



**OMEGA[®] Carver
User's Guide**

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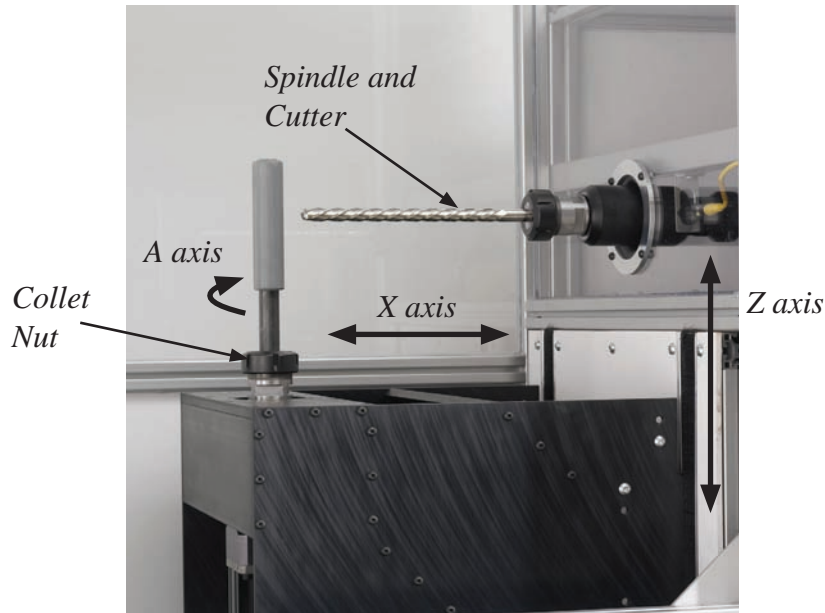
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CONTENTS

1.	Getting Started.....	5
1.1	Product Overview	5
1.2	About this Guide.....	5
1.3	Contacting Us.....	6
1.4	Installation and Environment	6
2.	Basic Operation	7
2.1	Safety Checks.....	7
2.2	Control Panel	7
2.3	Starting the Carver	9
2.4	Opening the Carver Door.....	10
2.5	Shutting Down the Carver.....	10
2.6	Downloading or Recovering Files Directly to the Carver PC.....	11
3.	Carving	13
4.	Carver Parameters and Settings	20
4.1	Carver Parameters	20
4.2	Carver Settings.....	22
5.	Specifications	28
6.	Safety.....	29
7.	Maintenance	31
7.1	Periodic Maintenance	31
7.2	Lubricating the Ball Screws.....	32
7.3	Cleaning the Top Hatch Area	37
7.4	Cleaning the Carving Chamber.....	37
7.5	Panel Cleaning	38
7.6	Cleaning the Dust Collection Filter	39
7.7	Replacing the Dust Collection Bag.....	39
7.8	Replacement Parts.....	39
8.	Troubleshooting	40
9.	Tips for Making Sockets Over Foam.....	46
10.	Index	48

1. GETTING STARTED

1.1 Product Overview



The **OMEGA**[®] Carver is a 3-axis carver that uses 4,000-RPM servo motors to carve foam blanks up to 24" in diameter and 25" in length.

The carver is fully integrated with **OMEGA**[®] *Tracer*[®] software and is accurate to 1/16" in the circumference of a 4" diameter 20" long cylinder. Additional features include casters and a removable carving chamber to make moving easier.

1.2 About this Guide

This guide describes how to operate and maintain the **OMEGA** Carver. For in-depth instruction on the *Tracer* C-Fab software, refer to the **OMEGA Tracer** User's Guide.

Be sure to read this entire guide at least once before operating the carver.

The following conventions are used throughout this guide:

- A **bold** font is used to highlight features of the user interface, such as buttons, field names, and menu items.
- An *italic* font is used for special emphasis, notes, and references to other areas of the document.
- A monospaced font is used to indicate information that you must type.

1.3 Contacting Us

You can contact Ohio Willow Wood at **800-848-4930** or via the Internet at www.owwco.com.

1.4. Installation and Environment

The **OMEGA** Carver is to be installed and serviced only by Ohio Willow Wood personnel.

The environment in which the carver is installed should include the following:

- A clean, dry area with as little dust as possible. Avoid exposure to rain and water droplets.
- A flat, stable, and level floor
- Suitable lighting
- A workspace area of 98 inches by 45 inches for installation of the carver and dust collection system
- No electrical machines or devices within 65 feet that may produce high-frequency noise. Examples of such machinery include:
 - Arc welder
 - Resistance welder
 - High frequency drier
 - Electric discharge machine
- Input voltage of 230V Single Phase at 60Hz
- Input current of 20A
- Internet access

2. BASIC OPERATION

2.1 Safety Checks

If any of the following abnormalities are detected, take corrective action prior to using the carver:

- Abnormal noises or vibration
- Damage to the carver
- Software/hardware not operating in the manner intended
- Cooling fans not functioning
- Error messages in the display

2.2 Control Panel



Cycle Start

The green Cycle Start button starts blinking after a carving job has been launched through the software. Pressing the blinking button initiates the carving process. This button is also used for referencing the carver and sending it to the home position.

Feed Hold

Pressing the red **Feed Hold** button stops the carver without cutting power to the motors, enabling the cycle to be resumed.

Main Isolator

This switch is used to isolate the carver from the local main supply. The switch can be locked in the OFF position to protect against unauthorized use of the carver.

Emergency Stop

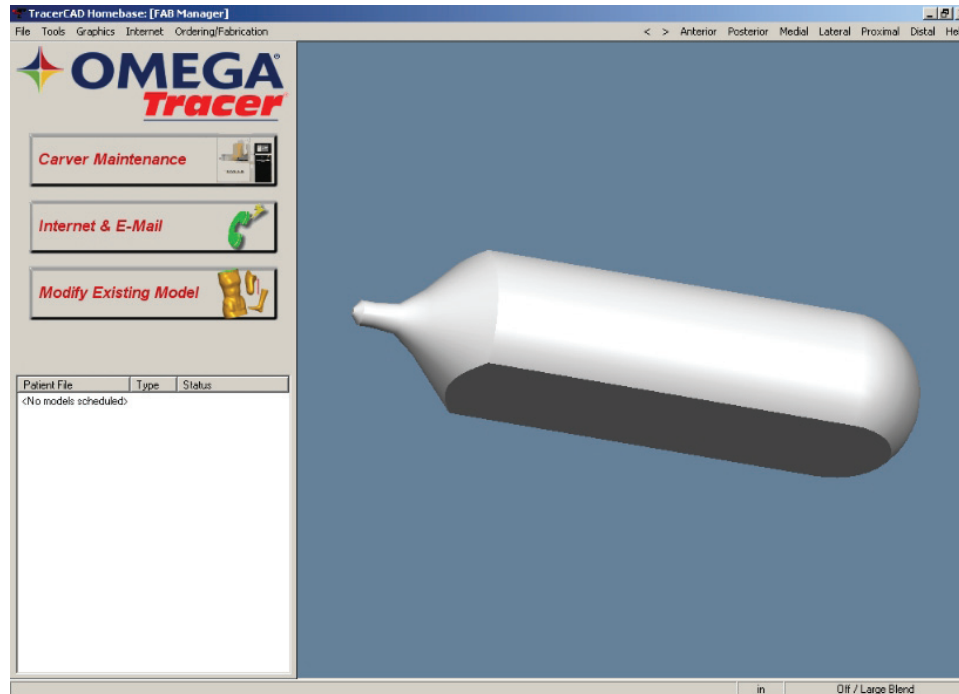
This button is used to stop the carver in an emergency situation.

Pressing the **Emergency Stop** button stops the power to the drives circuits. The motors may take a few seconds to run down after the button has been pressed. Resetting the **Emergency Stop** button turns the drives back on.

When the **Emergency Stop** button is pressed, the **Cycle Start** and **Feed Hold** buttons will blink rapidly until the **Emergency Stop** button is reset.

2.3 Starting the Carver

1. Turn on the Main Isolator switch located on the front lower panel of the carver. The PC turns on.
2. If necessary, log on to the network.
3. The **Tracer Start** screen will appear. If this does not happen, double-click the icons on the “quick launch” toolbar at the bottom of the screen.



4. Make sure that the **Emergency Stop** button is out.
*Note: Press the **Emergency Stop** button to stop the carver and turn off the carver motors. Pull the **Emergency Stop** button out to turn the carver motors on again.*
5. Click the **Carver Maintenance** button on the **Start** screen. When the **Omega Carver Maintenance** window appears, click on the **Reference** button. Wait while the carver references, which takes less than a minute.
6. Click the **Calibrate** button on the **Omega Carver Maintenance** window, and proceed through the steps of the calibration wizard.

2.4 Opening the Carver Door

The carver door has been designed for one-handed use. Be careful not to trap or hit any body parts when opening or closing the enclosure. Take appropriate safety precautions to eliminate contact with dust in the enclosure. Wear suitable coveralls, a particulate mask, and safety goggles.

The carver door is electrically interlocked to protect the operator and ensure that the machine can only carve with the door closed. If the door is opened when the carver is cycling, the carver will stop.

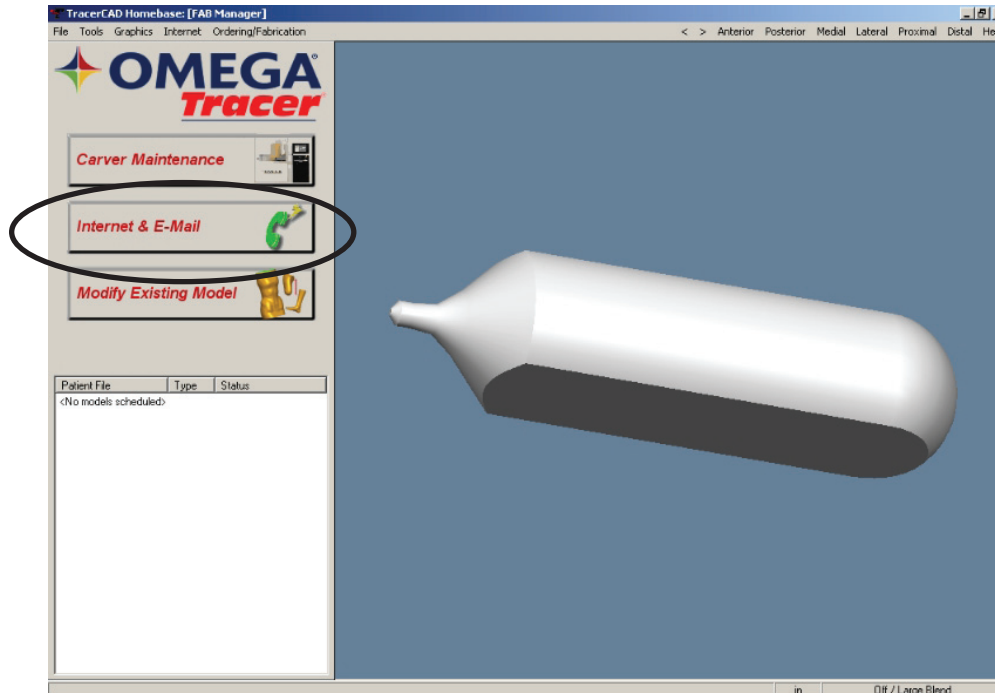
To prevent foam dust off of the keyboard, make sure that the keyboard tray is pushed in before opening the carver door.

