QUAZER™
NEW GENERATION DIAMOND PROCESSING SYSTEM

OPERATION GUIDE
QUAZER 4.22
Limited Warranty and Disclaimer

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About this Document

This document is the Quazer system Operator's Guide. All the information you need to operate the Quazer system is provided in this document.

Notes and Warnings

The following note is used in this document.

**NOTE**

This is an example of a note.

Important Safety Information

Laser Safety

The QUAZER is a class 1 laser system.

**NOTE**

Exposure to the beam of a Class 1 laser will not result in eye injury and may therefore be considered safe.

However because this class 1 system contains a laser system of a higher class it is vitally important that the machine is **NOT** operated with any of the protective doors, covers, hoods or windows open.

We at Sarin recommend that you provide laser safety training to all employees who work on or around the laser system. It is important that they understand the bio-effects of lasers as well as the facts about laser-radiation.

System installation, disassembly, maintenance and repair must only be performed by authorized Sarin customer support engineers. Sarin trained engineers are trained to comply with all applicable safety requirements regarding the use of laser devices at the customer's premises.

**NOTE**

The Sarin warranty becomes null and void if servicing of the system is undertaken by a third party.

If the panels are removed during servicing, the system may reach class 4. Therefore, it is important that the instructions of the Sarin engineers be adhered to. For this reason access to the system may be blocked during maintenance of the optics according to laser safety class 4. To fully comply with CE/UL requirements, the system must be isolated from the rest of the office environment during any maintenance involving the laser.

The requirements state:
If the system is in a room with other equipment, the room must be equipped with safety screens (either mobile or permanent) that can be closed so that they completely surround the system when maintenance is performed.

**Obtaining Safety Screens and Glasses**

For information on safety screens or blinds please see the website [www.TLM-Laser.com](http://www.TLM-Laser.com) or contact them at either [info@tlm-laser.com](mailto:info@tlm-laser.com) or [sales@tlm-laser.com](mailto:sales@tlm-laser.com).

**Quazer Laser Description and Class**

YAG, wavelength 532 nm, max power 12 Watts, Q Switch, class 4.

**What is a Laser Class?**

Laser products are classified to take account of the amount of laser beam you can get access to when the product is in normal use or during routine user maintenance. A laser product may contain a laser of a higher Class and this may be accessible during servicing.


**Acoustic Noise Levels**

The European Directive (2003/10/EC) on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) will be implemented nationally by Apr 2006 and will replace existing legislation such as the UK Noise at Work Act 1989.

The recommended acoustic noise in the operator environment should not be more than **80dB(A)**.

**NOTE**

The Sarin recommended quiet air compressor can be installed in the system working area as it is extremely quiet at 55dB(A).

**Waste Electrical and Electronic Equipment (WEEE)**

**Disposal of Electrical and Electronic Waste**

The symbol 🚚 is now displayed on Sarin products to show our compliance with directive WEEE. The WEEE directive is about recycling parts and states that no electrical or electronic equipment can be discarded into the city’s normal waste disposal system.

**Obligatory Acceptance of Discarded Electrical and Electronic Equipment**

The end user of this product now has the right to request the product supplier to dispose of the product. Therefore, if you require help in discarding this product please contact your local agent or Sarin directly.
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How to Contact Us

Please contact your local Sarin representative with any questions or comments you may have regarding the site preparation procedure.

Headquarters:
Sarin Technologies Ltd.
7 Atir Yeda Street
Kfar Saba 44425
ISRAEL

General Information:
www.sarin.com
TEL: +972-97-903500
FAX: +972-97-903501

Sarin Support:
Email: support@sarin.com
TEL: +972-97-903500 extension 111
Sarin presents the new generation of diamond processing lasers for innovative diamond manufacturing. State-of-the-art laser technology and advanced software combine to create the most cost effective system for diamond sawing, bruting, and shaping.

The QUAZER system is comprised of a software application, sawing and cutting areas and an operator control station.

The operator station includes a table and the computer peripherals needed for configuring and running the system. The user friendly interface and well-designed screens make it easy to edit shapes and import the information required to setup and run the automated jobs.

In a very short time you will be using the system like a pro, saving time and money every single day. Wherever you are Sarin service and support is never very far away.

**Key Features**

**Laser Sawing**

- High throughput and low weight loss result in an exceptionally cost effective system.
- Extremely low breakage rate.
- Built-in proprietary stone protection software for high tension stones
- Single and double sided sawing.
- Mirror smooth cutting surface further reduces weight loss in final polishing stages.
- Advanced software enables both sawing and shaping in a single operation.

**Laser Shaping**

- Advanced Shape Editor enables you to create and customize your own shapes.
- Sarin Advisor™ link enables importing shaping information to ensure laser bruting is perfectly performed.
- Exceptionally straight girdle.
- Unattended operation enables around the clock processing.
- Low maintenance system.
- Compact frame size.

**Product Options & Extensions**

Rotating tool for double sided sawing.
How Does the Laser Cut the Stone

Figure 1 below shows how the laser cuts the stone. The cut is accomplished by traversing the laser beam back backwards and forwards across the surface of the stone. To assist in the cutting process and cut down on the heat generated by the beam the stone holder sawing can be planned to turn 90 or 180 degrees in order to cut the stone in different sides.

![Diagram Showing How the Laser Cuts the Stone](image)

**Figure 1: Diagram Showing How the Laser Cuts the Stone**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EW</td>
<td>The end of cut wide.</td>
</tr>
<tr>
<td>An</td>
<td>The angle of the cut.</td>
</tr>
<tr>
<td>dz</td>
<td>The size of the Z-axis steps.</td>
</tr>
<tr>
<td>dx</td>
<td>The distance between the forward and backward laser scans.</td>
</tr>
<tr>
<td>Ldx or Final Dx</td>
<td>Counts the number of repetitive laser scans on the last dx.</td>
</tr>
<tr>
<td></td>
<td>After completing the Ldx scans the Ldx count is reset to zero and the table is lowered to the dz value so the laser can cut deeper into the stone.</td>
</tr>
<tr>
<td>Edge Rep</td>
<td>Edge Repeat is the number of repetitive cuts on the edge of the cut. This ensures a smoother surface.</td>
</tr>
<tr>
<td>BR</td>
<td>Beginning Repetition is the number of repetitive scans of the laser beam at the beginning of the cut to break the stone surface.</td>
</tr>
<tr>
<td>First Rep</td>
<td>First Repeat is used to take down all the high points on the stone until the cutting surface is flat.</td>
</tr>
</tbody>
</table>
System Power

Powering ON the Base Machine

1. Turn **ON** the power switch located on the electricity cabinet.
2. Wait a few seconds until you hear an audible click from the Modac.
3. Press the green button on the front of the machine.
4. Turn **ON** the system PC.
5. Wait for the system to load.
6. From the desktop, click the Quazer shortcut icon.

Powering ON the Cooling System

1. On the PolyScience operator panel, press the **Power** button.
2. Ensure that the temperature and flow settings are **EXACTLY** as shown on the unit data sheet.

   **To check the temperature setting:**
   a. Press the **Temperature Adjustment** knob, so that the decimal point starts to blink. The display now shows the unit temperature setting.
   b. If the data sheet shows a different setting, turn the knob either clockwise or counter-clockwise to set the correct temperature.
   c. Press the knob again to lock the setting.
3. Check the Pressure and flow rate against what is shown on the unit data sheet.

   Press the **Pressure and Flow** button to change the display from pressure to flow.
4. Wait until the laser cooling system stabilizes and reaches the correct temperature.
Powering ON the Laser System
1. On the Northrop Grumman power panel, turn the On/Off Key to ON.
2. Press the Power button.
3. Wait a few moments until the Laser has fully powered up.

Powering OFF the Laser
1. On the Main screen, click first the Gate Off and then the Power Off buttons.
2. On the Northrop Grumman power panel press the Power button continuously until the unit powers down.
3. Turn the On/Off Key to OFF.

Powering OFF the Cooling System
1. Ensure that the Northrop Grumman Laser is powered OFF.
2. On the PolyScience operator panel, press the Power button and wait for it to power OFF.

Powering OFF the Base Machine
1. Ensure that you have closed the application and powered OFF the laser (see above).
2. On the front cover of the machine, press the red button.
3. Turn OFF the switch in the electricity cabinet.

Resetting the Emergency Power OFF Switch
When the emergency power off switch has been activated (pushed), rotate the switch knob clockwise in the direction of the arrows to reset.
Getting started

Loading Quazer application

1. Double click on the Quazer icon located on the desktop screen.

2. Once the application load has completed press the OK button to begin the system homing procedure.

- Once the homing procedure is finished the job setup main screen will appear.
Menus

The Quazer application menus can be found on the top right corner.

Pressing the round button will reveal the following menus:

<table>
<thead>
<tr>
<th>Actions Menu</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home</strong></td>
<td>Perform Homing for the X-Y-Z stage</td>
</tr>
</tbody>
</table>
Tools Menu

<table>
<thead>
<tr>
<th>Tools Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Editor</td>
<td>Open the laser power editor</td>
</tr>
<tr>
<td>Profile Editor</td>
<td>Open the profile editor</td>
</tr>
<tr>
<td>System Settings</td>
<td>Open the system settings dialog</td>
</tr>
<tr>
<td></td>
<td>Setting are editable only with technician permission</td>
</tr>
<tr>
<td>Camera Settings</td>
<td>Open the camera settings dialog (B/W camera and Color camera)</td>
</tr>
<tr>
<td>Modac Monitor</td>
<td>Opens the Modac communication dialog (For Technicians)</td>
</tr>
<tr>
<td>Modac I/O</td>
<td>Opens the Modac I/O panel</td>
</tr>
</tbody>
</table>

Help Menu

<table>
<thead>
<tr>
<th>File Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissions</td>
<td>Opens the permissions dialog</td>
</tr>
<tr>
<td></td>
<td>The user can change the permission level</td>
</tr>
<tr>
<td>Report a Problem</td>
<td>In case the user detects a software problem, this menu item collects all relevant data and packs it into the support folder under the application root</td>
</tr>
<tr>
<td>Hasp View</td>
<td>A utility to view the features that are enabled on your hasp plug.</td>
</tr>
<tr>
<td>About</td>
<td>About dialog contains details of the software version you are using</td>
</tr>
</tbody>
</table>

Selecting a Camera

- On the right-hand side of the screen, click the camera you want to select.
Using the Movement Controls

X, Y and Z Axis Controls
Axes are controlled by the keyboard keys only.
Use the four keyboard arrow keys, ←, ↑, → and ↓ to control the X-Y stage.
Use the Page Up/Down keys to move the Z axis up and down

- Step Size Slider – Discrete movement of the axis systems with intervals of 1/10/100/1000 microns
- Speed Slider – The speed of the axis system in Jog mode.
  The speed is applicable only when the system is not executing a job.
- Reset Axis – Push button
  o Pushed – the coordinates are relative to the position where the button was pushed
  o Un-Pushed – the coordinates are relative to the homing position of the system.

Measuring Relative distances on the Stone
1. Position the center of the cross hairs on the start point you want to measure.
2. Click the Reset Axes button.
   The button in this mode is pushed inside. The X, Y and Z axis display on the left-hand side of the screen should now be reset to zero.
3. Move the table to the second point you want to measure.
   The X, Y and Z axis display shows the distance between the two points.
4. Click the Reset Axes button again to return to the normal display.
   The values now displayed represent the actual location of the table.
Pre working mandatory checks

Before using the machine the user have to perform the following actions to reduce the change of damage to the stone. The following procedures should be done before working with the machine and/or on an everyday basis.

Power check

The aim of this test is to verify that the laser power profile correlates with the actual power level on the machine table. To conduct the power check please perform the following:

1. Place a power meter on the Quazer table and close the door.

2. Navigate the table to the power meter sensor.
3. Once arriving to the point make sure to be out of focus to the power meter sensor to prevent damage to the device.
4. Open the laser editor using CTRL + L or using the main menu.
5. Go over all the power level profile in your system and verify that the laser profile power matches the reading of the power meter.
Laser spot check

The aim of this test is to verify that the machine laser beam correlates with the machine red cross location. To conduct the laser spot check perform the following:

1. Place a metal plate on the Quazer table
2. Navigate the table to the metal plate while making sure that the plate is visible and focused.
3. Enter the laser editor screen

![Laser Editor](image)

4. Select suitable laser profile.
5. Close the Quazer door
6. Operate the laser by pressing the laser on/off button in the laser editor menu.
7. Make sure that the laser spot matches the live video red cross marking.
Working mode selection

This section explains the different working mode exist in the Quazer. The Quazer enable you to work with various working modes according the cassette being used at the system.

Working mode options (left to right)
- a. Orientation cassette – for working with the various orientation cassettes (sawing 1.0, shaping 1.0, Turntool 1.0, Turntool 2.0)
- b. Import from strategist – for working with Strategist
- c. Single dop flow (other mode) – for working in manual planning mode.

Orientation Cassette

1. Press the orientation cassette button located in the job setup tab (after placing the relevant cassette on the machine table).
2. Press the Centered or the two cassettes button according to the cassette/s position on the table.
   - a. One cassette on the center
   - b. Two cassettes, one on each side
3. Select the Cassette Type by pressing the drop down button. Make sure that your selection match the cassette placed on the table.
The setup screen will be refreshed according to the cassette you select.

4. Double click on the desired cassette dop to start the planning process.
   a. Shaping 1.0 - select an available dop on the shaping cassette to plan a shaping job
   b. TurnTool 1.0 - select an available dop on the Turn & Saw cassette to plan a double side sawing job
   c. TurnTool 2.0 - select an available dop on the Turn & Saw cassette to plan a double side sawing job
   d. Sawing 1.0 - select an available dop on the single side sawing cassette to plan a single side sawing job

   • Table will move to the estimated dop location and planning screen will appear.

5. skip to job planning paragraph.
**Single dop flow (other mode)**

This section explains how to select different types of jobs. Each icon represents different job type.

![Job Type Selection Interface](image)

1. **Job Type selection**
   - **Shaping**: select an available dop on the shaping cassette to plan a shaping job.
   - **Double Side Sawing**: select an available dop on the Turn & Saw cassette to plan a double side sawing job.
   - **Single Side Sawing**: select an available dop on the single side sawing cassette to plan a single side sawing job.

2. Press on the desired job type selection
   - Planning screen will appear

3. Skip to job planning paragraph.

**Import from Strategist**

The section explains how to import jobs originated using Sarin strategist machine.

1. Click on the import from strategist button to enter strategist pack import mode.
2. Press on the drop down box.
   - All available pack files should appear to the user at this time
3. Close the Quazer door and Select the desired pack you wish to process
   - Quazer table will move to the reference cassette cross marking located on the turntool cassette.
4. Verify that the red cross and cassette cross match. If necessary adjust the red cross location by using the keyboard.

5. Press the log cassette cross button

- Pressing the log cassette cross button will enable the verification tab

6. Click on the verification tab

- At this time the table will move to the strategist arrow marking on the stone.
7. Continue verification according to the job type:

**In case of traditional strategist job:**

a. Perform manual correction to the strategist arrow and Press the Accept button or the decline & next dop button in case you want to discard the job.

- Pressing the accept button will take the user to the planning to review the various stone sides.

**In case of PIE strategist job:**

a. Perform manual correction to the strategist arrow and Press the Accept button or the decline & next dop button in case you want to discard the job.

- Pressing the accept button will take the user to pie first meeting point of both sawing planes for verification.

b. Perform manual correction to the first meeting point of both pie saw planes and press accept button for the second time.
c. Perform manual correction to the first meeting point of both pie saw planes and press accept button for this third and final time.

8. Press on the save & next dop button
• Current job verification is finished. System will move to verify the next stone or go back to the job setup screen.

9. Repeat stage 7-10 to the next stone

10. Press on the cut verified button

• Once pressing the cut verified button the system will be transferred to the execution screen.

11. skip to chapter 6 (execution)

**Job Planning**

This section explains how to perform the stone planning

**Single side planning**

1. Select B&W camera and move table to the desired stone first side log top position.

   • Various key board commands which performs respective action to adjust Dope surface

<table>
<thead>
<tr>
<th>Keys on Keyboard</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up / Down Navigator Key</td>
<td>Moves Table in Y Direction(Up/Down)</td>
</tr>
<tr>
<td>Left / Right Navigator Key</td>
<td>Moves Table in X Direction(Left/Right)</td>
</tr>
<tr>
<td>Page Up(Z+) / Page Down(Z-) Key</td>
<td>Moves Z axis(Camera Focus) (Up/Down)</td>
</tr>
</tbody>
</table>

2. Click on the Next button to define the log top point
The log top stage button will become enabled and log top axis position will be.
Press on the undo button to discard the log point.
3. Move the table to the starting point of the side.
4. Click the Next button. The log Start button is now enabled.
5. Move the table to the end point of the cut.
6. Click the Next button.
7. The data window contains the coordinates of Top/Start/End
   - You can overview your log points by pressing the log buttons at the bottom of the control to move the axis system to the logging positions.
8. The parameters dialog on the left is now enabled.
9. Define and select the suitable parameters in the parameters window according to the stone parameters.
10. In case it is a single side job press “Save Job” button.
11. Repeat stages 1-10 to plan additional stone.

**Multiple Sides planning**

The saw function can be planned for multiple sides. The current and planned side is displayed in the **Side** field on the Turn Tool control.

1. After planning the first side, click the Save Side button.
2. The tool automatically rotates 180 degrees relative to the angle of the first saw plane.
3. You can also plan multiple banding jobs. To set a job to be a banding job, select banding only to be true on the combo box right to the parameter name.
4. Click the Prev Side to edit sides that you already planned.
5. Click Save Job when finished to plan all sides for this stone.
6. The application will create a job for this stone. A job will be added to the end of the job list.
# Turn Tool Function Table

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side (1)</td>
<td>The current stone side number</td>
</tr>
<tr>
<td>Turn tool (2)</td>
<td>The Turn Tool control. Control rotation actions.</td>
</tr>
<tr>
<td>Reset(3)</td>
<td>Rotates the tool to its home position</td>
</tr>
<tr>
<td>Next Side (4)</td>
<td>Editing/Viewing the next side, in case of multiple sides</td>
</tr>
<tr>
<td>Prev side (5)</td>
<td>Editing/Viewing the prev side, in case of multiple sides</td>
</tr>
<tr>
<td>Undo Side (6)</td>
<td>Removes the selected planned side.</td>
</tr>
<tr>
<td>Turn CCW (2)</td>
<td>Each click of the button rotates the stone counter clockwise one degree. The current angle is shown in the Axis Control field (11).</td>
</tr>
<tr>
<td>Turn CW (2)</td>
<td>Each click of the button rotates the stone clockwise one degree. The current angle is shown in the Axis Control field (11).</td>
</tr>
<tr>
<td>Turn 90 (9)</td>
<td>When using the Turn tool this button causes the stone to rotate 90 degrees. The current angle is displayed in the Axis Control field (11).</td>
</tr>
<tr>
<td>Turn 180 (10)</td>
<td>When using the Turn tool this button causes the stone to rotate 180 degrees. The current angle is displayed in the Axis Control field (11).</td>
</tr>
<tr>
<td>Rotation Angle (11)</td>
<td>Current Rotation angle</td>
</tr>
</tbody>
</table>
7. To plan additional multi sided stones repeat stages 1-6

**Shaping job planning**
This section explains how to cut a shape into a stone.

**Shape Selection**

1. From the **Shape Adj** control, click **Choose shape**.
2. From the **Shape** list box, select a shape.
3. You can also select **Shape Editor Shapes**... to open the shape editor, or **Advisor Shapes**... to Import from Advisor.
Shape Manipulation

Manipulation is possible by using the +/- buttons or the +/- keyboard keys

1. Blow
   a. Use the +/- to blow the shape in/out on the width/height/both aspects
   b. Use the width/height edit boxes to set the exact width/height values

2. Rotate
   a. Use the +/- to rotate the shape CW/CCW around the center.
b. Use the rotation angle edit box to set the rotation angle for each step

3. Explore
   a. Use the +/- to iterate CW/CCW over the shape outline
   b. Use the start button to start the auto explore option.

4. Sh/Tn
   a. Use the Sh/Tn combo box to select the Shoulder group or tension group.
   b. Use the +/- to increase/decrease the tension/Shoulder coefficient
   c. Use the Start/Stop button to control the automatic exploring procedure.

**Shaping Logging**

The logging procedure is based on center of the shape and the top point of the surface you want to shape.

1. Click the “Next” Button to set the location of CENTER the shape on the stone.

2. Select **Camera 1**.

3. Use the motion controls to focus **Camera 1** on the top point of the stone.

4. Ensure that the top point is perfectly in focus.

5. Click the Next button to Log the TOP of the shape.
**Go To Log Positions**

Use the highlighted button on the bottom of the control in order to move the axis to the exact position of the log top/center.

![Image of control interface with highlighted Log Center button]

**Shaping Job Parameters**

1. The shaping job parameters will be enabled only after the log Center and log Top are successfully performed.

2. Shaping job parameters:
   a. Set the stone height that you want to cut
   b. Select the stone type which reflects the stone profile
   c. The job parameters are taken from the profile you chosen.
   d. You can change one or more of the parameters.
   e. Press the save job button.
Shaping Loops

1. Select the **Outer Loops - False** combo box if you DO NOT want section B cut into the stone as shown in the example below.

2. All internal loops are automatically disabled and are not subject to the user selection.
Upon saving the stone/s planning the user will need to perform verification on planning on the stones in order to make sure that all stone are in place, in the correct location and planned according to the user desire.

This section explains the how to perform the verification stage.

**Traditional sawing verification**

1. Close the Quazer door and click on “Verification” Tab

   - System will move to the first job log top sawing side for verification

2. Job verification tab will appear on the right bottom side of the screen.
   a. Press Accept to accept location and proceed to the next job
   b. Press Decline in reject the location and remove the job from the job list
   c. Press Skip all in case you want to skip the verification stage (not recommend)

   - Verification stage will continue until all jobs in the job list are verified.
   - Upon finishing the verification screen the execution tab will become enabled
   - Opening the door during verification and/or execution will require the verification stage to be repeated.

3. Press the on execution tab to begin the execution process stage.
Chapter 7

EXECUTION

Upon verifying the stone/s planning the user will move to the execution screen to start the execution process.
This section explains how to use the execution page.

Execution screen

1. Press the execution tab to enter the execution screen
2. Press the Start button to start the stones execution.

- At this time the system will start the execution stage of the jobs in the job list.

User options during execution

During execution the user will be able to:

1. Pause/resume - pause/resume the job by pressing the on the pause button
2. Skip side – skip current side and start the next side by pressing on the skip side button
3. Skip stone – skip current stone by pressing on the skip side button
4. Stop after banding – when pressed the system will pause the execution upon finishing the last banding side of each job.
5. Double clicking the job in the lob list show the job parameters.
Browsing between the job side is possible by pressing the pin button and the right and left arrow key next to it.
Selecting a Laser Power Level for Editing

1. In the **Power Levels** list box, on the top left-hand side of the screen, select the required laser power.

2. Select an available laser power level.

3. The **Current (A)** value can be entered manually.

4. Set the **Q-Sw Frequency** if required.

   The Q-Sw Frequency affects the Laser power.

5. Click the **OK** button.

   Click the **Apply** button if you want to apply the new settings but you do not want to close the window.
Creating a New Laser Power Level

To create a new laser power level:

1. From the Laser Editor, click the Create New Power Level button.

2. Enter a name for the new power level.
3. Edit the values for the new power level.
4. Click the OK button.

Deleting a Power Level

To delete a power level:

1. From the Laser Editor, select the Laser Level you want to delete.
2. Click the Delete Power Level button.

3. Enter a name for the new power level.
4. Edit the values for the new power level.
5. Click the Yes button.

The selected Laser Power Level profile is now deleted.
When using a Laser to cut a stone you have to setup the cut parameters to suit each specific stone. When using a Sarin Laser you are able to fine tune all the cutting parameters using modification profiles. The Band profile is used to modify the basic parameters when making the initial cut and the Progressive profile for continuing the cut to completion. By creating profiles for each special case you are able to control the cut completely.

This section enables you to change the Laser settings to better suit the special requirements for each type of stone. These settings set the movement increments, laser power and cutting speed. The default profiles are for dangerous, delicate and regular stones. Therefore you are able to control the Laser cutting environment to cater for the different types of cut required in order not to damage the stone. For a better understanding what the Profile Editor does see How Does the Laser Cut the Stone on page 2.

The four tabs enable you to change the profiles for each basic function:

- Sawing
- Shaping
- Banding
- Progressive
Sawing and Shaping Tab

Use these parameters when sawing or shaping.

◆ To edit the sawing or shaping profile parameters:
1. From the Tools menu, click Profiles.
2. Click either the Sawing or Shaping tab is selected.
3. Select the profile you want to edit.
4. Use the table below as a guide to edit the required profile settings.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height ($\mu$)</td>
<td>Height of the rough stone.</td>
</tr>
<tr>
<td>Begin Width ($\mu$)</td>
<td>Width of the uncut stone or the width before cutting.</td>
</tr>
<tr>
<td>End Width ($\mu$)</td>
<td>Width of the stone after it has been cut.</td>
</tr>
<tr>
<td>Dz ($\mu$)</td>
<td>The size of the Z axis steps or depth of cut,</td>
</tr>
<tr>
<td>Speed (mm/s)</td>
<td>Stone rotation speed during the cutting process.</td>
</tr>
<tr>
<td>Dx ($\mu$)</td>
<td>Width of the cut that is not the first or the last.</td>
</tr>
<tr>
<td>Final Dx ($\mu$)</td>
<td>Width of the last cut, narrower and repeated multiple times.</td>
</tr>
<tr>
<td>Final Dx Count</td>
<td>Number of times the Last Dx is repeated.</td>
</tr>
<tr>
<td>Edge Repetition</td>
<td>Special cut similar to Final Dx.</td>
</tr>
<tr>
<td>Surface Repetition</td>
<td>Special cut used to initially break the surface of the stone.</td>
</tr>
<tr>
<td>Banding Profile</td>
<td>When making the surface cuts you can use the Banding profiles to modify many of the parameters without having to change the basic parameters.</td>
</tr>
<tr>
<td>Progressive Profile</td>
<td>After the surface cuts have been made you can continue cutting the stone using the Progressive profile to modify many of the parameters without having to change the basic parameters.</td>
</tr>
</tbody>
</table>

5. Select a Banding Profile for the initial cut, if required.

The banding profile enables you to modify individual parameters to better suit the physical properties of specific stones.
6. Select a **Progressive Profile** if required.

![Progressive Profile]

This profile is similar to the banding profile and modifies the parameters only after the initial cut until the end.

7. Click the **Ok** button.

**To create a new profile:**

1. From the **Tools** menu, click **Profiles**.
2. Select the tab where you want to create a new profile.
3. Click the **Create New Profile** button.

![Profile Name]

4. Enter a descriptive name.
5. Click the **Ok** button.

**To delete a profile:**

1. From the **Tools** menu, click **Profiles**.
2. Click the tab to display the profile you want to delete.
3. Select the profile you want to delete.
4. Click the **Delete Profile** button.

![Deletion Confirmation]

5. Click the **Yes** button.

The selected profile is deleted.
To rename a profile:
1. From the Tools menu, click Profiles.
2. Click the tab to display the profile you want to rename.
3. Select the profile you want to rename.
4. Click the Rename Profile button.
5. Click the Ok button.

The selected profile is deleted.

Banding Tab

To edit the banding profile parameters:
1. From the Tools menu, click Profiles.
2. Click the Banding tab.
3. Using the table below as a guide, edit the required parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (%)</td>
<td>Change the Depth parameter (Dz) as a percentage.</td>
</tr>
<tr>
<td>Width (%)</td>
<td>Change the Width parameter (Dx) as a percentage.</td>
</tr>
<tr>
<td>Dz (µ)</td>
<td>Change the Depth parameter (Dz) in microns.</td>
</tr>
<tr>
<td>Dx (µ)</td>
<td>Change the Width parameter (Dx) in microns.</td>
</tr>
<tr>
<td>Speed (mm/s)</td>
<td>Stone rotation speed during the cutting process.</td>
</tr>
<tr>
<td>Power</td>
<td>Selects the Laser power parameters suited for banding.</td>
</tr>
</tbody>
</table>
4. Click the Ok button.
Progressive Tab

◆ To edit the progressive profile parameters:
1. From the Tools menu, click Profiles.
2. Click the Progressive tab.

3. Using the table below as a guide, edit the required parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (%)</td>
<td>Change the Depth parameter (Dz) as a percentage.</td>
</tr>
<tr>
<td>Power</td>
<td>Selects the Laser power parameters suited for banding.</td>
</tr>
<tr>
<td>Speed (mm/s)</td>
<td>Stone rotation speed during the cutting process.</td>
</tr>
<tr>
<td>Dx (%)</td>
<td>Change the Width parameter (Dx) in percentage.</td>
</tr>
<tr>
<td>Dz (%)</td>
<td>Change the Depth parameter (Dz) in percentage.</td>
</tr>
<tr>
<td>Edge Rep (%)</td>
<td>Special cut similar to Final Dx.</td>
</tr>
</tbody>
</table>

4. Click the Ok button.
This section enables you to change the camera settings.

**To change the camera settings:**

1. From the **Tools** menu, click **Camera Settings**.

2. Select a display type or set to AUTO (default=PAL).

3. Using Table 1 as a guide, change the required camera settings.

4. When you have completed setting up **Camera 1**, click the **Copy to Cam 2** button to copy the setup to Camera 2.

5. Click the **Ok** button to save the settings and close the screen.

### Table 1: Camera Settings Table

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mirror</strong></td>
<td>Makes a mirror image.</td>
</tr>
<tr>
<td><strong>Gamma Correction</strong></td>
<td>Before being displayed, the linear RGB data must be processed (gamma corrected) to compensate for the gamma of the display.</td>
</tr>
<tr>
<td><strong>Chroma AGC</strong></td>
<td>The gain as it pertains to the intensity of colors in the active picture.</td>
</tr>
<tr>
<td><strong>Luma Notch Filter</strong></td>
<td>Separates the NTSC black and white information from the color 3.58 MHz carrier signal. Also used for Y/C separation.</td>
</tr>
<tr>
<td><strong>Brightness</strong></td>
<td>The amount or intensity of light on a screen without regard to color.</td>
</tr>
<tr>
<td><strong>Contrast</strong></td>
<td>The range of light and dark values in a picture, or the ratio between the maximum and the minimum brightness values.</td>
</tr>
<tr>
<td><strong>Saturation U, V and UV</strong></td>
<td>Chroma or chroma gain. The intensity of the color, or the extent to which a given color in any image is free from white. The less white in a color, the truer the color or the greater its saturation.</td>
</tr>
</tbody>
</table>
System Description and Requirements

System Configuration

The QUAZER systems consist of:
- QUAZER Sawing and Cutting system
- Wall mounted electricity box for connecting the system power
- Compressor (optional) strongly recommended

Environmental Requirements

Air Conditioning

Temperature
The Quazer optimal operating temperature is 25°C (77°F). The system air conditioner system must be able to maintain this operating temperature even when the system is dissipating full power for extended periods.

Heat Dissipation

QUAZER System
Heat dissipation is TBD kW

Atlas Copco SF4FF Compressor
Heat dissipation is 2.2 / 3.7 kW

Humidity
The allowable relative humidity in the QUAZER system room is 50-60%.

Dust evacuating system
The QUAZER system must be connected to a Dust Collector unit in order to evacuate the diamond dust during the time the laser is operating. A flexible pipe with a diameter of 10 cm is supplied with the system.

An example of a Dust Collector system used by Sarin is the KPF400 from Klepp. Visit their website [http://www.klepp.de/index-uk.htm].
Particulate Matter and Chemical Vapors

1. The QUAZER system is designed to operate in an extremely clean environment. The work area **MUST NOT** be exposed to liquids of any type, corrosive vapors, or particulate matter.

2. Special care should be taken to avoid the accumulation of airborne dust or dirt particles in the QUAZER room, which can result in excessive wear of mechanical parts.

3. Normal plant air filtering should generally be sufficient to eliminate particulate matter. However, smoking should not be allowed in the QUAZER system room. Smoke particles accumulate on optical components and may also reduce the lifetime of computer equipment.

Fire Control

A Halon 1211 or similar gas extinguisher should be available in case of fire in or around the system. Do **NOT** use liquid fire extinguishers.

Compressed Air

- The QUAZER system requires that you obtain and use an extremely oil and humidity free compressed air supply. This is to ensure that no damage is caused to the diamond while being sawed or cut.

  We at Sarin strongly recommend you use an Atlas Copco SF2FF or SF4FF air compressor.

The following specifications for the compressed air supply meet the very strict ISO 8573-1 standard:

<table>
<thead>
<tr>
<th>Air quality classes</th>
<th>ISO 8573-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dust (solid particles)</td>
<td>Water</td>
<td>Oil</td>
<td>Max. concentration</td>
<td>Max. concentration</td>
<td>Max. concentration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum number of particles per m³</td>
<td>particle diameter (d) size, μm</td>
<td>Max. pressure dewpoint</td>
<td>Max. pressure dewpoint</td>
<td>Max. pressure dewpoint</td>
<td>Max. pressure dewpoint</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>≤0.10</td>
<td>0.1 ≤ d ≤ 0.5</td>
<td>0.5 ≤ d ≤ 1.0</td>
<td>1.0 ≤ d ