag* counter on the *Maintenance* menu *Counters* tab.

Replacing the Coolant Filter

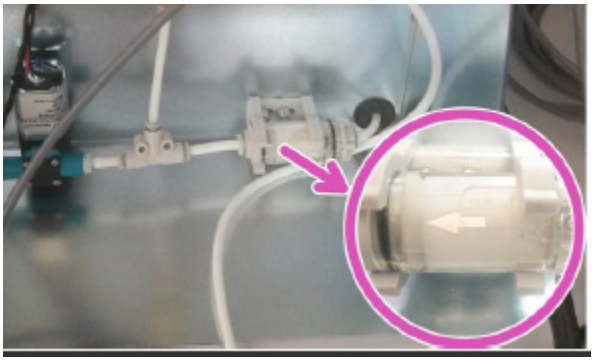
Approximately every six months or as needed, replace the water filter.

Note

Small amounts of debris can get into the coolant reservoir during normal use. You may need to change the filter more often than every six months if you see a significant accumulation of debris in the filter or notice restricted water flow.

To change the filter, follow these steps:

1. Disconnect the fluid delivery system from the edger. Disconnect both the power wires and the fluid delivery tube where it enters the edger.
2. Drain the fluid delivery system by removing the filler cap and dumping the water into an appropriate container.
3. The water filter will likely still have some water in it even after draining the system, so perform the next steps in a location where some water drips will not cause a safety hazard.
4. Remove the fluid delivery hose from the inlet of the water filter by using the push-to-connect fitting.
5. Remove the fluid delivery hose from the outlet of the water filter using the push-to-connect tube coupling.
6. Remove the water filter from the fluid delivery system.
7. Install a new water filter on the fluid delivery system.
8. Reinstall the fluid delivery hoses to the inlet and outlet of the water filter, ensuring that the flow arrow is oriented properly toward the pump.
9. Reconnect the fluid delivery system to the edger. Reconnect both power and the fluid delivery tube.
10. Refill the fluid delivery system. Follow the instructions in **Chapter 2** to prime the system and ensure that fluid is flowing. Check for leaks while priming the fluid delivery system.



Section 2: As Needed Maintenance

Note

Many of the procedures below require or allow interaction with sensitive electronic components inside the edger. When servicing electronic components of the edger, observe proper precautions for handling electrostatic sensitive devices and preventing electrostatic discharge (ESD), more commonly referred to as static electricity.

Opening /Closing the Electrical Enclosure (Trained personnel only)

The electronic control system for the edger is located on the right side of the edger and is covered by the electrical cover. Certain as-needed maintenance operations require you to remove the electrical cover.

To open the electrical enclosure, follow these steps:

1. Turn off the power switch on the back of the edger.
2. Remove all electrical connections from the back of the edger, including the power cord to disconnect from mains power.
3. Open the edger lid and lock it in the highest open position.
4. Open the edger service door to nearly its fully open angle.
5. Remove the 4x M4 screws holding the electrical cover to the back of the edger.
6. Remove the electrical cover by sliding it slightly back to disengage the three keyhole fasteners on the case and then leaning it to the right to disengage it from the edger base.

Removing the electrical cover exposes components that are connected to the equipment mains power. Do not remove the electrical cover without first disconnecting the mains power by unplugging the power cord from the edger. Do not plug the power cord into the edger while the electrical cover is removed. Doing so creates a risk of electrical shock to the user.

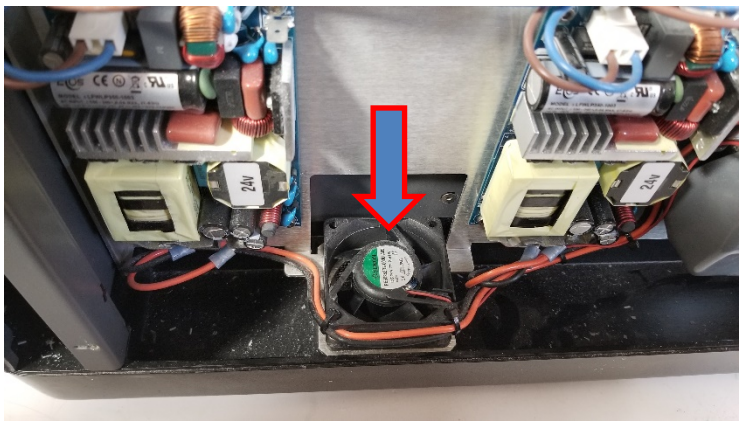
To close the electrical enclosure, follow these steps:

1. Install the electrical cover by resting its lower lip on the inside of the edger base, slightly back from its installed position. Lean the electrical cover slightly to the right.
2. Orient the cover front to back so that the three keyhole fasteners on the electrical cover line up with the large parts of the three keyholes.
3. Tilt the electrical cover up to vertical, ensuring that the three keyhole fasteners pass through the large parts of the keyholes.
4. Slide the electrical cover forward until all three keyhole fasteners are in the small parts of the keyholes. There should be only a very small gap between the electrical cover and the rear of the machine case. You may need to rap lightly on the back of the electrical cover to fully seat it.
5. Install the 4x M4 screws holding the electrical cover to the back of the edger.
6. Close the service door.
7. Close the edger lid.
8. Reconnect all electrical connections.

Cleaning the Air Filter (Trained personnel only)

If the air filter is dirty, follow these steps:

1. Open the electrical enclosure. See **Opening /Closing the Electrical Enclosure (Trained personnel only)**
2. Using clean, dry compressed air or non-flammable canned compressed air, gently blow air through the fan from above to dislodge debris from the air filter screen mounted below the fan.



Use only clean, dry compressed air or non-flammable canned compressed air for this operation. Use of compressed air with particles, oil, water, or flammable propellants creates a risk of fire or electrical shock.

3. If this process cleans the filter sufficiently, skip to step 7. Otherwise, proceed to the next step.
4. Remove the electrical plate from the edger by removing the 4x M4 screws holding it in place (one screw in each corner).
5. Remove the air filter, now visible and accessible in the bottom of the electrical enclosure. The filter is held on by 4x M4 screws, one in each corner.
6. Thoroughly clean or replace the air filter.
7. Close the electrical enclosure.
8. Reconnect all electrical connections.

Spindle Replacement (Trained personnel only)

Motor bearings are the primary limitation on the spindle's life, and increasingly loud operation is the most common sign for need of replacement. The spindle should be replaced following these steps:

9. Open the electrical enclosure. See **Opening /Closing the Electrical Enclosure (Trained personnel only)**
1. Open the edger service door and lid, but do not tilt the main plate up.
2. Disconnect the spindle power and phase sensor wires from the driver board, and fish them back through the wiring access opening. Note their routing for reinstallation.
3. Remove the tool from the spindle. See instructions for **Changing the Cutter Body** in the previous section.
4. Using a 5mm hex driver, remove the 4x M6 screws holding the spindle into the main plate.

5. Pull the spindle up and out of the main plate. Pull the spindle straight up and out. If it does not come easily, rotate the spindle body back and forth as you pull up.

Do not strike any part of the spindle with a hammer or mallet when removing or installing a spindle. The shock from hammer blows may damage internal spindle components and render it unfit for repair

6. Clean the area of the main plate where the spindle was installed with a clean soft cloth. Remove any foreign particles and debris from this area. Inspect the spindle pilot bore through the main plate to insure that it is in good condition before proceeding.
7. Lubricate the spindle pilot bore through the main plate with a thin layer of grease to prevent binding during installation.
8. Place the new spindle into the pilot bore through the main plate, keeping the new spindle vertical while you install it. If it does not go in easily, rotate the spindle body back and forth as you install it.
9. Using a 5mm hex driver, install the 4x M6 screws that hold the spindle in place. Tighten each screw a small amount until they are firmly installed. Do not fully tighten any one screw without the other screws already snug or you may distort the spindle housing or plate, reducing the accuracy of the machine.

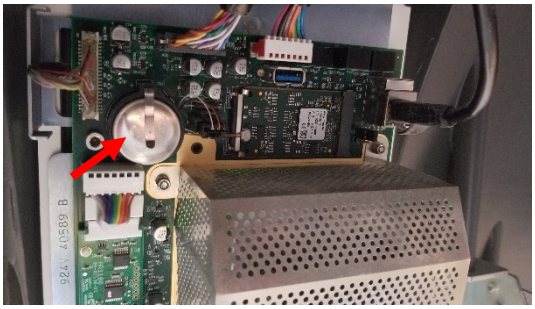
Do not use the screws to draw the spindle down into position. The spindle flange should be resting on the machined surface of the main plate and you should be able to rotate the spindle housing easily by hand before installing the screws. Using the screws to draw the spindle down can damage the pilot bore through the main plate, preventing future spindle removal.

10. Reinstall the tool in the spindle. See instructions for **Changing the Cutter Body** in the previous section.
11. Feed the spindle power and phase sensor wires back into the electrical enclosure through the wiring access opening. Reconnect the spindle power and phase sensor wires to the connectors on the driver board.
12. Close the electrical enclosure.
13. Close the edger.

CPU Battery Replacement (Trained personnel only)

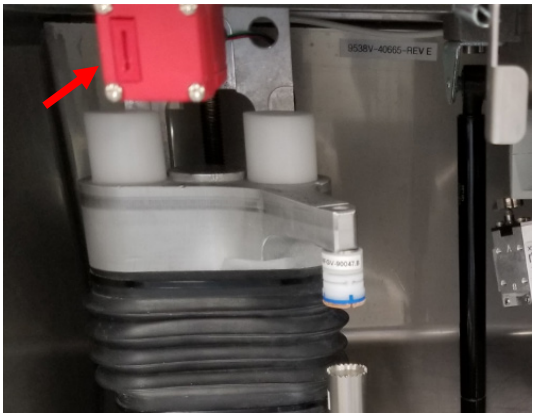
The CPU battery has a long life, but will still occasionally need replacement. Replace only with a 3V battery of type CR2477.

1. Turn off the edger.
2. Remove the mains power cord from the back of the edger.
3. Open the edger lid and locate the battery on the back of the display module.
4. Remove the old battery. Install the new battery in the same orientation as the old battery (positive terminal facing out).
5. Close the edger lid.
6. Reinstall the mains power cord in the back of the edger.



Door Safety Switch Replacement, V1 (Trained personnel only)

1. Turn off the edger.
2. Remove the mains power cord from the back of the edger.
3. Remove the 2x M4 x 25mm long screws that hold the red safety switch (PN 20-061-960) onto the main plate.
4. Open the edger lid and unplug the cable connected to the safety switch you just removed.
5. Remove the grommet that secures the safety switch cable where is passes through the main plate. Remove the grommet from the cable.
6. Fish the connector through the main plate, and dispose of the old safety switch and cable.
7. Install the new safety switch using the 2x M4 x 25mm long screws removed in step 3.
8. Fish the connector up through the main plate. Install the grommet on the cable.
9. Plug the cable connector into the PCB on top of the main plate. Reinstall the grommet in the hole in the main plate.
10. Close the edger lid.
11. Reinstall the mains power cord in the back of the edger.



Appendix A *Diagnostic Screens*

General

The edger is provided with diagnostic screens for operating various machine components outside of the normal cycle. These diagnostics should be used by highly trained personnel only. Access the *Diagnostic* screens through the main menu.

CAUTION

Machine diagnostics must be used with extreme care! The usual anti-collision checks are disabled in the Diagnostic screens, and incorrect operation of the motion system can result in severe damage to the edger.

On all Diagnostics tabs, only the functions currently allowed by the machine state are available. Buttons for functions and commands that are not available for the current machine state are greyed out, while available buttons are presented in color (e.g. the Home button will not be available for an axis that has already been homed).

Note

Nearly all Diagnostics functions require that the operator door and machine lid be closed. This is the fundamental function of the safety system and prevents the user from contacting potentially hazardous moving parts.

On any *Diagnostics* tab, check the *Override* checkbox to force the machine to perform operations that are greyed out and not allowed by the current machine state (e.g. to close the operator door even though the operator door is already closed). The *Override* checkbox does not disable the safety system, so operations that would endanger the user cannot be performed from the diagnostic screens.

Note

Screenshots and software instructions are from V1.14 of the software. Later versions of the software may have different graphics, options, and behavior.

Door Tab

Use the *Door* tab to control the operator door.

Command Buttons

- Init: Initialize the door open/close drive
- Open: Open the operator door
- Close: Close the operator door

Status Fields (cannot be edited)

- *Rev.:* The current revision level of the Door assembly
- *Door Open Sensor:* Checked if the door open sensor is active
- *Door Close Sensor:* Checked if the door closed sensor is active
- *Lid Open Sensor:* Checked if the lid open sensor is active
- *Safety Switches:* Checked if both the lid and door safety switches are engaged
- *Axes Ready:* Checked if machine axes have been activated after the door is closed

X Axis Tab

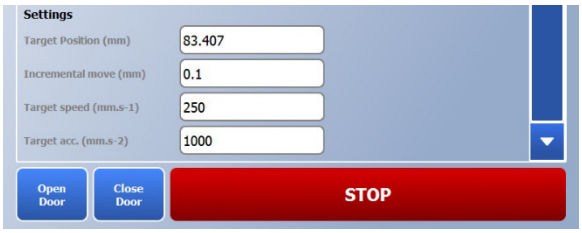
Use the *X Axis* tab to control the machine X axis (left/right).

Command Buttons

- *Init:* Initialize the X axis controller
- *Home:* Home the X axis
- *Test Home:* Home the X axis, but do not redefine the home position
- *Move To:* Move the X axis at the *Target Speed* and *Target Acceleration* to the *Target Position*
- *On:* Turn the X axis controller on, which powers the motor
- *Off:* Turn the X axis controller off, which unpowers the motor
- *Stop:* Stop the motion of the X axis
- *Align phases:* In-house use only
- *Move to Limit:* Moves the X axis left to the left-hand limit switch
- *Inc Move (+):* Move the X axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Moves the X axis to the left.
- *Inc Move (-):* Move the X axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Moves the X axis to the right.

Status Fields (cannot be edited)

- *Rev:* The current revision level of the X axis assembly
- *Home Sensor:* Checked if the X axis home flag is in the home sensor
- *Limit Sensor:* Checked if the X axis home flag is in the limit sensor
- *Has Been Homed:* Checked if the X axis has already been properly homed
- *Motion Complete:* Checked if the X axis has completed all commanded motion
- *Axis On:* Checked if the X axis motor is powered on
- *Controller enabled:* Checked if the X axis is enabled
- *Controller powered:* Checked if the X axis is powered
- *Controller on error:* Checked if the X axis is on error
- *Index position (deg):* The position of the X axis encoder index pulse relative to the X axis home switch



- *Home positioning error (mm):* The calculated homing error of the X axis after pressing *Test Home* (compared to home at boot up)
- *Actual Position (mm):* The current position of the X axis

Settings Fields (can be edited)

- *Target Position (mm):* The desired end position for *Move To*
- *Incremental Move (mm):* The motion increment for *Inc Move +/-*
- *Target Speed (mm/s):* The desired speed for *Move To* and *Inc Move +/-*
- *Target Acc (mm/s^2):* The desired acceleration for *Move To* and *Inc Move +/-*

Z Axis Tab

Use the *Z Axis* tab to control the machine Z axis (up/down).

Command Buttons

- *Init:* Initialize the Z axis controller
- *Home:* Home the Z axis
- *Test Home:* Home the Z axis, but do not redefine the home position
- *Move To:* Move the Z axis at the *Target Speed* and *Target Acceleration* to the *Target Position*
- *On:* Turn the Z axis controller on, which powers the motor
- *Off:* Turn the Z axis controller off, which unpowers the motor
- *Stop:* Stop the motion of the Z axis
- *Align phases:* In-house use only
- *Inc Move (+):* Move the Z axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Moves the Z axis up.
- *Inc Move (-):* Move the Z axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Moves the Z axis down.

Status Fields (cannot be edited)

- *Rev:* The current revision level of the Z axis assembly
- *Home Sensor:* Checked if the Z axis home flag is in the home sensor
- *Has Been Homed:* Checked if the Z axis has already been properly homed
- *Motion Complete:* Checked if the Z axis has completed all commanded motion
- *Axis On:* Checked if the Z axis motor is powered on
- *Controller enabled:* Checked if the Z axis is enabled
- *Controller powered:* Checked if the Z axis is powered
- *Controller on error:* Checked if the Z axis is on error
- *Index position (deg):* The position of the Z axis encoder index pulse relative to the Z axis home switch

- *Home positioning error (mm):* The calculated homing error of the Z axis after pressing *Test Home* (compared to home at boot up)
- *Actual Position (mm):* The current position of the Z axis

Settings Fields (can be edited)

- *Target Position (mm):* The desired end position for *Move To*
- *Incremental Move (mm):* The motion increment for *Inc Move +/-*
- *Target Speed (mm/s):* The desired speed for *Move To* and *Inc Move +/-*
- *Target Acc (mm/s^2):* The desired acceleration for *Move To* and *Inc Move +/-*

C Axis Tab

Use the *C Axis* tab to control the machine C axis (lens rotation).

Command Buttons

- *Init:* Initialize the C axis controller
- *Home:* Home the C axis
- *Test Home:* Home the C axis, but do not redefine the home position
- Move To: Move the C axis at the Target Speed and Target Acceleration to the Target Position
- *On:* Turn the C axis controller on, which powers the motor
- *Off:* Turn the C axis controller off, which unpowers the motor
- *Stop:* Stop the motion of the C axis
- *Align phases:* In-house use only
- *Modulo:* Resets the actual position to a position between 0 and 360 degrees.
- *Inc Move (-):* Move the C axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Moves the C axis clockwise when viewed from above.
- *Inc Move (+):* Move the C axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Moves the C axis counter clockwise when viewed from above.

Status Fields (cannot be edited)

- *Rev:* The current revision level of the C axis assembly
- *Home Sensor:* Checked if the C axis home sensor is activated
- *Has Been Homed:* Checked if the C axis has already been properly homed
- *Motion Complete:* Checked if the C axis has completed all commanded motion
- *Axis On:* Checked if the C axis motor is powered on

- *Controller enabled:* Checked if the C axis is enabled
- *Controller powered:* Checked if the C axis is powered
- *Controller on error:* Checked if the C axis is on error
- *Index position (deg):* The position of the C axis encoder index pulse relative to the C axis home switch
- *Home positioning error (deg):* The calculated homing error of the C axis after pressing *Test Home* (compared to home at boot up)
- *Actual Position (deg):* The current position of the C axis

Settings Fields (can be edited)

- *Target Position (deg):* The desired end position for *Move To*
- Incremental Move (deg): The motion increment for Inc Move +/-
- Target Speed (deg/s): The desired speed for Move To and Inc Move +/-
- Target Acc (deg/s^2): The desired acceleration for Move To and Inc Move +/-

P Axis Tab

Use the *P Axis* tab to control the machine P axis (lens clamp open/close). This tab is used for direct positioning control of the axis clamping motor, while the *Lens Clamp* tab described later is for standard open/close operations at a specified force.

Command Buttons

- *Init:* Initialize the P axis controller
- *Home:* Home the P axis
- Move To: Move the P axis at the Target Speed and Target Acceleration to the Target Position
- *On:* Turn the P axis controller on, which powers the motor
- *Stop:* Stop the motion of the P axis
- *Off:* Turn the P axis controller off, which unpowers the motor
- *Align phases:* In-house use only
- *Inc Move (+):* Move the P axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Closes the clamp
- *Inc Move (-):* Move the P axis at the *Target Speed* and *Target Acceleration* by the *Incremental Move* distance. Opens the clamp.

Status Fields (cannot be edited)

- *Rev:* The current revision level of the P axis assembly
- *Home Sensor:* Checked if the P axis home flag is in the home sensor
- *Has Been Homed:* Checked if the P axis has already been properly homed
- *Motion Complete:* Checked if the P axis has completed all commanded motion
- *Axis On:* Checked if the P axis motor is powered on
- *Controller enabled:* Checked if the P axis is enabled
- *Controller powered:* Checked if the P axis is powered
- *Controller on error:* Checked if the P axis is on error
- *Actual Position (mm):* The current position of the P axis

Settings Fields (can be edited)

- *Target Position (mm):* The desired end position for *Move To*
- Incremental Move (mm): The motion increment for Inc Move +/-
- Target Speed (mm/s): The desired speed for Move To and Inc Move +/-
- Target Acc (mm/s^2): The desired acceleration for Move To and Inc Move +/-

D Axis Tab

Use the *D Axis* tab to control the machine D axis (drill rotation) if the machine is equipped with a drill unit.

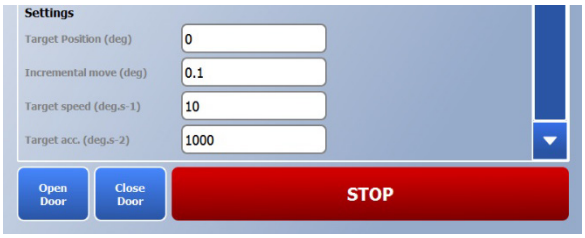
Command Buttons

- *Init:* Initialize the D axis controller
- *Home:* Home the D axis
- *Test Home:* Home the D axis, but do not redefine the home position
- Move To: Move the D axis at the Target Speed and Target Acceleration to the Target Position
- *On:* Turn the D axis controller on, which powers the motor
- *Off:* Turn the D axis controller off, which unpowers the motor
- *Stop:* Stop the motion of the D axis
- *Align phases:* In-house use only
- *Modulo:* N/A
- Inc Move (+): Move the D axis at the Target Speed and Target Acceleration by the Incremental Move distance.
- Inc Move (-): Move the D axis at the Target Speed and Target Acceleration by the Incremental Move distance.

Status Fields (cannot be edited)

- *Rev:* The current revision level of the D axis assembly
- *Home Sensor:* Checked if the D axis home flag is in the home sensor
- *Has Been Homed:* Checked if the D axis has already been properly homed
- *Motion Complete:* Checked if the D axis has completed all commanded motion
- *Axis On:* Checked if the D axis motor is powered on
- *Controller enabled:* Checked if the D axis is enabled
- *Controller powered:* Checked if the D axis is powered
- *Controller on error:* Checked if the D axis is on error
- *Index position (deg):* The position of the D axis encoder index pulse relative to the D axis home switch
- *Home positioning error (deg):* The calculated homing error of the D axis after pressing *Test Home* (compared to home at boot up)
- *Actual Position (deg):* The current position of the D axis

Settings Fields (can be edited)



- *Target Position (mm):* The desired end position for *Move To*
- Incremental Move (mm): The motion increment for Inc Move +/-
- Target Speed (mm/s): The desired speed for Move To and Inc Move +/-
- Target Acc (mm/s^2): The desired acceleration for Move To and Inc Move +/-

XZBC Axes Tab

Use the XZBC Axes tab to execute simultaneous moves of the X, Z, B, and C axes.

Status Fields (cannot be edited)

- *Motion Complete:* Checked if all four axes have completed all commanded motion

Spindle Tab

Use the *Spindle* tab to control the machine spindle.

Command Buttons

- *Init:* Initialize the spindle controller
- *Turn On:* Turn the spindle on
- *Turn Off:* Turn the spindle off
- *Set Speed:* Change the speed of the spindle to the *Requested Speed* in RPM

Status Fields (cannot be edited)

- *Rev:* The current revision level of the spindle assembly
- *Actual Speed (RPM):* The current speed of the spindle
- *Is on error:* Checked if there is a spindle controller error or if the spindle controller has not been reset
- *Controller enabled:* Checked if the spindle is enabled
- *Controller powered:* Checked if the spindle is powered
- *Controller on error:* Checked if the spindle is on error

Settings Fields (can be edited)

- *Requested Speed (RPM):* The new target speed for the spindle
- *X Calibration (mm):* The X calibration value of the spindle location. Set in Calibration.
- *Y Calibration (mm):* The Y calibration value of the spindle location. Set in Calibration.
- *Z Calibration (mm):* The Z calibration value of the spindle location. Set in Calibration.
- *C Calibration (mm):* The C calibration value of the spindle location. Set in Calibration.

Lens clamp Tab

Use the *Lens Clamp* tab to control the lens clamp. Use this tab for basic open/close operations and selecting the close force. Use the *P Axis* tab for direction positioning control of the lens clamp motor without force control.

Command Buttons

- *Init:* Initialize the lens clamp controller
- *Home:* Home the clamp
- *Open:* Open the lens clamp
- *Close:* Close the lens clamp at the *Force Requested*
- *Change Force:* Change the clamp force to the *Force Requested* value

Status Fields (cannot be edited)

- *Rev:* The current revision level of the lens clamp assembly
- *Has Been Homed:* Checked if the lens clamp has already been properly homed
- *Force Applied (lb):* The current clamp force
- *Clamp Opened:* Checked if the clamp is open
- *Clamp Closed:* Checked if the clamp is closed

Settings Fields (can be edited)

- *Force Requested (lb):* The new target force for the lens clamp
- *Clamp Lbs per Amp Ratio:* Calculated value from calibration
- *Clamp LBs Offset:* Calculated value from calibration

Probe Tab

Use the *Probe* tab to control the edger probe.

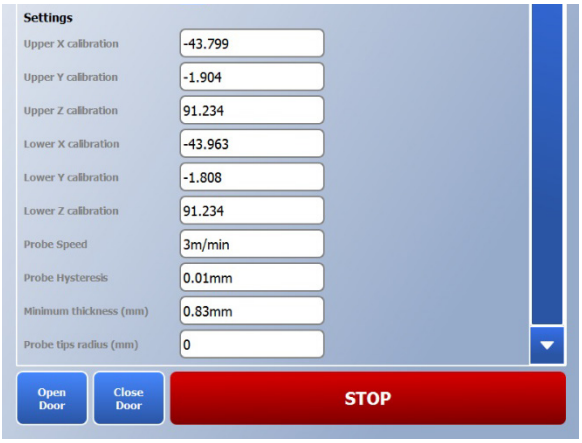
Command Buttons

- *Init:* Initialize the probe controller
- *Lower:* Lower the probe
- *Raise:* Raise the probe
- *Open:* Open the probe arms
- *Close:* Close the probe arms
- *Home:* Begin the probe homing routine

Status Fields (cannot be edited)

- *Rev:* The current revision level of the probe assembly
- *Upper Probe Reading (mm):* The current position of the upper probe tip
- *Lower Probe Reading (mm):* The current position of the lower probe tip
- *Thickness Reading (mm):* The current calculated lens thickness
- *Has been homed:* Checked if the probe has been homed
- *Raised:* Checked if the probe arms and snout are in the raised position
- *Lowered:* Checked if the probe snout has been lowered
- *Open:* Checked if the probe arms are open
- *Kick Off:* Checked if the probe kick off sensor has been activated
- *Upper probe arm open:* Checked if the upper probe arm is open
- *Lower probe arm open:* Checked if the Lower probe arm is open
- *Lower probe arm raised:* Checked if the Lower probe arm is raised

Settings Fields (can be edited)



- *Upper X Calibration:* The X calibration value for the upper probe tip. Set in Calibration.
- *Upper Y Calibration:* The Y calibration value for the upper probe tip. Set in Calibration.
- *Upper Z Calibration:* The Z calibration value for the upper probe tip. Set in Calibration.
- *Lower X Calibration:* The X calibration value for the lower probe tip. Set in Calibration.
- *Lower Y Calibration:* The Y calibration value for the lower probe tip. Set in Calibration.

- *Lower Z Calibration:* The Z calibration value for the lower probe tip. Set in Calibration.
- *Probe Speed (m/min):* The circumferential speed that the probe tips move around the lens during probing
- *Probe Hysteresis (mm):* The distance that the lens moves down at *Probe Downward Speed* before data is collected for each point.
- *Minimum Thickness (mm):* The thinnest lens that the probe will contact on both top and bottom. Set in Calibration.
- *Probe tips radius (mm):* The probe tip radius used for calculations.

Mister Tab

Use the *Mister* tab to control the edger fluid delivery system.

Command Buttons

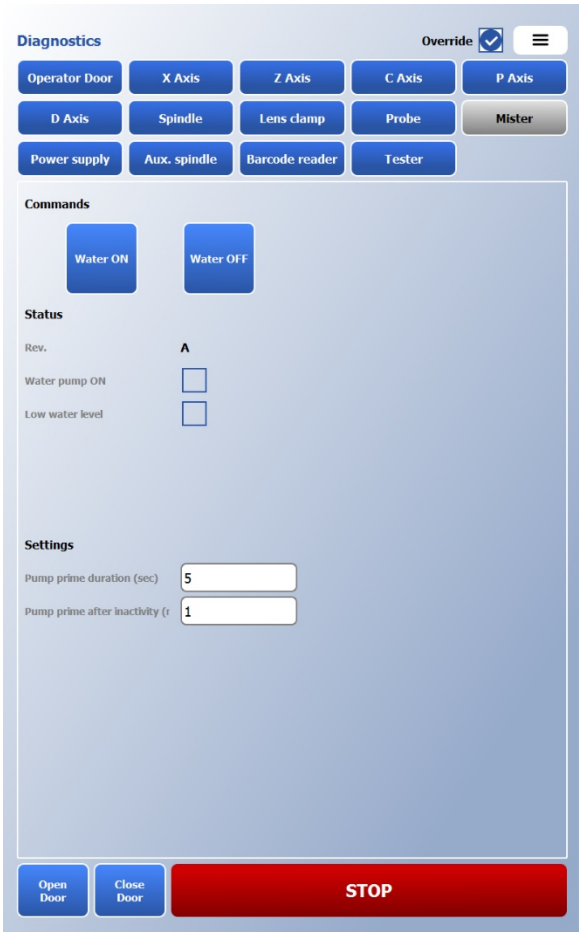
- *Water On:* Turn on the water pump
- *Water Off:* Turn off the water pump

Status Fields (cannot be edited)

- *Rev:* The current revision level of the mister assembly
- *Water Pump On:* Checked if the water pump is turned on
- *Low Water Level:* Checked if the low water level sensor is active

Settings Fields (can be edited)

- *Pump Prime Duration (sec):* The length of time that the water pump will be turned on before the lens engages with the polish wheel after a period of inactivity.
- *Pump Prime After Inactivity (min):* The length of time between uses of the fluid delivery system that will trigger a pump prime cycle.



Power supply Tab

Use the *Power Supply* tab to view power supply status, control the internal cooling fan, and turn the vacuum on and off.

Command Buttons

- *Fan On:* Turn on the cooling fan in the electronics enclosure
- *Fan Off:* Turn off the cooling fan in the electronics enclosure
- *Vacuum On:* Turn on the external vacuum relay
- *Vacuum Off:* Turn off the external vacuum relay

Status Fields (cannot be edited)

- *Rev:* The current revision level of the power supply assembly
- *3.3V:* Checked if 3.3VDC power is properly detected
- *24V:* Checked if 24VDC power is properly detected
- *48V:* Checked if 48VDC power is properly detected
- *Fan on:* Checked if the power supply cooling fan is turned on
- *Vacuum on:* Checked if the vacuum relay output line is turned on

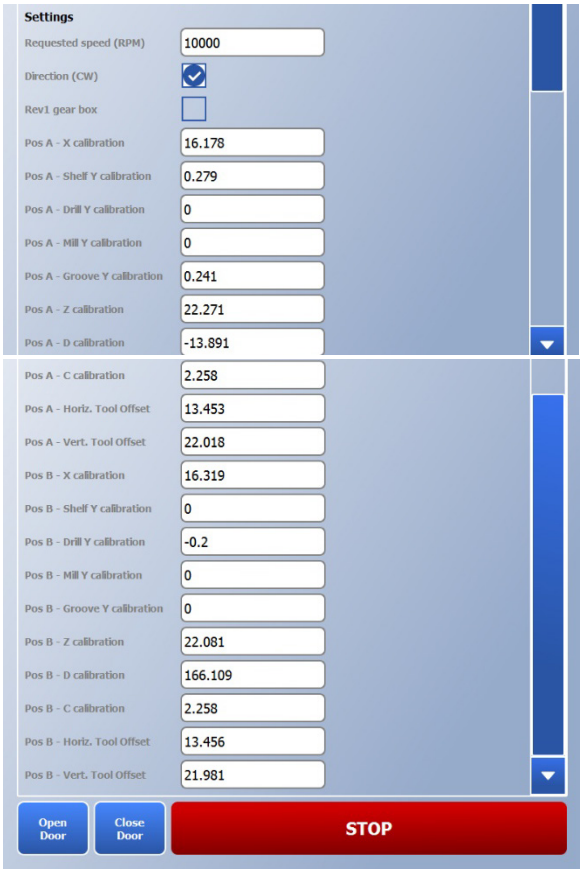
Aux. spindle Tab

Use the *Aux. Spindle* tab to control the spindle and positioning for the Auxiliary Spindle assembly (if installed).

Command Buttons

- Init: Initialize the Aux. spindle controller
- *Park:* Retract the mill/drill assembly into its parked position
- *Engage:* Move the mill/drill assembly forward into its engaged position
- *Turn On:* Turn the mill/drill spindle on
- *Turn Off:* Turn the mill/drill spindle off
- *Set Speed:* Change the speed of the mill/drill spindle to the *Requested Speed* in RPM

Status Fields (cannot be edited)



- *Rev:* The current revision level of the Auxiliary Spindle assembly
- *Actual Speed (RPM):* The current speed of the spindle
- *Is on error:* Checked if there is a spindle controller error of if the spindle controller has not been reset
- *Engaged:* Checked if the mill/drill assembly is sensed in the engaged position
- *Parked:* Checked if the mill/drill assembly is sensed in the retracted park position
- *Tool Parked:* Checked if the mill/drill angle (D axis) is rotated correctly to allow the mill/drill assembly to be parked.

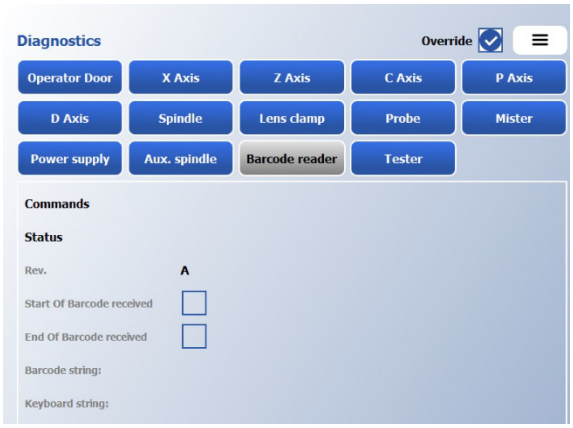
Settings Fields (can be edited)

- *Requested Speed (RPM):* The new target speed for the mill/drill spindle
- *Direction (CW):* Check to spin the auxiliary tool in the opposite direction in diagnostics. Has no effect on tool direction during a cycle.
- *Rev1 Gear Box:* Check to reverse all auxiliary tool rotation directions in the cycle. DO NOT USE.
- *Pos A – X Calibration:* The X calibration value for Aux Spindle A. Set in Calibration.
- *Pos A – Shelf Y Calibration:* The Y calibration value for Aux Spindle A when a shelving tool is installed.
- *Pos A – Drill Y Calibration:* The Y calibration value for Aux Spindle A when a drill is installed.
- *Pos A – Mill Y Calibration:* The Y calibration value for Aux Spindle A when a mill is installed.
- *Pos A – Groove Y Calibration:* The Y calibration value for Aux Spindle A when a groove is installed.
- *Pos A – Z Calibration:* The Z calibration value for Aux Spindle A. Set in Calibration.
- *Pos A – D Calibration:* The B calibration value for Aux Spindle A. Set in Calibration.
- *Pos A – C Calibration:* The C calibration value for Aux Spindle A. Set in Calibration.
- *Pos A – Horiz Tool Offset:* The horizontal offset from the center of the Aux Spindle A tool to the center of the Aux spindle high speed gearbox. Set in Calibration.
- *Pos A – Vert. Tool Offset:* The vertical offset from the base of the Aux Spindle A tool to the center of the Aux spindle high speed gearbox. Set in Calibration.
- *Pos B – X Calibration:* The X calibration value for Aux Spindle B. Set in Calibration.
- *Pos B – Shelf Y Calibration:* The Y calibration value for Aux Spindle B when a shelving tool is installed.
- *Pos B – Drill Y Calibration:* The Y calibration value for Aux Spindle B when a drill is installed.
- *Pos B – Mill Y Calibration:* The Y calibration value for Aux Spindle B when a mill is installed.
- *Pos B – Groove Y Calibration:* The Y calibration value for Aux Spindle A when a groove is installed.
- *Pos B – Z Calibration:* The Z calibration value for Aux Spindle B. Set in Calibration.
- *Pos B – D Calibration:* The B calibration value for Aux Spindle B. Set in Calibration.
- *Pos B – C Calibration:* The C calibration value for Aux Spindle B. Set in Calibration.

- *Pos B – Horiz Tool Offset:* The horizontal offset from the center of the Aux Spindle B tool to the center of the Aux spindle high speed gearbox. Set in Calibration.
- *Pos B – Vert. Tool Offset:* The vertical offset from the base of the Aux Spindle B tool to the center of the Aux spindle high speed gearbox. Set in Calibration.

Barcode reader Tab

Use the Bar Code Reader tab to view bar code reader status.

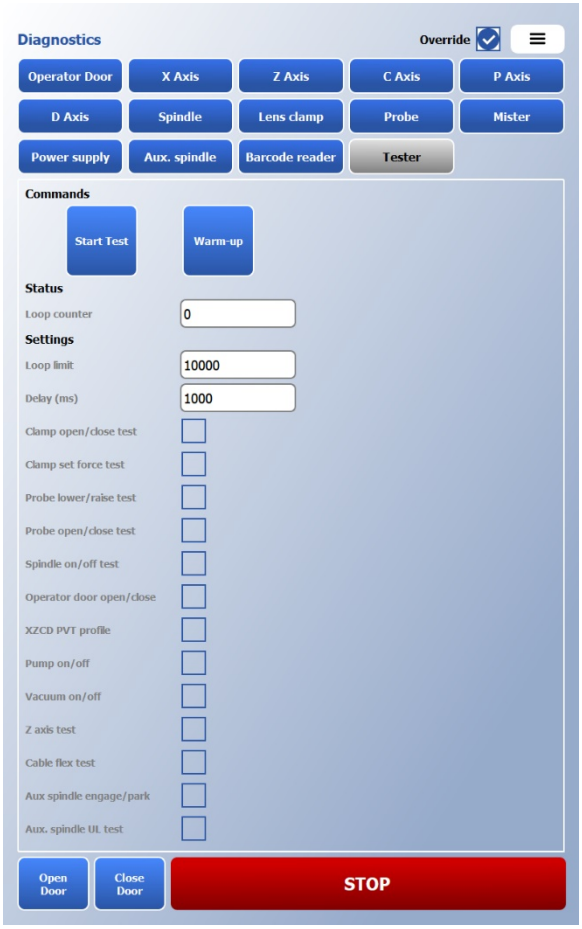


Status Fields (cannot be edited)

- *Rev:* The current revision level of the barcode
- *Start of Barcode Received:* Checked if the start of a barcode has been received
- *End of Barcode Received:* Checked if the end of a barcode has been received
- *Barcode String:* Displays the string received from the barcode
- *Keyboard String:* Displays the string received from the keyboard

Tester Tab

Use the Tester tab to run various repeated cycles on the machine.



Command Buttons

- *Start Test:* Begin the selected test(s) that is checked
- *Warm-up:* Begin the 5-minute machine warmup. Remove all lenses from the machine before pressing.

Status Fields (cannot be edited)

- *Loop Counter:* The number of cycles that have been completed by the tester

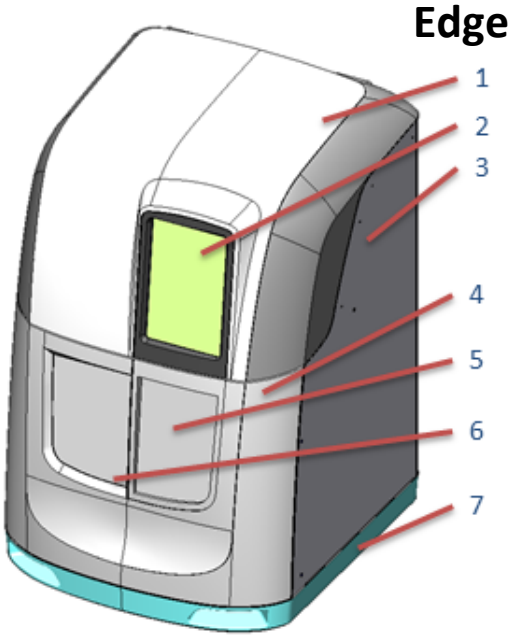
Settings Fields (can be edited)

- *Loop Limit:* The number of cycles of each selected test to run before stopping
- *Delay (ms):* The delay, in milliseconds, before each cycle loop is executed
- *Clamp Open/Close Test:* Closes and opens the lens clamp at the requested force
- *Clamp Set Force Test:* Changes between the currently commanded force and the requested force
- *Probe Lower/Raise Test:* Lowers and raises the probe
- *Probe Open/Close Test:* Opens and closes the probe arms

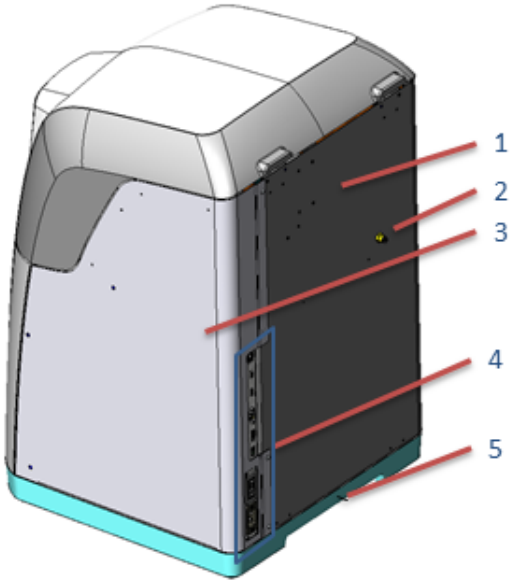
- *Spindle On/Off Test:* Turns the spindle on and off
- *Operator Door Open/Close:* Opens and closes the operator door
- *XZCD PVT profile:* For internal use only
- *Pump On/Off:* Turns the fluid delivery pump on and off
- *Vacuum On/Off:* Turns the vacuum on and off
- *Z axis test:* Moves the Z-axis up and down
- *Cable flex test:* Moves the Z-axis, X-axis, and Aux spindle to stress all cabling
- *Aux spindle engage/park:* Engages and parks the mill drill assembly
- *Aux spindle UL test:* Performs a pre-programmed cycle using the mill/drill

Chapter B REFERENCE FIGURES

Edger External Parts

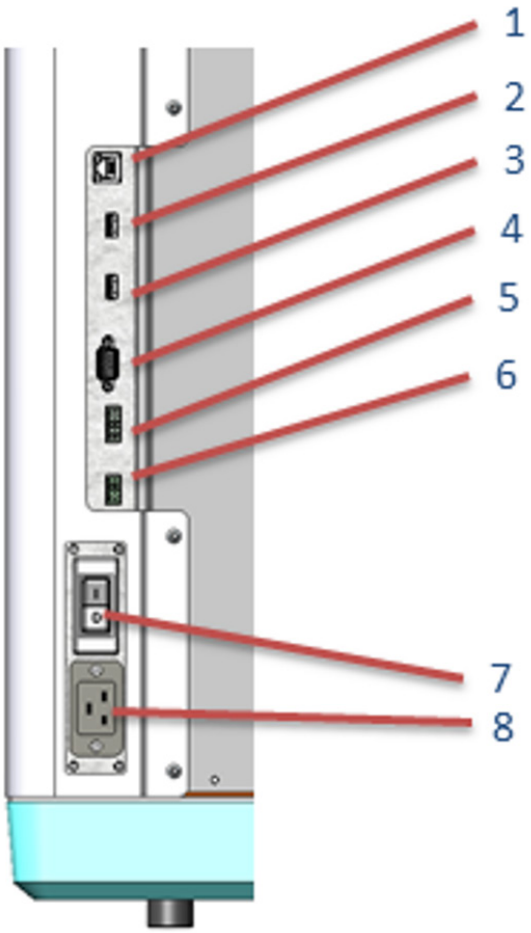


Part	Description
1	Lid
2	Display
3	Electronics Cover
4	Service Door
5	Fixed Window
6	Operator Door
7	Base



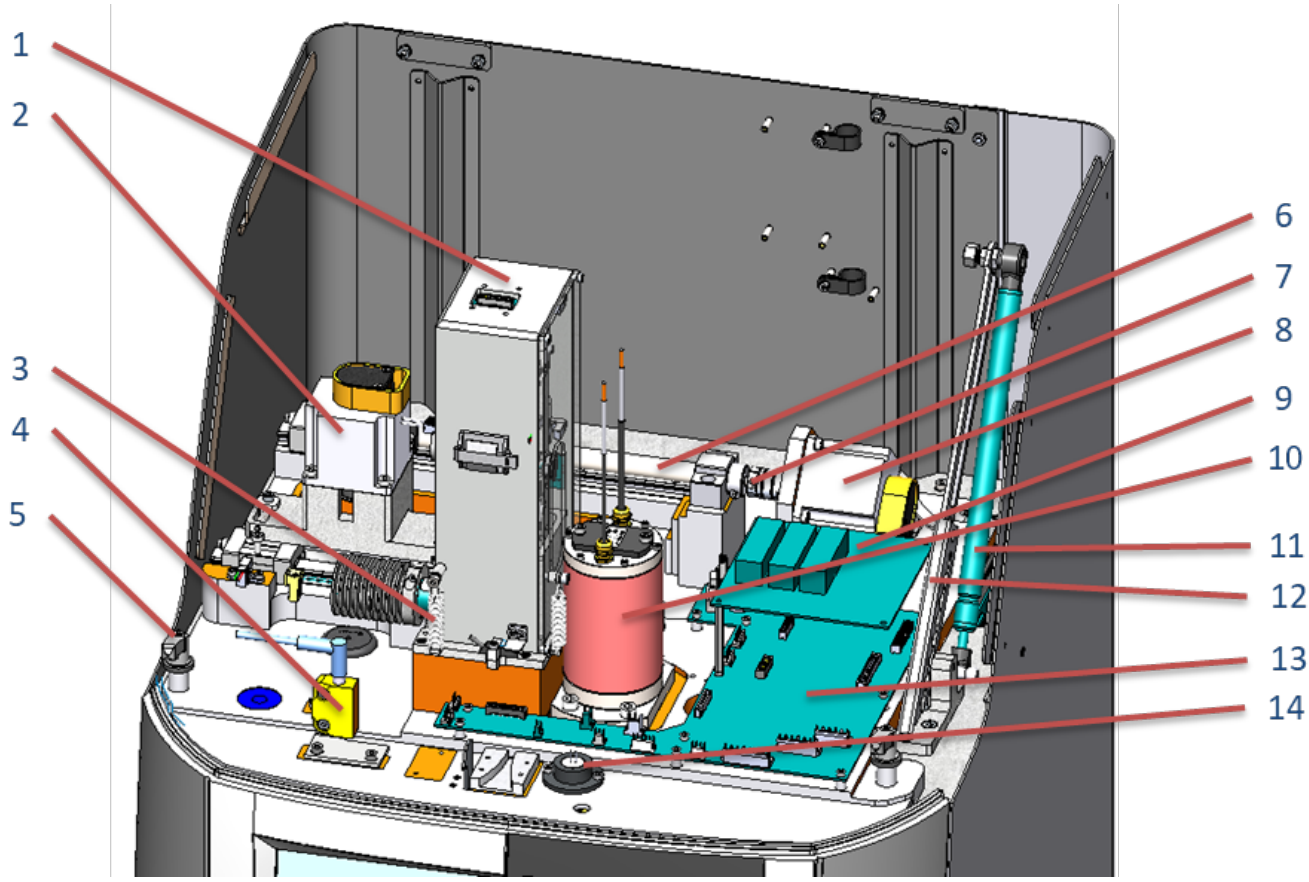
Part	Description
1	Enclosure
2	Fluid Inlet (4mm Push-to-Connect)
3	Electronics Cover
4	Electrical Connections and Power Switch
5	Ground Stud

Edger Electrical Connections – Rear View



Part	Description
1	Ethernet Port
2	USB 1
3	USB 2
4	Serial Port
5	Vacuum Signal Plug
6	Fluid Delivery System Plug
7	On/Off Switch
8	Mains Power Input

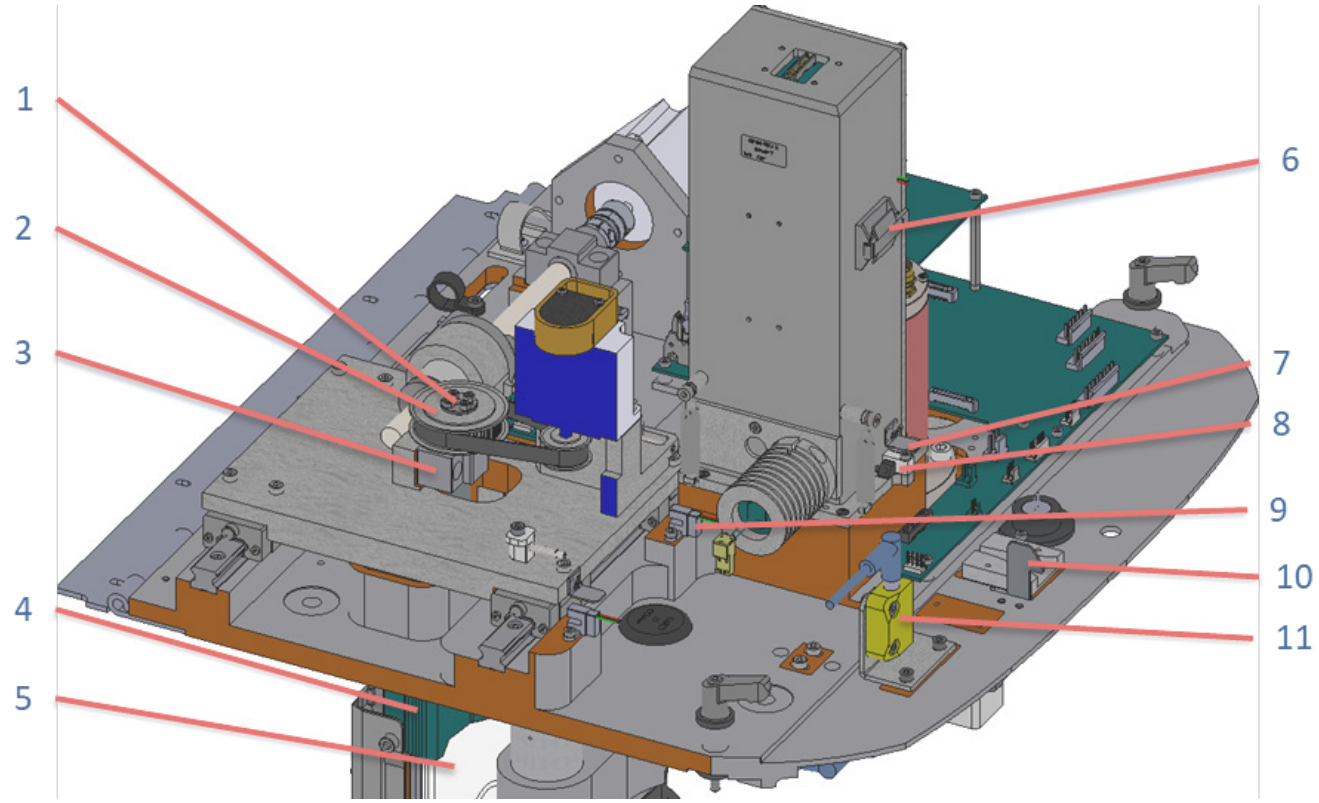
Edger Internal Parts – Upper View – Right Side



Part	Description
1	Probe Assembly
2	Z-Axis Motor
3	Probe External Spring (x4)
4	Lid Safety Switch
5	Main Plate Hold Down Screw
6	X-Axis Leadscrew
7	X-Axis Coupling

Part	Description
8	X-Axis Motor
9	Safety Relay Board
10	Main Spindle
11	Lid Damper
12	Lid Cam Stay
13	System Interface Board
14	LED

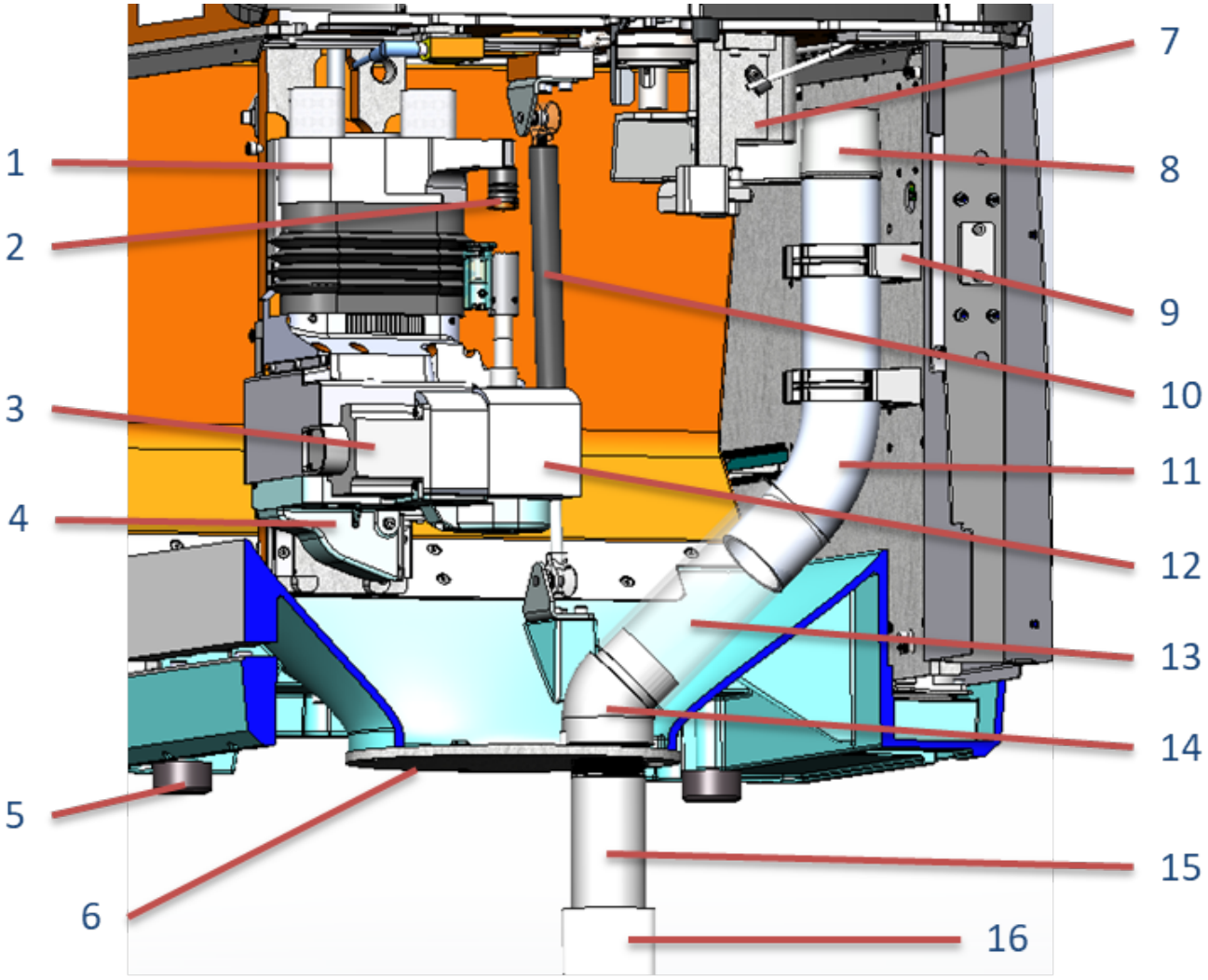
Edger Internal Parts – Upper View – Left Side



Part	Description
1	Keyless Bushing
2	Pulley for Z-axis
3	Z-Axis Leadscrew Bearing
4	Cover, Front-Outer
5	Cover, Front Sliding
6	Probe Cable Clip

Part	Description
7	Probe Kickoff Flag
8	Probe Kickoff Sensor
9	X-Axis Home Switch
10	Lid Latch
11	Lid Safety Switch
	(blue area is sectioned)

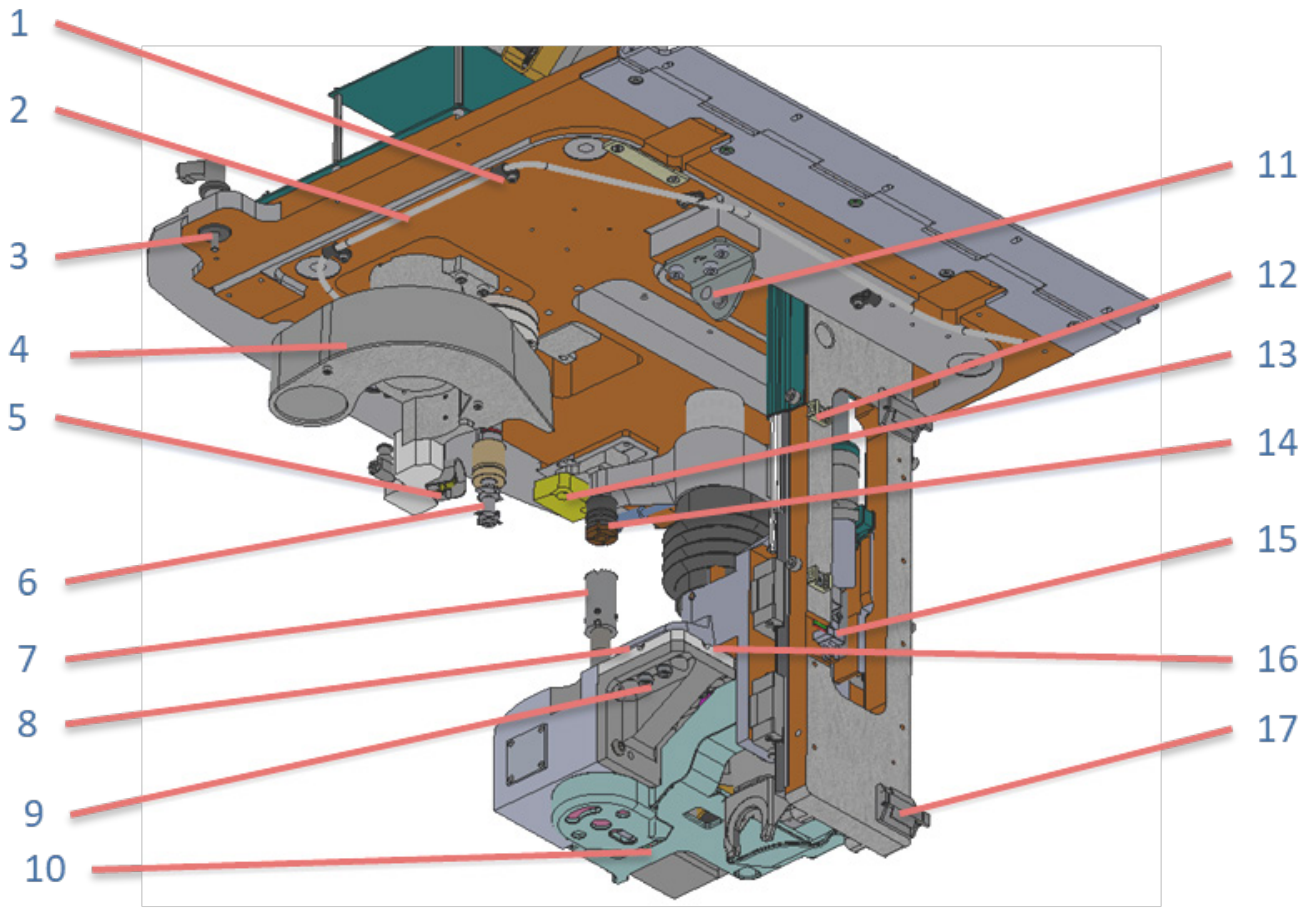
Edger Internal Parts – Lower Front View



Part	Description
1	Lens Clamp Arm
2	Top-Side Clamp
3	C-Axis Motor
4	Cover, Clamp Underside
5	Vibration Absorption Mount
6	Debris Collection Plate
7	Mister Support Housing
8	Chip Chute

Part	Description
9	Tube Clamp
10	Gas Spring
11	Vacuum Tube
12	C-Axis Gearbox
13	Flexible Vacuum tube (shown clear)
14	Debris Collection Elbow
15	Vertical Vacuum Output Tube
16	Vacuum Hose Coupler

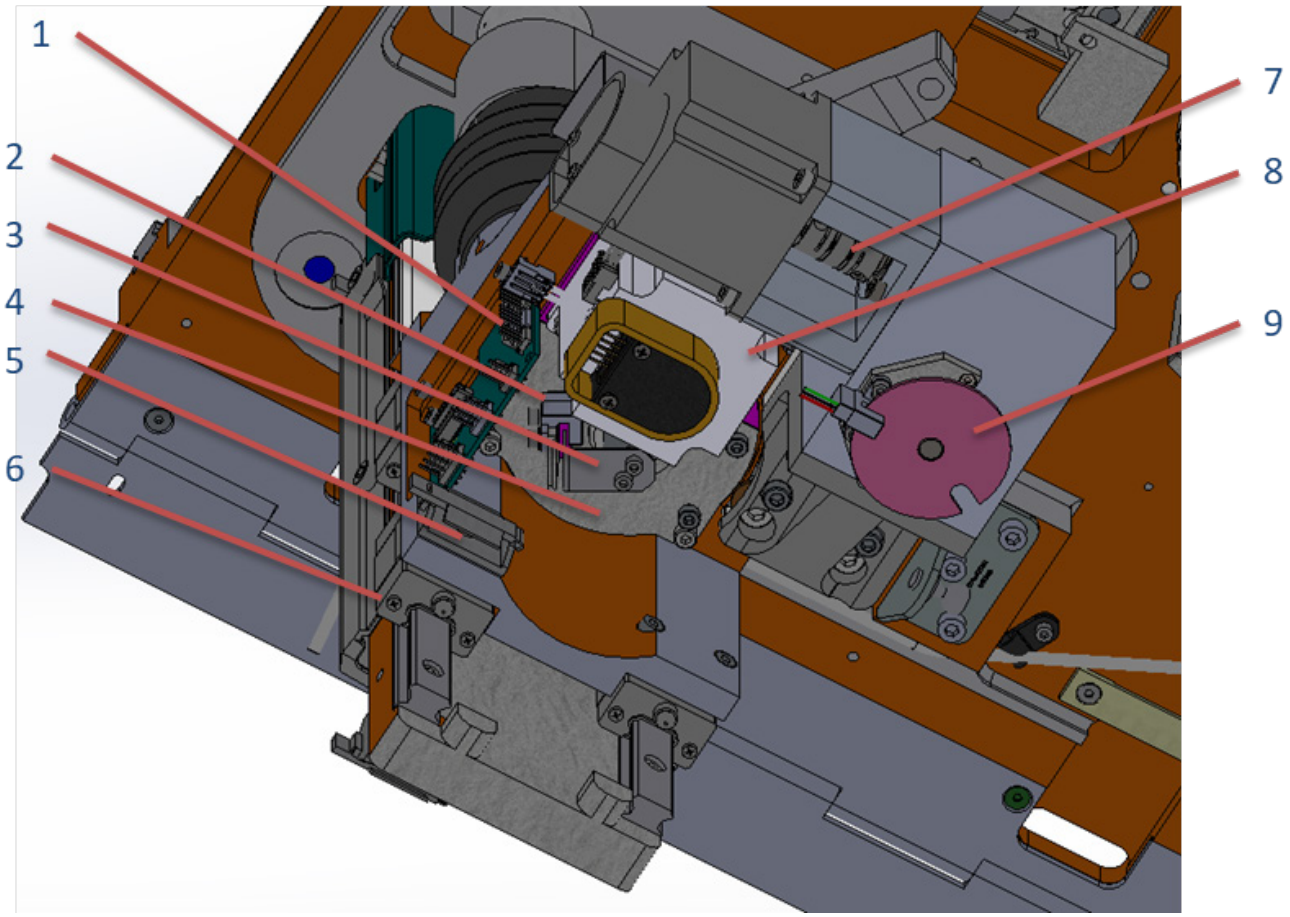
Edger Internal Parts – Lower Back View



Part	Description
1	Mister Tubing Clip
2	Mister Water Supply Tubing
3	Vibration Isolation Pad
4	Chip Chute
5	Mister Nozzle
6	Edging Tool
7	Chuck
8	Left-Right Gearbox Adjusting Screw
9	Gearbox Mounting Screws

Part	Description
10	Cover, Lens Clamp Underside
11	Gas-Spring Upper Mounting Bracket
12	Z-Axis Home Switch Cable Clips
13	Operator Window Safety Switch
14	Top-Side Clamp
15	Z-Axis Home Switch
16	Front-Back Gearbox Adjusting Screw
17	C-Axis & Clamp Cable Clips

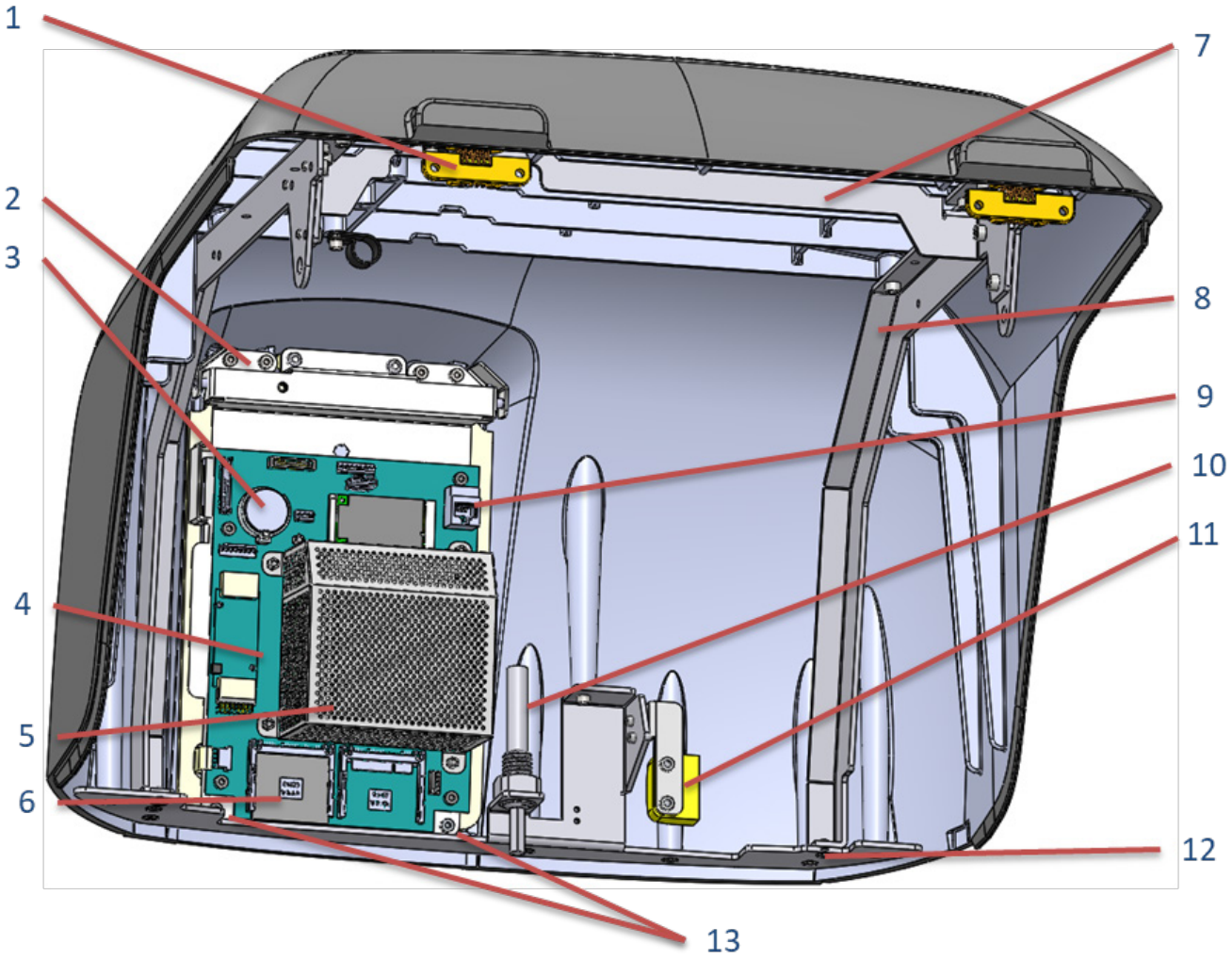
Edger Internal Parts – Lower Detail View



Part	Description
1	C & Clamp Connector PCB
2	Clamp Home Switch
3	Clamp Home Switch Flag
4	Clamp Bottom Housing Cover
5	C & Clamp Cable Clip

Part	Description
6	Z-Axis Carriage
7	C-Axis Coupling
8	Clamp Motor and Gear
9	C-Axis Home Switch

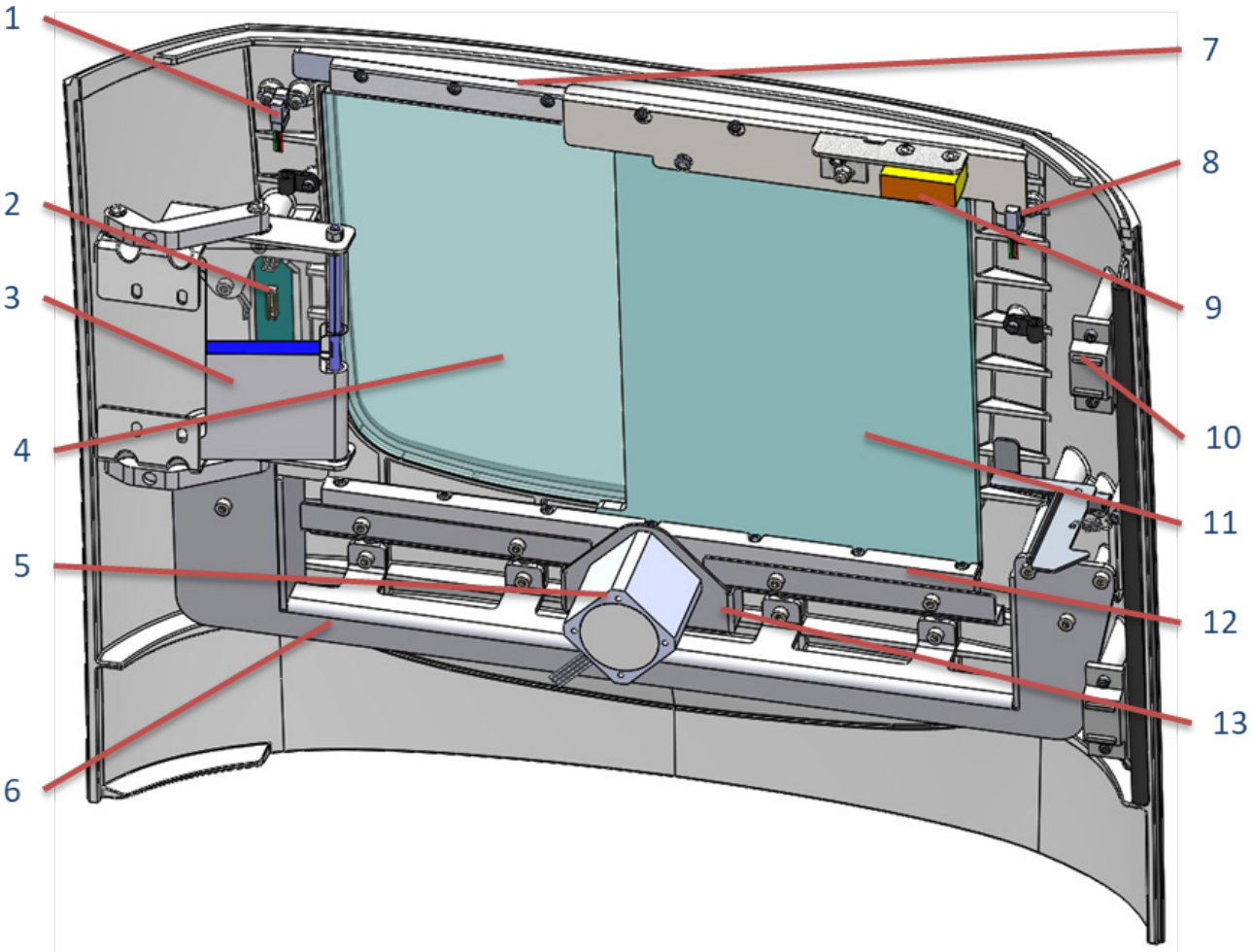
Edger Lid Parts – Internal View



Part	Description
1	Lid Hinge
2	Display Mounting Hinge
3	CPU Battery
4	CPU PCB Assembly
5	CPU EMI Shield
6	CFAST Card
7	Cross Stiffener

Part	Description
8	Side Stiffener
9	CPU Ethernet Port
10	Lid Spring Plunger
11	Lid Safety Switch Magnet
12	Lid Front Stiffener
13	Display Assembly Removal Screws

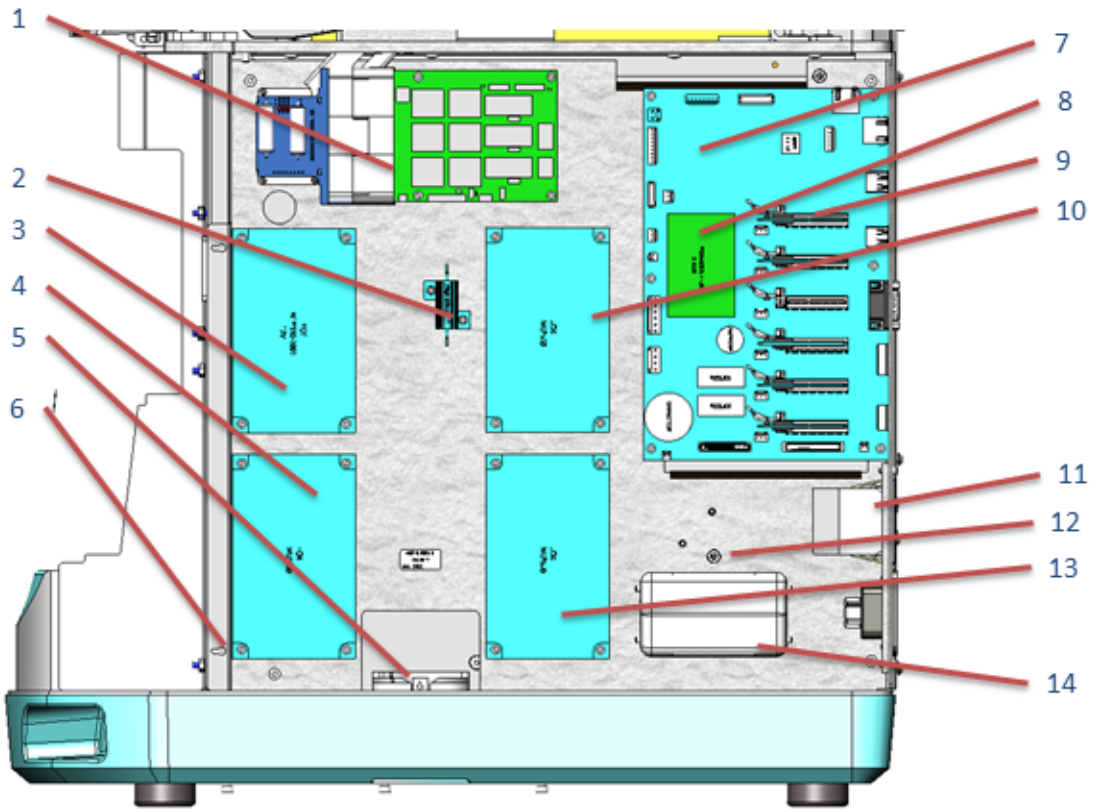
Edger Service Door Parts – Internal View



Part	Description
1	Operator Door Open Switch
2	Service Door PCB
3	Service Door Hinge Assembly (sectioned)
4	Service Door Fixed Window
5	Operator Door Motor and Gear
6	Service Door Stiffener
7	Operator Door Upper Slide

Part	Description
8	Operator Door Closed Switch
9	Operator Door Safety Switch Magnet
10	Magnetic Door Catch
11	Operator Door
12	Operator Door Lower Slide
13	Operator Door Motor Mount

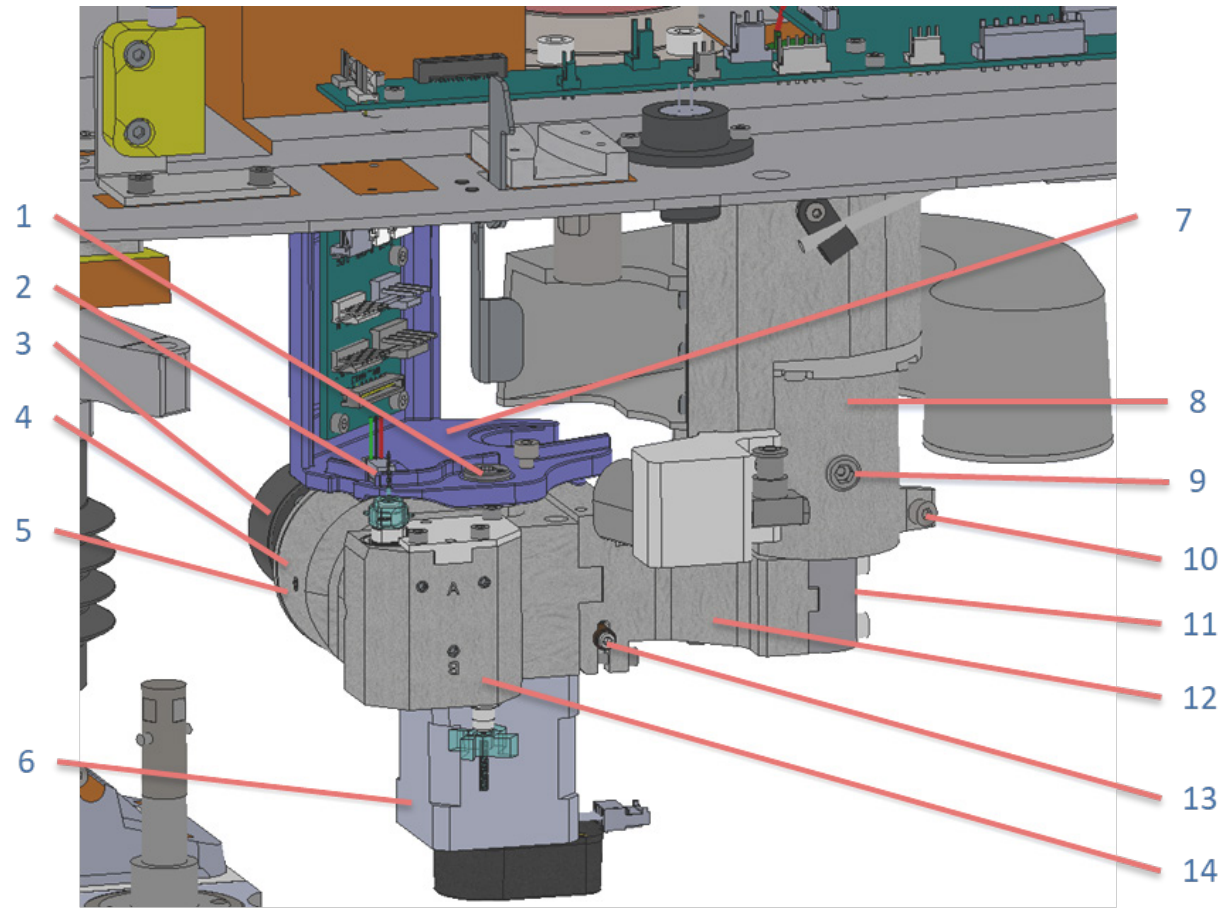
Edger Electrical Parts – Right Side View



Part	Description
1	Spindle Controller
2	Spindle Braking Resistor
3	Power Supply 1 (12v)
4	Power Supply 2 (24v)
5	Cooling Fan
6	Keyhole Cutout for Electronics Cover
7	Motion Board

Part	Description
8	C Axis Controller
9	Axis Controllers
10	Power Supply 3 (24v)
11	On/Off Switch
12	Electronics Plate Ground Stud
13	Power Supply 4 (24v)
14	Line Filter

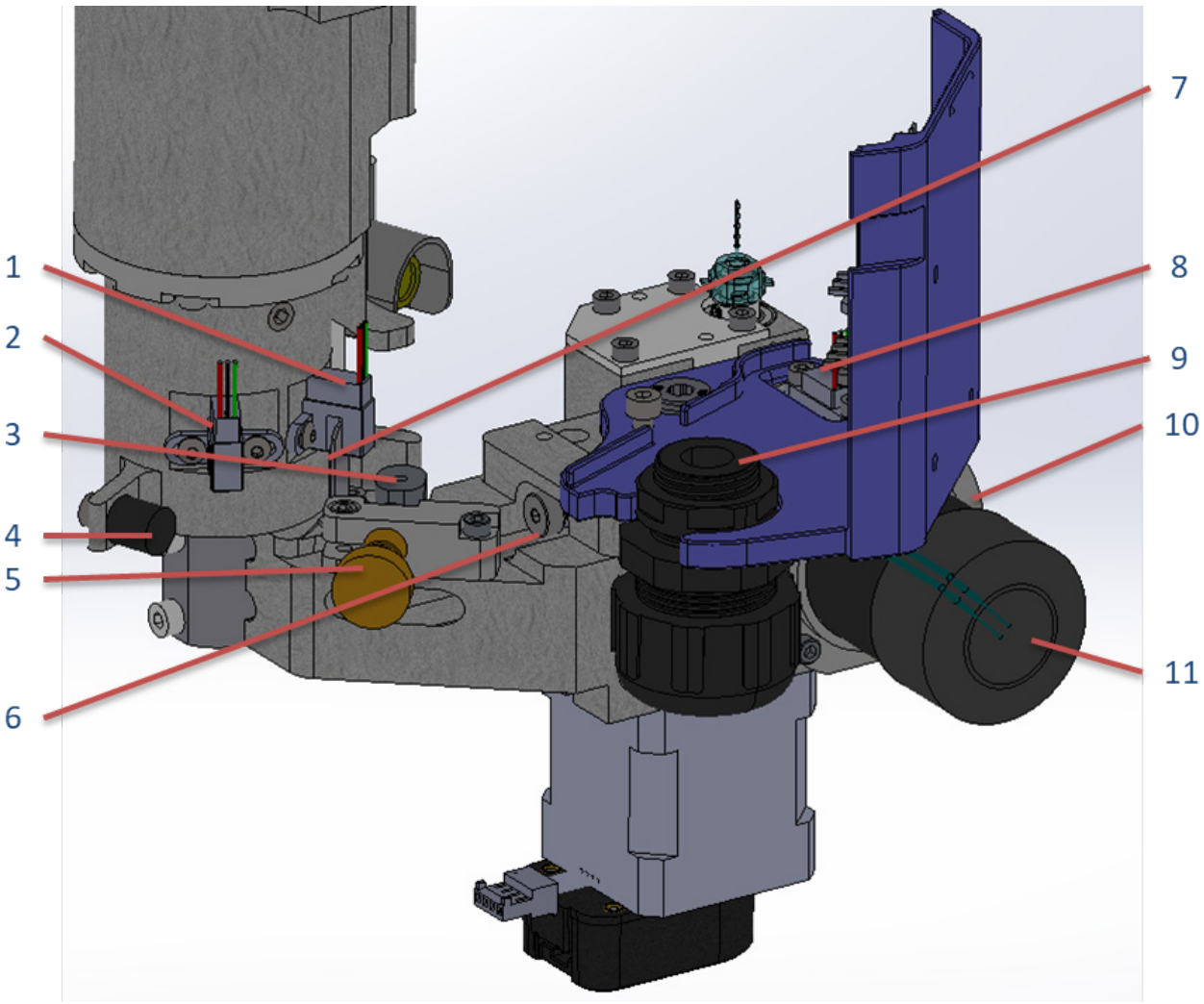
Edger Aux Spindle Parts – Front View



Part	Description
1	Worm Shaft Access Screw
2	Aux Spindle Tilt Home Switch
3	Aux Spindle Motor
4	Aux Spindle Tilt Gearbox Housing
5	Aux Spindle Coupling Access Screw
6	Aux Spindle Tilt Motor
7	Aux Spindle PCB and Cover

Part	Description
8	Aux Spindle In/Out Bearing Housing
9	Aux Spindle In/Out Detent Plunger
10	Aux Spindle Park Bumper Screw
11	Aux Spindle In/Out Shaft
12	Aux Spindle Support Arm
13	Aux Spindle Y Adjustment Screw
14	Aux Spindle High Speed Gearbox

Edger Aux Spindle Parts – Rear View



Part	Description
1	Aux Spindle Engaged Switch
2	Aux Spindle Park Switch
3	Aux Spindle In/Out Adjustable Hard Stop
4	Aux Spindle Park Bumper
5	Aux Spindle In/Out Adjustment Screw
6	Aux Spindle Tilt Housing Retaining Screw
7	Aux Spindle Engage/Park Switch Flag

Part	Description
8	Aux Spindle Tilt Home Switch
9	Liquid Tight Cord Grip with Wiring
10	Aux Spindle Motor Mounting Plate
11	Aux Spindle Motor

QM-X4 / ES-shape-2
User Manual Revision List

Date: **September 2, 2022**
Rev: 2.00

The QM-X4 and ES-shape-2 User Manual is available in the revision levels indicated below. Entries in **bold** are the latest available version of the manual. Blank entries indicate that a manual is not yet available for that language and revision level.

Language	**Corresponding Revision Level**					
English (US)	**2.00**					
Deutsch						
Français						
Español						
Português						
Italiano						
中國						
日本語						