2.5 Shutting Down the Carver

1. Shut down the software applications and PC in a safe manner.
2. Push the **Emergency Stop** button.
2. Turn off the **Main Isolator** switch and secure if necessary.

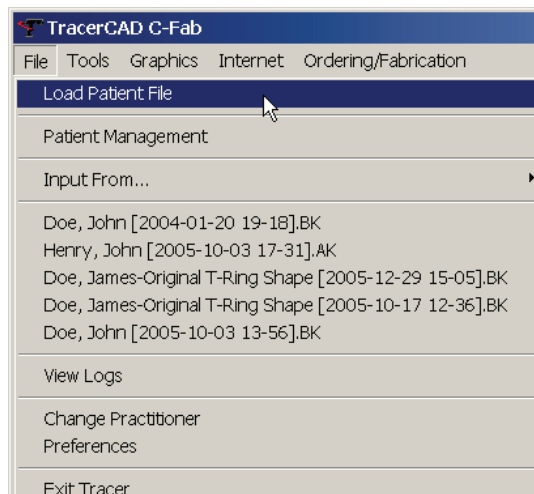
2.6 Downloading or Recovering Files Directly to the Carver PC

1. Click on the **Internet & Email** button on the *Tracer Start* screen.



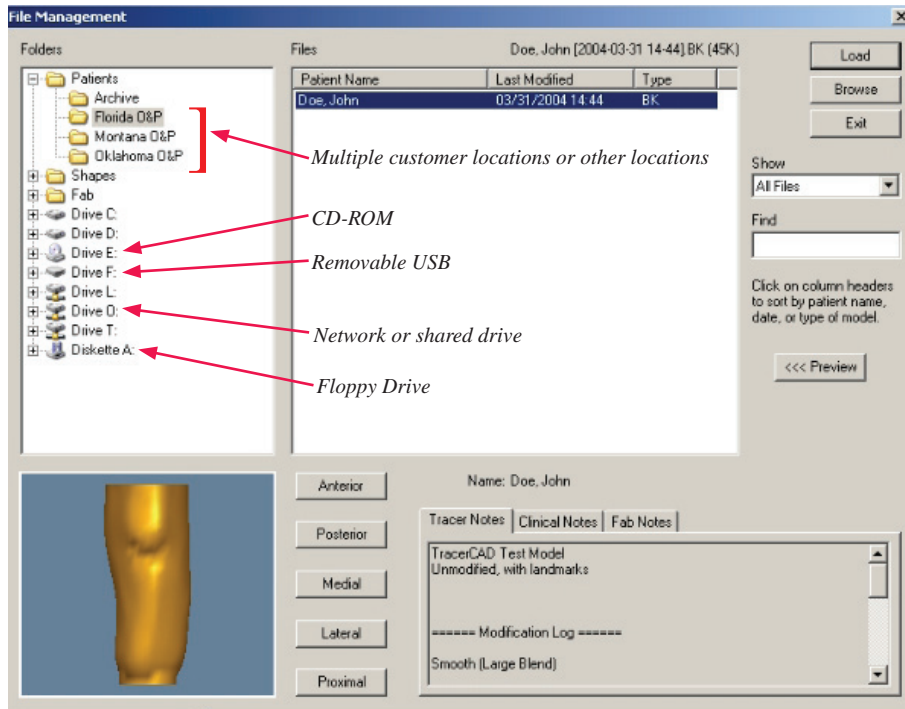
OR

Select **File > Load Patient File**.



- Right-click on the desired file and select **Schedule File(s)**.

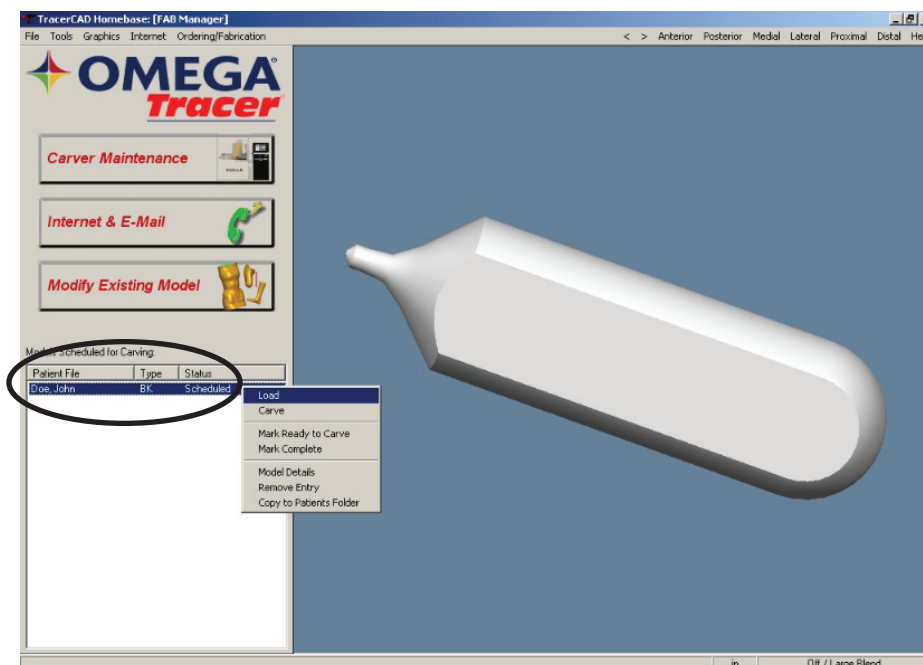
Note: the **Patients** folder is the default folder that is displayed in this window. If your desired file is located in one of the other folders shown below, click on the desired folder to display its contents, then select the desired file.



Repeat for additional files if desired. Click on **Exit** when you are done.

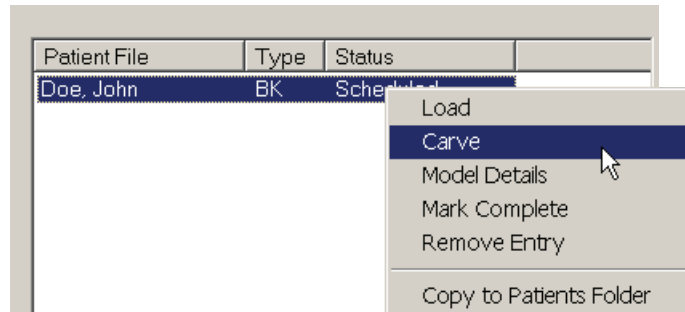
- The file(s) will now be listed on the **Start** screen with a status of “Scheduled.”

Note: Refer to the **OMEGA Tracer User’s Guide** for information on using the software tools to modify files.

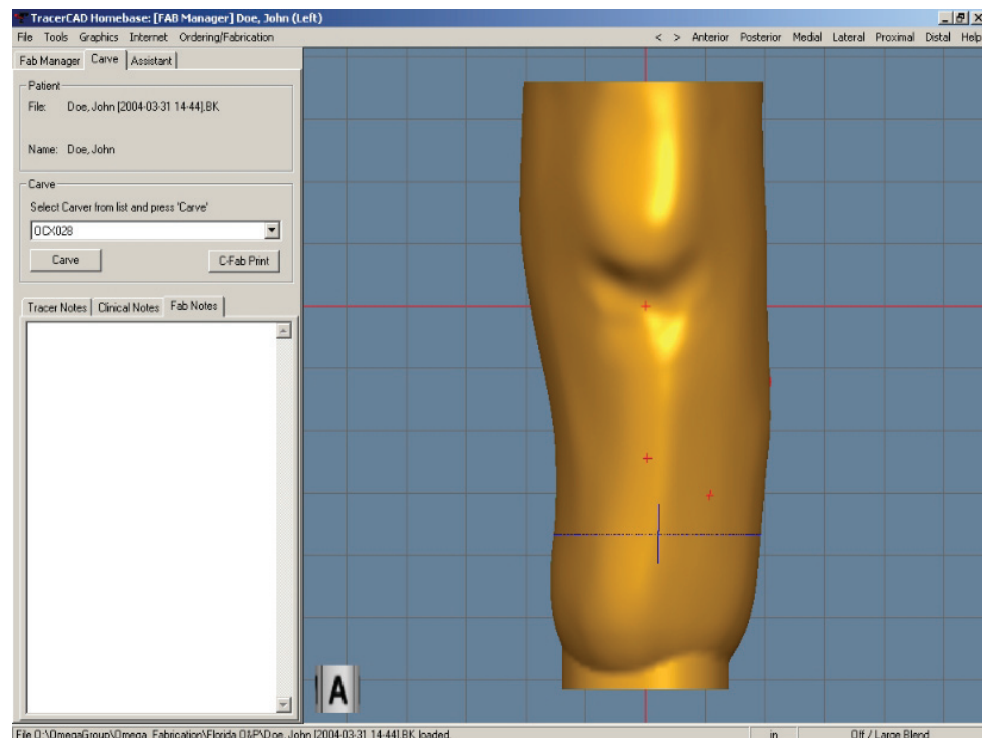


3. CARVING

1. Click on the desired file in the list of scheduled files on the **Start** screen and select **Carve** from the menu.

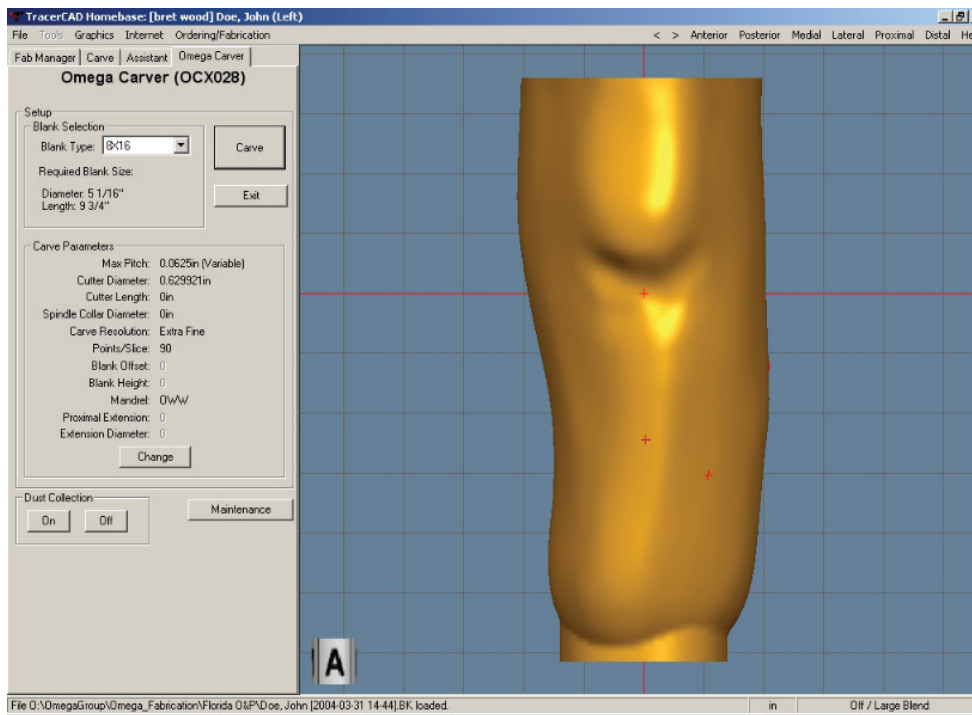


2. The **Carve** screen will appear, displaying a menu of available carvers along with any Fab Notes that have been entered. If desired, click on the **Assistant** tab to make modifications to the model. Refer to the OMEGA *Tracer* User's Guide for instructions on using the software tools to make the desired modifications. When you are done, click on the **Carve** tab to return to the **Carve** screen.

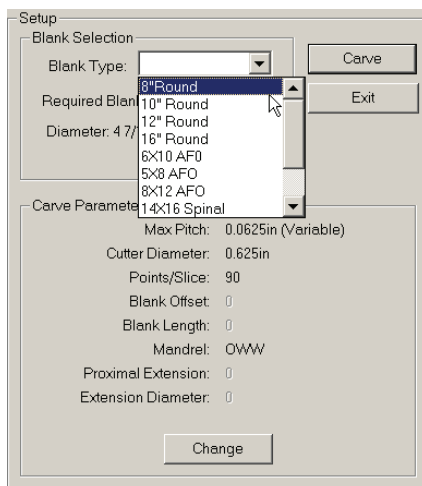


3. Make sure that **OMEGA** is selected from the list of carvers, then click on **Carve**.

4. The **Omega Carver** screen will be displayed.



- If you don't agree with the blank size that is displayed, select the desired blank size from the drop-down menu.



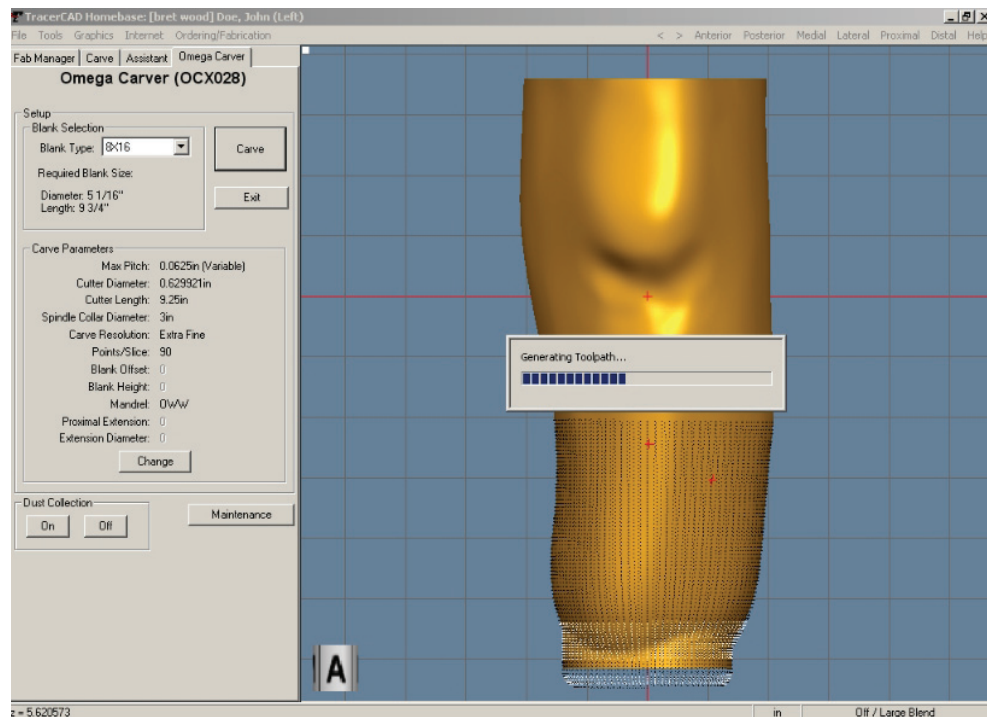
- Click on the **Change** button to access the carve parameters described in Section 4.1.

Note: Under normal conditions, there is no need to change the carving parameters.

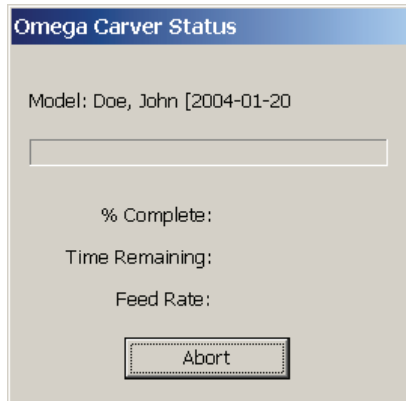
5. Load the blank into the carver as follows:

- Press the mandrel into the blank material to the shoulder of the mandrel.
Note: beware of any sharp points on the mandrel.
- Open the carver door.
- Using the Collet Wrench that is included with the carver, loosen the Collet Nut if needed (shown on page 5).
- Set the mandrel into the collet. Spin the foam blank until the slot on the bottom of the mandrel engages with the pin at the bottom of the collet.
- Tighten the Collet Nut with the Collet Wrench.
- Close the carver door.

6. Click on the **Carve** button. *Tracer* will display a progress bar.



7. Once the toolpath is generated, the **Omega Carver Status** window will appear, and the green **Cycle Start** button will start blinking. Press the button to initiate carving. The status of the file will be displayed on the **Start** screen as “Carving.”



When the job cycle starts, the carver begins by cutting any unnecessary material off of the foam blank. After the cut has been made, open the carver door, remove the excess material, close the carver door, then press the green Cycle Start button to resume the job cycle.

Warning

In the event of an emergency, push the red **Emergency Stop** button on the front of the panel to cut power to all of the motors.

Pressing the **Feed Hold** button or opening the carver door will stop the carver without cutting power to the motors, allowing the carving job to be resumed.

While the Carver is Running:

Opening the Carver Door

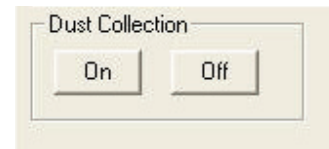
Opening the carver door will stop the carver without cutting power to the motors. The green **Cycle Start** button will start to blink after the door is opened. Press the button to resume carving.

Pressing the Feed Hold Button

Pressing the **Feed Hold** button will stop the carver without cutting power to the motors. The green Cycle Start button will start to blink after the door is opened. Press the button to resume carving.

Starting the Dust Collection System

Click the **On** button in the **Dust Collection** box on the **Omega Carver** screen.



Stopping the Carving Job

Click on the **Abort** button on the **Omega Carver Status** window.



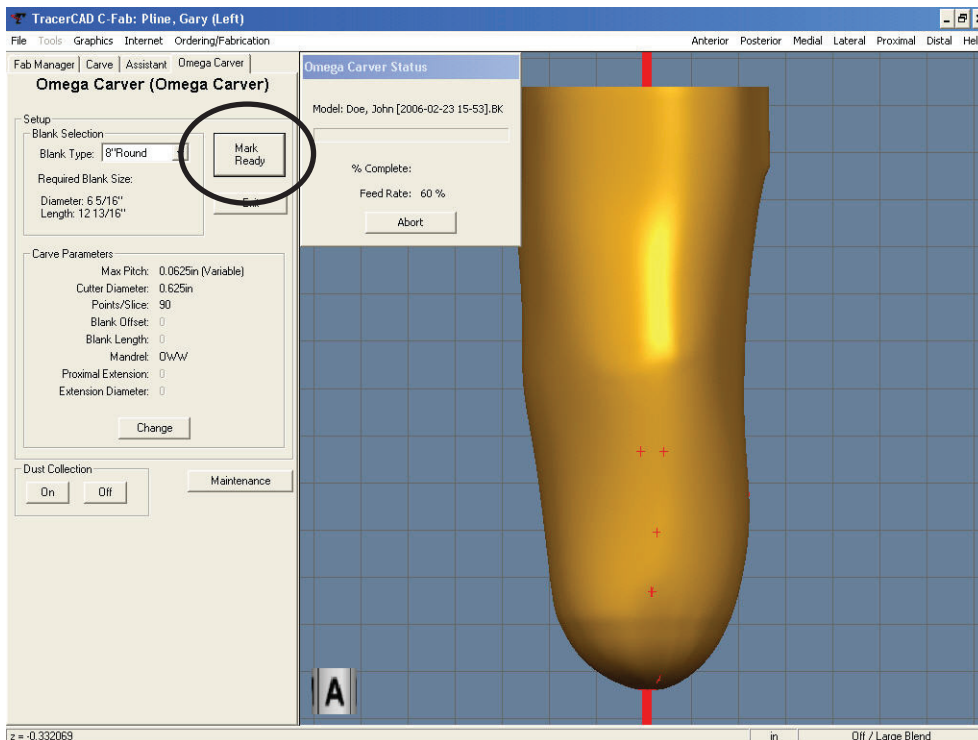
When the carving is complete, open the carver door, loosen the Collet Nut, and remove the carved shape on the mandrel.

Carving Additional Files

The ability to load other files while a file is currently being carved allows the files to be “prepared” for carving. (For example, a distal adapter can be added.) When the current file is complete, the new file can be started with out the delay of placing the adapter on the model.

To load additional files while another model is still carving:

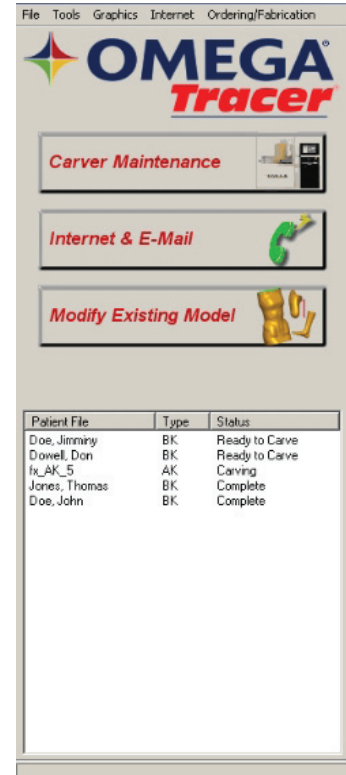
1. Click on the desired file in the list of scheduled files on the **Start** screen and select **Mark Ready to Carve** from the menu.
2. The **Carve** screen will appear, displaying a menu of available carvers along with any Fab Notes that have been entered. If desired, click on the **Assistant** tab to make modifications to the model. Refer to the *OMEGA Tracer User's Guide* for instructions on using the software tools to make the desired modifications. When you are done, click on the **Carve** tab to return to the **Carve** screen.
3. Make sure that **OMEGA** is selected from the list of carvers, then click on **Carve**.
4. The **Omega Carver** screen will be displayed. You will see a **Mark Ready** button on the **Omega Carver** screen instead of a **Carve** button. Select the desired blank size from the drop-down menu.



5. Click on the **Ready to Carve** button. The status of the file will now be displayed on the **Start** screen as “Ready to Carve”.

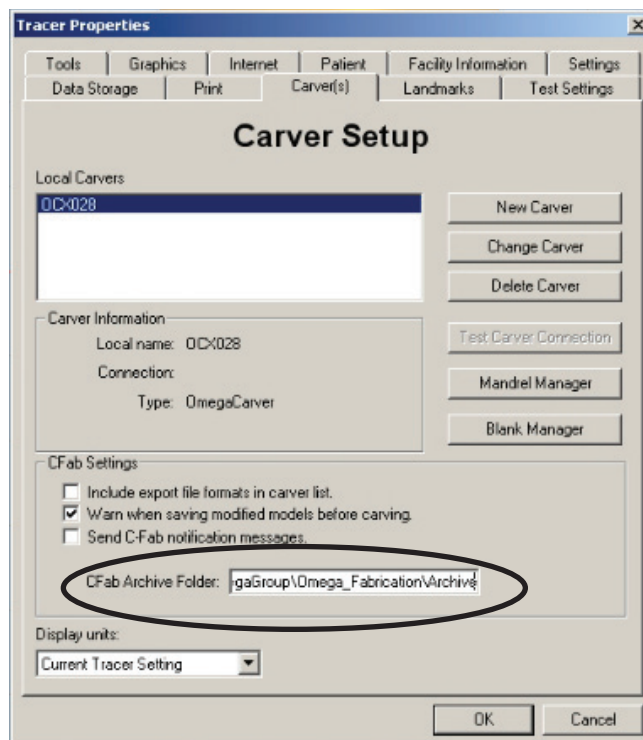
When the first file is finished carving, its status will be marked as “Complete” on the **Start** screen. Remove the completed model from the carver, and load a foam blank of the appropriate size for the next model.

Return to the **Start** screen, click on a file marked **Ready to Carve**, and click on the **Carve** button. *Tracer* will display a progress bar. Once the tool path is generated, the **Omega Carver Status** window will appear, and the green **Cycle Start** button will start blinking. Press the blinking **Cycle Start** button to initiate carving.



Archiving files

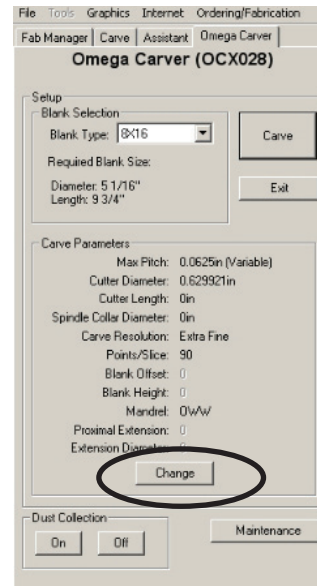
The default folder for CFab files is the **Patients** folder in the *Tracer* directory. To designate a different folder, go to **Help > Set Options** and click on the **Carver(s)** tab. Enter the desired folder name in the **CFab Archive Folder** field and click **OK**.



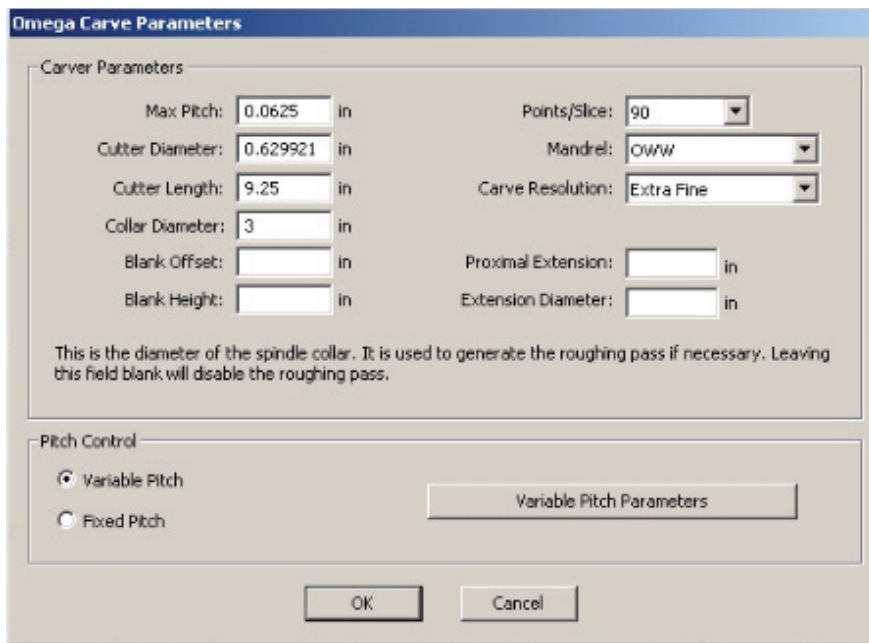
4. CARVER PARAMETERS AND SETTINGS

4.1 Carver Parameters

To view or change any of the carver parameters, click on the **Change** button on the **Omega Carver** screen.



The **Omega Carve Parameters** window will appear.



The following carve parameters are displayed in the **Omega Carve Parameters** window:

Maximum Pitch: the maximum distance the carving bit travels along the axis of the model between each revolution. If the **Variable Pitch** feature is enabled, the movement between some rotations will vary depending on the detail of the model and will likely be less than this value.

Cutter Diameter: the diameter of the carver bit. *Tracer* expects a round cutter. It is important to set this accurately since this value is used to compensate for the diameter of the cutter when carving models.

Blank Offset: shifts the model proximally in the blank (away from the chuck). This option is typically used when the mandrel might interfere with the carving. *Tracer* remembers the setting for each model type (this is particularly useful for AFOs). Note that the blank must be long enough with this value added to carve the model.

Blank Length: carves the model at the most proximal end of a blank of this length.

Note: Only one Blank Offset or Blank Length is allowed.

Cutter Length: the exposed length of the cutter. Enter 9 1/4" for this setting.

Collet Diameter: Enter 3" for this setting.

Points/Slice: the number of data points to be sent to the carver for every revolution (slice) of the model. Only 90 points/slice and 180 points/slice are supported. Usually 90 is sufficient and recommended.

Mandrel: Make sure that OWW is selected as the mandrel. The OMEGA Carver is designed to work only with the OWW mandrel.

Proximal Extension: the amount (if any) that you would like to carve beyond the proximal end of the model.

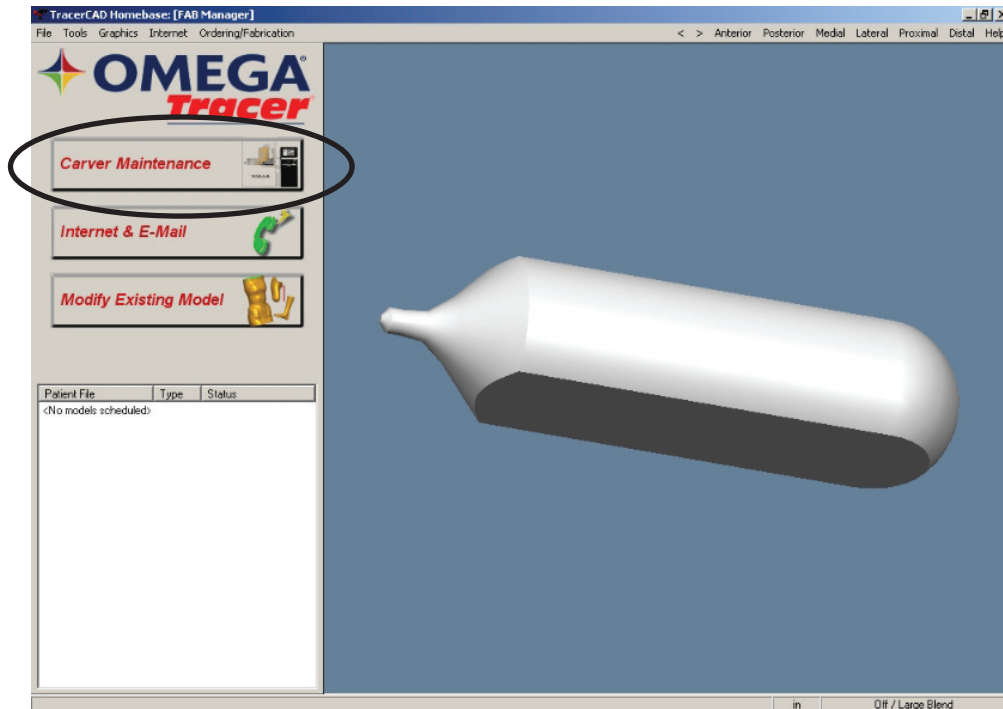
Proximal Diameter: allows you to expand the diameter of the proximal extension by the amount specified. This is useful for providing a smooth surface that tapers away from the model when vacu-forming over the carved model.

Variable Pitch: *Tracer* incorporates a technology that analyzes the model and adjusts the pitch for the smoothest finish possible. Select this option to use a Variable Pitch, which is the setting that is recommended by Ohio Willow Wood for most applications. To change the variable pitch parameters, click on the **Variable Pitch Parameters** button. Under normal circumstances these parameters do not need to be changed; they should only be changed under the guidance of **OMEGA Tracer** Technical support

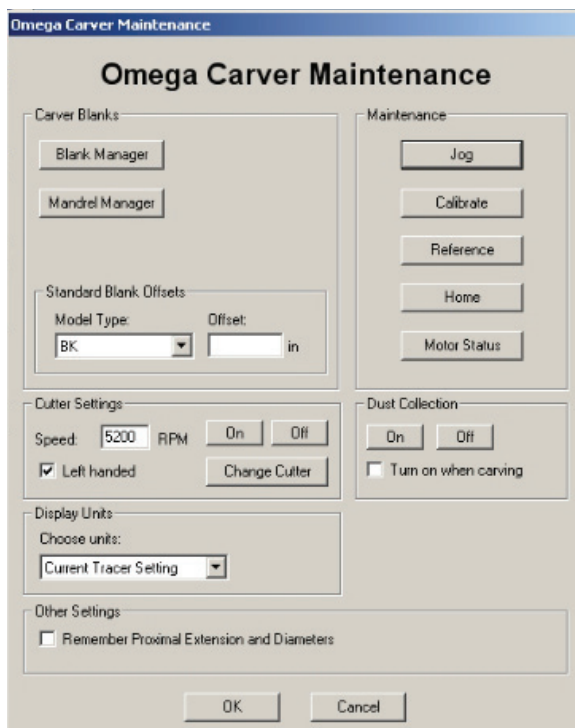
Fixed Pitch: Select this option to disable Variable Pitch and use a pitch equal to the maximum pitch setting. This setting is only recommended for models that are not sensitive to the "grooving" created during the carving process.

4.2 Carver Settings

All of the carver settings are accessed by means of a **Maintenance** button. From the **Start** screen, click on the **Carver Maintenance** button. Or, while on the **Omega Carver** screen, press the **Maintenance** button.



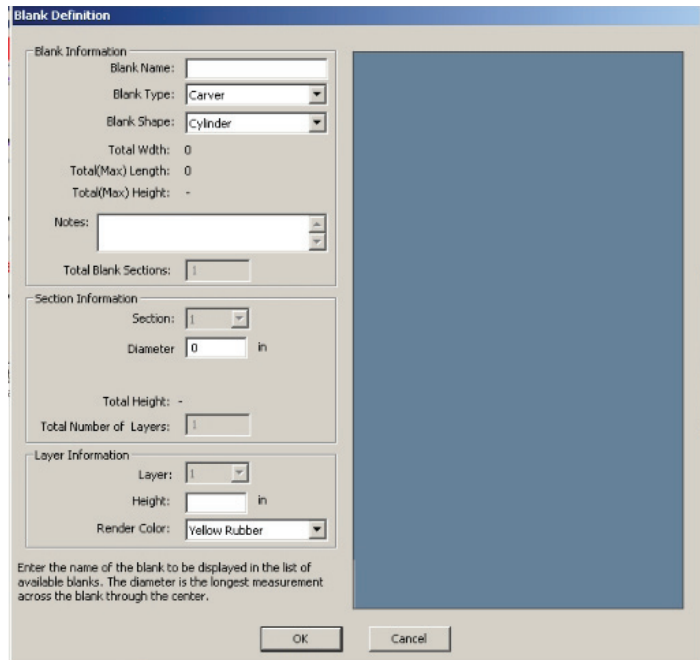
The **Omega Carver Maintenance** window will be displayed. The buttons and menus described in the rest of this section are all found on this window.



Adding New Selections to the Blank List

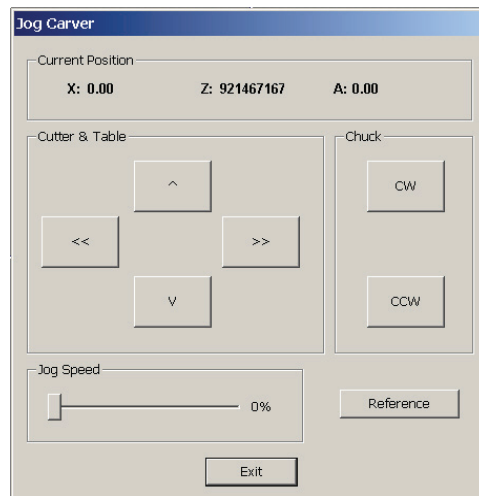
The software contains a list of all sizes of blanks that are available from Ohio Willow Wood. Additional sizes can be added as follows:

1. Click on the **New** button.
The **Blank Definition** window appears.
2. Enter a name and diameter of the new blank, then click **OK**.
3. The new blank will be added to the list.
4. To change the order in which the blanks are listed, select the desired blank and click on the **Move Up** or **Move Down** buttons.



Jogging the Carver & Adjusting the Speed

To jog the carver, click on the **Jog** button. The **Jog Carver** window appears.

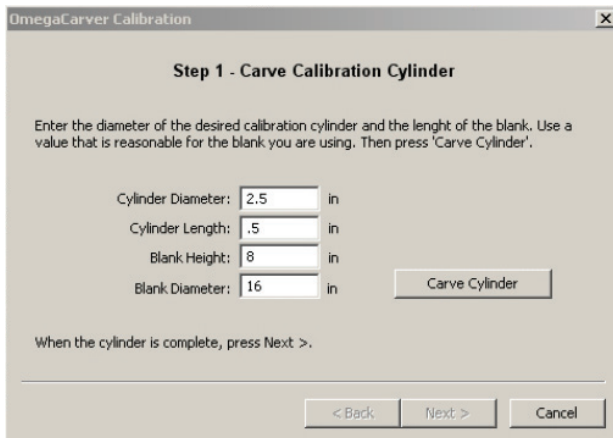


- Use the slider bar to adjust the carver's jogging speed as desired.
- Click on the arrows to re-position the Cutter & Table as desired.
- Click on the **CW** or **CCW** buttons to turn the chuck clockwise or counter-clockwise as desired.
- To initiate a reference cycle, press the **Reference** button and press the green **Cycle Start** button after it starts blinking.

Click on **Exit** when you are done.

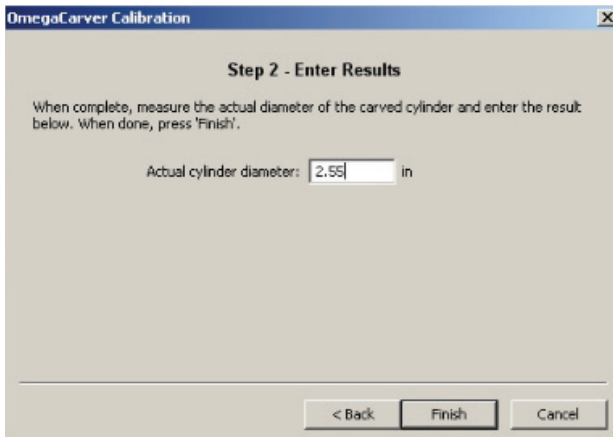
Calibration

1. Click the **Calibrate** button on the **Omega Carver Maintenance** screen. The **OmegaCarver Calibration** screen appears.



The screenshot shows a dialog box titled "OmegaCarver Calibration" with a close button (X) in the top right corner. The main heading is "Step 1 - Carve Calibration Cylinder". Below the heading is a paragraph of instructions: "Enter the diameter of the desired calibration cylinder and the length of the blank. Use a value that is reasonable for the blank you are using. Then press 'Carve Cylinder'." There are four input fields, each followed by "in": "Cylinder Diameter:" with the value "2.5", "Cylinder Length:" with ".5", "Blank Height:" with "8", and "Blank Diameter:" with "16". To the right of these fields is a button labeled "Carve Cylinder". At the bottom of the dialog box, there are three buttons: "< Back", "Next >", and "Cancel". A small instruction at the bottom left says "When the cylinder is complete, press Next >."

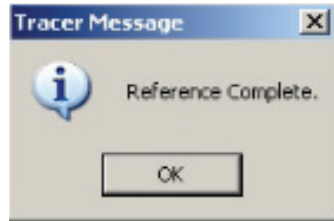
2. Enter the desired cylinder diameter, cylinder length, blank length, and blank diameter. Load the foam blank into the carver, then click on **Carve Cylinder**.
3. Press the blinking green **Cycle Start** button to initiate carving.
4. When the carving is complete, click on the **Next** button. Measure the actual diameter of the cylinder that was carved. If you are satisfied with the result, click **Cancel**. Otherwise, enter the diameter of the carved cylinder and click **Finish**.



The screenshot shows a dialog box titled "OmegaCarver Calibration" with a close button (X) in the top right corner. The main heading is "Step 2 - Enter Results". Below the heading is a paragraph of instructions: "When complete, measure the actual diameter of the carved cylinder and enter the result below. When done, press 'Finish'." There is one input field labeled "Actual cylinder diameter:" with the value "2.55" and "in" to its right. At the bottom of the dialog box, there are three buttons: "< Back", "Finish", and "Cancel".

*Note: If no cylinder was carved because the cutter never hit the foam, click on the **Back** button and entered a reduced cylinder diameter. The amount of the reduction should be slightly larger than the distance between the cutter and the blank during the previous attempt. After entering the smaller cylinder diameter, resume the process at Step 2 above.*

5. If a new diameter was entered in Step 4, the green Cycle Start button flashes. Push the green Cycle Start button to reference the carver and accept the new number.
6. When the "reference complete" message appears, click **OK**.



Reference

To send the carver through a reference cycle and then return the carver to its home position, click the **Reference** button on the **Omega Carver Maintenance** screen.

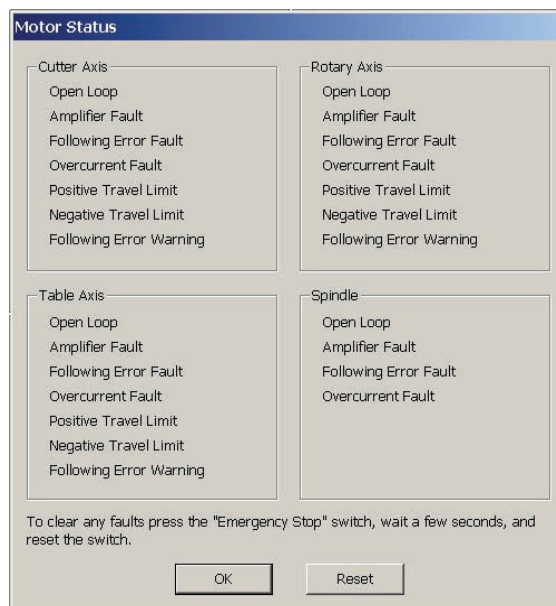
Home

To return the carver to its home position, click the **Home** button on the **Omega Carver Maintenance** screen.

*Note: **Home** can't be used if the carver has not been referenced.*

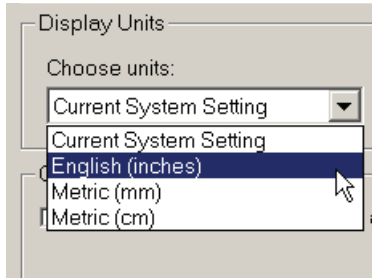
Motor Status

To check on the status of the Cutter, the Rotary Axis, the Table Axis, or the Spindle, click the **Motor Status** button on the **Omega Carver Maintenance** screen. Any faults will be displayed in red text, and any warnings will be displayed in yellow text.



Display Units

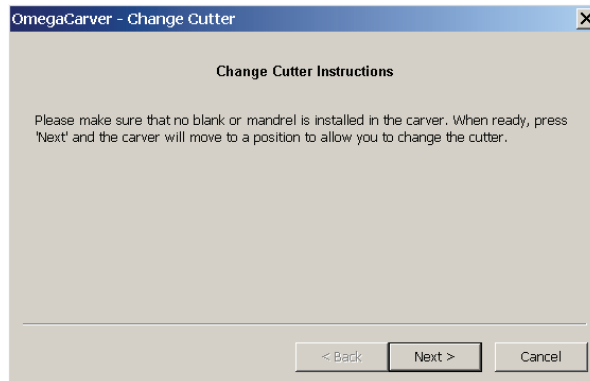
To change the units in which measurements are displayed in the software, select the desired units from the drop-down menu in the **Display Units** field of the **Omega Carver Maintenance** screen. This setting is independent of the *Tracer* display units setting which is shown at the bottom right of the *Tracer* screen. It forces all units to this setting when using the OMEGA Carver.



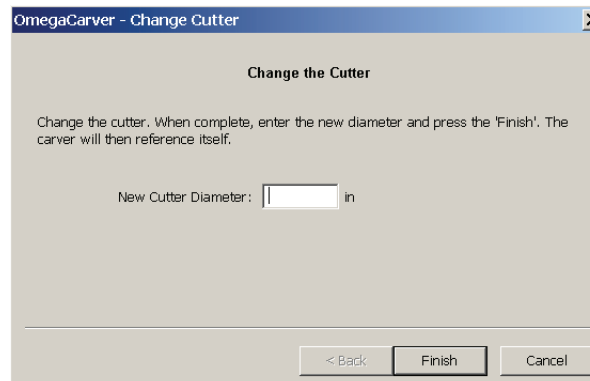
Changing the Cutter

To change the cutter, click on the **Change** button to launch the **Change Cutter** wizard.

Make sure that no blank or mandrel is installed in the carver, then click on **Next**.

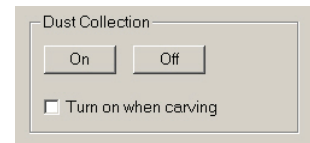


Loosen the nut and remove the cutter. Install a new cutter and tighten the nut. Enter the diameter of the new cutter in the **New Cutter Diameter** box, then click on **Finish**.



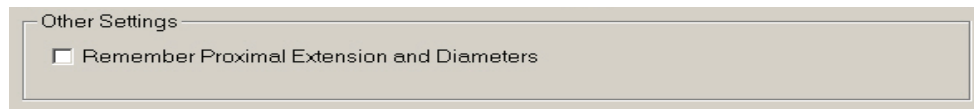
Dust Collection

Click the **On** button to turn on the Dust Collection function; click the **Off** button to turn the function off.



Placing a check in the **Turn on when carving** box will cause the Dust Collection system to turn on automatically each time a carving job is started. Once the system is started automatically, it will continue to run until it is turned off using the **Off** button on this screen or on the **Omega Carver Maintenance** screen.

Remember Proximal Extension and Diameter



Place a check in this box on the **Omega Carver Maintenance** screen if you would like the carver to remember the proximal extension and diameter that you enter in the **Omega Carve Parameters** screen (refer to Section 4.1). These values are remembered on a per-model basis.

5. SPECIFICATIONS

Dimensions

Overall height	92 inches
Overall width	86 inches (102 inches with vacuum)
Overall depth	32.5 inches

Axis travel

X axis	18 inches
Z axis	25 inches
A axis	360°

Electrical

Input voltage and current requirement	230V Single Phase 60Hz 20A
Spindle motor	AC Induction 0.75KW 230V 60Hz
Spindle speed	Max speed: 5000 RPM
Axis motors	4 off DC servo motors
Maximum axis speed	5m/min
Control	Industrial PC Pentium 4 512 ram CD ROM USB wireless Floppy Drive Network card 56K internal modem
Axis control	3 axis servo controller with integral PLC
Software	PC operating system: Windows XP CAD system: OMEGA Tracer

Temperature 5 to 40° C (41 to 104° F)

Storage Temperature -25 to 55° C (-13 to 131° F)
Short periods not to exceed 75° C (167° F)

Humidity 10% to 80% RH (no condensation)

6. SAFETY

Please read and fully understand this instruction manual before using the carver. Be sure to understand all safety precautions and warnings prior to operation and maintenance. Operation and servicing of automated equipment involves potential hazards and it is important that you take precautions to avoid injury.

- Ohio Willow Wood cannot anticipate all possible circumstances that might involve a potential hazard. The warnings listed in this manual therefore do not necessarily cover all circumstances.
- If a procedure, tool, work method, material, or operating technique not specifically recommended by Ohio Willow Wood is used, make that such a procedure does not endanger yourself and others.
- Observe all federal, state, and local regulations, as well as your employer's health and safety practices, when operating the carver.
- If English is not read and understood by any carver operators, display safety precautions and warnings in their native language(s) on the carver.
- Ohio Willow Wood will not be held responsible for any incidental or consequential damages or other costs resulting from abuse or misapplication of the carver.
- Keep hands clear of moving machinery. Loose fitting clothing, jewelry, hair or ties may become entangled in the machinery. Do not wear these items while operating or servicing the machine.
- Electric shocks can kill. The carver control enclosure should only be opened by competent service personnel. The carver control enclosure should never be powered up with the protective covers removed.
- The carver is intended for use in a variety of countries using different supply voltages. The carver is set up for use on one particular supply voltage. The machine identity label on the back of the carver clearly shows which supply voltage is required.
- The carver has been fitted with various devices in order to protect against any short-circuit or overload conditions.
- Do not remove, disable, or bypass the various safety and protection devices (guards and safety door etc.) fitted for the safety of the operator.
- Always unplug the carver's power cord before performing maintenance of any kind.
- Never modify the machine without prior written permission of Ohio Willow Wood. If modification of the machine has been made without permission, including removal or stopping functions of protective devices, Ohio Willow Wood accepts no liability whatsoever.

- During operation of the carver, the following items should be strictly observed to avoid a generation of unexpected fire:
 1. Do not machine flammable material.
 2. Do not place flammable articles around the machine.
 3. If the machine is smoking or smells of smoke or burning, immediately stop the machine. Shut the carver down in a controlled manner and isolate the power. Do not use again until the cause has been located and removed.
- Avoid cutting excessively hard materials e.g. hard wood and/or preventing the machine spindle to move as this may damage the machine.
- Ohio Willow Wood recommends using suitable and sufficient extraction while operating the carver. Dispose of extracted waste in accordance with your local authority regulations.

7. MAINTENANCE

7.1 Periodic Maintenance

Frequency	Directions
Daily	<p>Clean machine after use.</p> <p>Brush down all accessible parts with a soft hand brush, then remove waste using a vacuum cleaner.</p> <p>Check for any damage to the interior and exterior of machine.</p> <p>Check operation of emergency stop switch.</p> <p>Check the tightness of the cutter grub screws.</p> <p>Do not use compressed air to clean the carver. This will send dust into the bearing seals and the surrounding atmosphere.</p>
Weekly	<p>Check air filter on the front of the PC; replace if it is excessively dirty.</p>
Every 60 days	<p>Clean and lubricate the ball screws (refer to page 32).</p>
Every six months	<p>Check condition of all drive belts.</p>

Servicing beyond these periodic maintenance items must be performed by Ohio Willow Wood.

Warning

Always unplug the carver's power cord before performing maintenance of any kind.

7.2 Cleaning and Lubricating the Ball Screws

In order to keep the ball screws dust-free and properly lubricated, **this procedure must be performed at least once every 60 days.**

Items required:

- A general-purpose, graphite-free lubricant such as Mobil Vactra Oil No.2
- Rubbing alcohol
- Towels

1. Remove the metric bolts from the OMEGA Carver's back access panel. Remove the panel and set it aside.



2. If you will be using the OMEGA Carver's vacuum, connect the external duct hose to the evacuation port on the front of the carver.

You may the use a vacuum other than the OMEGA Carver's vacuum if you wish.



3. Activate the vacuum by clicking the **On** button for **Dust Collection** on the **Omega Carver Maintenance** screen.

4. Vacuum the foam dust from the following areas:

- Around and below the electrical box/
panel area



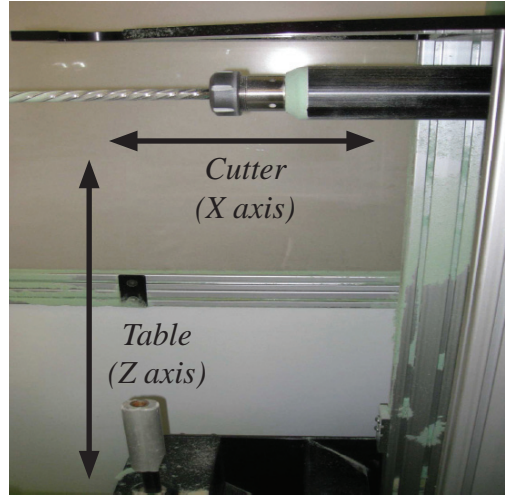
- Base of vertical ball screw



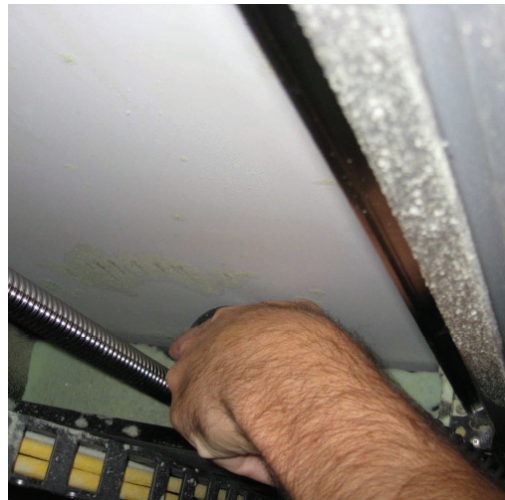
- Base of horizontal ball screw



5. Step around to the front of the carver. Using the **Jog** interface described on page 23, jog the table (Z axis) downward until it stops. Then jog the cutter (X axis) as far to the right as possible.



6. Return to the back side of the carver. Vacuum the foam dust from the top side of the table assembly.



7. Apply rubbing alcohol to a towel. Use the towel to clean the horizontal ball screw.

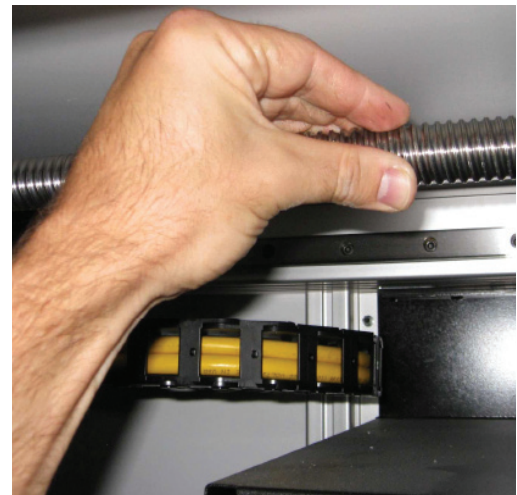




8. Apply rubbing alcohol to another towel. Use the towel to clean the vertical ball screw.



9. Apply a thin line of lubricant across the horizontal ball screw. Lightly rub or spread the lubricant into the “threads” of the ball screw with a bare hand or a towel.



10. Apply a thin line of lubricant across the vertical ball screw. Lightly rub or spread the lubricant into the “threads” of the ball screw with a bare hand or a towel.



11. Return the table and cutter to their starting positions by refereneing the carver as described on page 23.
12. Re-attach the carver's rear access panel.

7.3 Cleaning the Top Hatch Area

1. Loosen the M8 cap screw at the back of the hatch. Lift the hatch.



3. Vacuum as needed using a Shop Vac®.

7.4 Cleaning the Carving Chamber

1. Connect the vacuum hose to the port on the front of the carver.
2. Activate the vacuum by clicking the **On** button for **Dust Collection** on the **Omega Carver Maintenance** screen.
3. Use the hose to clean the inside of the chamber.



7.5 Panel Cleaning

Cleaning the clear panels

1. Soften dirt by wiping with lukewarm water.
2. Gently remove dirt with a sponge or soft cloth and a solution of lukewarm water and ordinary household cleaner or mild soap.
3. Repeat the cleaning process, then dry the panel with a soft cloth.

Notes:

- *Do not scrub clear panels with brushes or instruments.*
- *Avoid contacting the surface with Butyl Cellosolve, Isopropanol, or any other solvents.*
- *Avoid any abrasives or cleaners of a highly alkaline nature.*
- *Test any cleaner on a small area of the carver prior to use.*
- *Solvent cleaners which state they are suitable for use on polycarbonates may not be safe for use on the clear panels.*

Cleaning the white panels

1. To remove dust, wipe in one direction with a solution of soap and water.
Note: wiping in a circular motion can create a build-up of static charge.
2. Remove any residual soapy film with a lint-free wipe moistened with heptane, octane, methyl alcohol, or methylated sprits. These solvents will also remove greasy deposits and dust or dirt adhering to the surface. Take appropriate safety measures when using any of these cleaning agents.

7.6 Cleaning the Dust Collection Filter

Turn the handle on the top of the to rotate the cleaning flapper inside the canister. This will shake the dust from the filter and allow it to fall into the collection bag.

7.7 Replacing the Dust Collection Bag

Note: Wearing a particle mask/respirator for protection against fine dust particles during cleaning is highly recommended.

1. Remove the Collector Bag by pushing the Snap Ring of the Collection Bag upwards at an angle and pulling the Collection Bag and Snap Ring out.
2. Empty the contents into an appropriate container.
3. Place the Snap Ring over the top of the new Collection Bag and fold over the bag approximately three inches.
4. Insert the Snap Ring of the Collection Bag into the bottom of the housing at an angle.
5. Pull down on the Snap Ring to make sure it “seats” in the housing.

Note: make sure the Snap Ring “snaps” into place in the housing, and also that the Collection Bag hangs down approximately 3" so that there are no air leaks.

7.8 Replacement Parts

FB-001	Carver Mandrel
FB-003	Spinal Mandrel
OMEGA-5237	Carver Cutting Bit
OMEGA-3610	Metal Shielded Collection Bags (Set of 5)

8. TROUBLESHOOTING

The OMEGA Carver Will Not Reference

Definition:

The green button will not stop flashing when the operator attempts to reference the OMEGA Carver.

Likely cause(s):

1. One of the safety eyes (proximity switches) either inside the door or underneath the top hatch is not making contact with the metal safety brackets. There may be a build-up of foam dust between the bracket and the proximity switch.
2. The startup procedure has not been done in the correct sequence.
3. One of the Axis motors may be unresponsive because an amplifier may have failed on the GEO Brick (motor controller). The cutter assembly will move but the Table/Chuck assembly will not travel in any direction.
4. The power cord on the GEO brick has come loose, or is not completely making contact.
5. The Config file that was originally flashed into the controller has become corrupted.

Solution:

1. Press in the Emergency stop button, abort the reference sequence by clicking on abort, open the carving door, and then shut the door. Verify that the door is tightly latched shut. Pull the emergency button back out. Attempt to reference the OMEGA Carver again.
2. Always verify that the OMEGA Carver's front door is always closed during the start-up procedure. This will insure that there is a constant connection between the four safety eyes.
3. One of the safety eyes could be malfunctioning. In that circumstance the operator should contact OMEGA *Tracer* support.
4. Attempt to jog the OMEGA Carver. The operator should immediately contact OMEGA *Tracer* support if the Table/Chuck assembly will not travel in any direction.
5. If reconfiguring the OMEGA Carver's GEO Brick is necessary, contact OMEGA *Tracer* support.

Motor Fault

Definition:

One of the OMEGA Carver's servo motors is being "taxed" or is attempting to move past the specified limits.

Likely cause(s):

1. The Axis motor did not receive enough power to activate the motor.
2. There was an error in the positioning of the motor, or was not phased properly.
3. A new cutter was installed or the cutter was rotated by hand.
4. There was an amplifier fault on the GEO Brick controller.
5. The "chuck" was over-tightened.
6. The settings that control the rotation of the chuck, the motion of the spindle assembly, and the table are set too low (or too high) and need to be adjusted.
7. Dust particles have collected within the spindle axis motor's or the table axis motor's housings, and the dust buildup is binding up the motor. In this specific case you may actually hear a "knocking" or "clunking" sound when the table or spindle axis attempts to move.

Solution:

1. Press the Emergency stop button and then release the Emergency Stop Button. Attempt to reference or carve the shape file again.
2. Press the Emergency stop button and then release the Emergency Stop Button. Click the "reset" button in the motor status panel. The errors on screen should then go away. Attempt to Reference the carver or "jog" the machine's axis again. If an "amplifier" error appears or does not clear (located in the motor status panel), than it is likely that an amplifier on the GEO brick has failed. This can be verified by looking directly at the GEO brick to identify the error code that might be flashing.
3. If the motor fault is occurring randomly during the carving phase, then it is very likely that the GEO brick parameters need to be changed or edited. Please contact OMEGA *Tracer* support.
4. Clean and lubricate the ball screws (refer to page 32).

Carved Shape (Foam Model) Measurements Are Incorrect

Definition:

The circumference of the shape that is outputted by the OMEGA Carver is too small or too large, or the shape is deformed in some manner.

Likely cause(s):

1. The cutting bit could be loose or may have traveled out.
2. The mandrel may not have been secured tightly.
3. The OMEGA Carver may be out of calibration.
4. A software error could have occurred.

Solution:

1. Verify that the cutter is firmly in the spindle housing and that the collet ring is tightened.
2. Verify that the mandrel is inserted properly and tightened. Remember that the OMEGA Carver mandrels are “keyed” to specifically fit the OMEGA Carver’s chuck.
3. Calibrate the carver and verify that the OMEGA Carver is indeed calibrated.
4. Insure that all the people who operate the OMEGA Carver are taking circumference measurements in the same way, and make sure that they are all using the same operational practices.
5. Always operate with most current version of the *Tracer* software.

The OMEGA Carver's PC Will Not Boot Up

Definition:

The OMEGA Carver's PC will not boot up. The PC does not make any sound, nor will the monitor power up, and all activity lights are off on the front of the PC.

Likely cause(s):

1. The power supply in the on-board PC has been hit with some type of power surge.
2. The Main Breaker has been "tripped" or the fuses have failed.

Solution:

1. Verify the power connections on the PC. Verify that the activity lights on the front of the PC chassis are lit when power is restored to the OMEGA Carver.
2. Verify that the four main breaker switches on the OMEGA Carver are powered on, and that the fuses under the block numbered FU221 are functional. Contact OMEGA *Tracer* support at this point for further instruction.

Carver Maintenance Button (Within Tracer) Is Inactive

Definition:

Tracer loads as it should and the initial screen looks normal. But when the operator clicks on the **Carver Maintenance** button, *Tracer* locks up or does not proceed.

Likely cause(s):

1. *Tracer* can not communicate with the GEO Brick controller via USB port because of a driver mismatch or GEO Brick firmware corruption, or a general failure within the GEO Brick (motor controller).

Solution:

1. Go to **Start > Control Panel > Performance and Maintenance > System**. Click on the **Hardware** tab, then click on the **Device Manager** button. Check to see if **2.0 UMAC DELTA TAU DEVICE** is listed under "Universal Serial Bus Controllers."
 - If this device is not listed, then it is likely that the GEO brick is down, or that the USB connection has failed on the GEO brick. Verify that the GEO brick is running and has power.
 - If this device is listed, this means that the firmware has been corrupted on the GEO brick. Contact OMEGA *Tracer* support for further instruction.

Spindle/Cutter Stops Suddenly While Carving a Model

Definition:

The Cutter spins and stops abruptly; green and amber lights briefly flash or continue to flash. Using the E-stop button doesn't clear the problem. The cutter continues to stop during the carving sequence (either in the initial cutoff, or while the model is being carved).

Likely cause(s):

1. There is likely a loose wire connection, at either the motor contactor (mounted directly next to the SOLA power supply) or the connection directly on the back of the E-Stop.

Solution:

1. Access the electrical panel and verify that two wire connections are secure.

The Red "Pause" Button Does Not Function or Will Not Pause/ Stop the Carver From Running

Definition:

One of the two metal brackets is not making contact with the safety eyes (proximity switches).

Likely cause(s):

1. The OMEGA Carver has redundant safety eye switches (two separate sets of two switches). If all four of these safety eyes are not making contact with metal (at either the door bracket or the top hatch bracket), the red "pause" button will not function. It will light up and flash, but when it will not work when pressed.
2. This could also cause the OMEGA Carver's cutter to stop while the rest of the machine continues to run. This could be destructive to the OMEGA Carver's hardware.

Solution:

1. While the OMEGA Carver is powered on, remove the access panel from the back of the carver. Check to see if all four of the safety eye switches are lit up. (One set is directly in front of you when you are standing at the back of the carver; the other set is located just to the right hand side of the PC casing, where the frame of the carver meets the framing of the top half of the carving chamber.) If one of these safety eyes is not lit up, then you will need to manually turn it until it lights up.

Note: it may also be necessary to adjust the metal bracket in the top hatch.

The "Chuck" Continues To Spin During the Reference Sequence

Definition:

The proximity switch underneath the chuck/table is not making contact.

Likely cause(s):

1. The cable link or proximity switch is loose.

Solution:

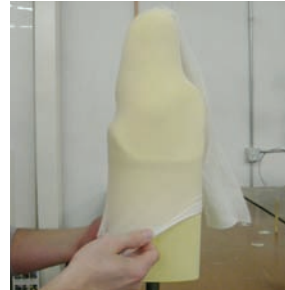
1. Jog the table axis all the way up until it stops.
2. Find the gray or yellow cable connection that connects to the chuck assembly (underneath the table).
3. Verify that the proximity switch is lit.
4. Turn the cable clockwise to ensure that it is tight and that it is making contact with the sensor.
5. Clean out the area and the sensor with compressed air. It is possible that a buildup of dust is causing the problem.
6. Jog the chuck clockwise (CW), then counter-clockwise (CCW). Then reference the carver again.

9. TIPS FOR MAKING SOCKETS OVER FOAM

The techniques for fabricating sockets over the foam that is used with carvers are slightly different from the techniques for fabricating over plaster. Our experience with foam has led us to develop the following suggestions.

Socket Type	Method
-------------	--------

Clear Plastic Check Socket	<ul style="list-style-type: none"><li data-bbox="451 558 998 787">• Apply an AK Nysert* sleeve over the model to keep the plastic from sticking to the foam. (We use the AK size because it can be used for both AK and BK sizes. For BK models, reflect the excess length back onto the model.)<li data-bbox="451 892 998 1123">• Just before pulling the plastic, spray the Nysert-covered model with water to prevent the plastic from absorbing the white pigment from the Nysert. The more water you apply, the clearer the plastic will be.<li data-bbox="451 1144 998 1218">• Pull the plastic over the model using standard procedures.
---------------------------------------	---



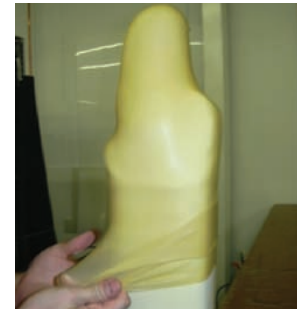


Socket Type	Method
-------------	--------

Copoly Socket/ Polypro Socket/ Flexible Liner	<ul style="list-style-type: none">• Apply an AK Nysert* sleeve over the model as shown above.• Using straight pins or something similar, poke pin holes throughout the entire surface of a latex cone*. (We use several pins mounted in a handle.) Make sure that the pin holes go all the way through the latex.	
--	--	---



- Apply the latex cone over the Nysert sleeve. The latex cone will serve as a separator between the Nysert and the plastic.



Notes:

- **If you do not poke holes in the latex cone, the vacuum will not be able to reach the plastic.**
- **Be sure to poke the holes BEFORE applying the latex cone to the model.**

- Apply talcum powder over the latex cone.
- Pull the plastic over the model using standard procedures.



Laminated Socket	<ul style="list-style-type: none">• Apply an AK Nysert* sleeve over the model to keep the layup from sticking to the foam.• Laminate using standard procedures.
-----------------------------	--

**Contact Ohio Willow Wood for information on where to purchase Nysert sleeves or latex cones.*

Index

A

Abort 17
Adjusting the Speed 23
Archive Folder 19
axis motors 28
axis speed 28
axis travel 28
A axis 5

B

ball screws 32
blank 15
Blank Definition 23
Blank Length 21
Blank Offset 21

C

carving 13
C-Fab 5
Calibration 24
Carver Maintenance button 22
Carver Mandrel 39
Carver Parameters 20
Carver Settings 22
Carve button 15
Carve Cylinder 24
Carve screen 13, 18
Carving 16
Carving Additional Files 18
Carving Tool 39
CFab Archive Folder 19
Change button 14, 20
changing the cutter 26
Changing the Cutter 26
Check Socket 46
Cleaning the Ball Screws 32
Cleaning the Carving Chamber 37
Cleaning the Dust Collection Filter 39
Cleaning the Top Hatch Area 37
Clear Plastic Check Socket 46
Collection Bag 39
collet 5, 15
Collet Diameter 21
Config file 40
control panel 7
Copoly Socket 47
current 6, 28
Cutter 23
cutter 5
cutter, changing 26

Cutter Diameter 21
Cutter Length 21
Cycle Start 17
Cycle Start button 7, 16, 23

D

Diameter
 Cutter 21
 Proximal 21
dimensions 28
Display Units 26
door 10, 15, 17
Downloading or Recovering Files 11
Dust Collection 27
Dust Collection Bag 39
Dust Collection Filter 39
Dust Collection System 17

E

Emergency Stop button 7, 8, 9, 16
environment 6
Extension
 Proximal 21

F

fabricating sockets over foam 46
Fab Notes 13, 18
Feed Hold button 7, 16, 17
filter 39
Fixed Pitch 21
Flexible Liner 47
foam 46
foam blank 15

G

GEO Brick 40, 41, 43

H

Home 25
humidity 28

I

installation 6
Internet & Email button 11

J

Jogging the Carver 23
Jog button 23
Jog Control window 23

L

Laminated Socket 47
latex cone 47
Length 21
Load Patient File 11
lubricant 32
Lubricating the Ball Screws 32

M

Main Isolator switch 8
maintenance 31
Maintenance button 22
Main Isolator switch 7, 9, 10
Mandrel 21, 39
Mark Ready 18
Mark Ready to Carve 18
Maximum Pitch 20
modify files 12
motor controller 40
motor fault 41
Motor Status 25
Move Down 23
Move Up 23

N

Nysert 46

O

Offset 21
Omega Carver Maintenance window 22, 32
Omega Carver screen 14, 18, 22
Omega Carve Parameters window 20
operation 7

P

panels
 cleaning 38
panel cleaning 38
parameters 20
Parts 39
Pitch
 Fixed 21
 Maximum 20
 Variable 21
Points/Slice 21
Polypro Socket 47
Proximal Diameter 21
Proximal Extension 21
proximity switches 40, 44

R

Ready to Carve 18
Reference 25, 40
reference cycle 23
Remember Proximal Extension and Diameter 27
Replacement Parts 39
Replacing the Dust Collection Bag 39

S

safety 29
Schedule File(s) 12
servo motors 41
settings 22
shutting down the carver 10
Snap Ring 39
sockets 46
software tools 12
specifications 28
Spinal Mandrel 39
spindle 5
spindle motor 28
spindle speed 28
Standard Carving Tool 39
starting the carver 9
Start screen 9
Status window 16
stopping the carver 10
Stopping the Carving Job 17
Storage Temperature 28

T

Table 23
talcum powder 47
temperature 28
Tips for Making Sockets Over Foam 46
troubleshooting 40

V

vacuum 32
Variable Pitch 21
voltage 6, 28

X

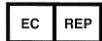
X axis 5, 34

Z

Z axis 5, 34



OHIO WILLOW WOOD®
free the body...free the spirit® 
15441 Scioto Darby Road
Mt. Sterling, OH 43143
phone 740.869.3377 / 800.848.4930
fax 740.869.4374 www.owwco.com



Ohio Willow Wood Company B.V. 
Keizersgracht 62/64
1015 CS Amsterdam
The Netherlands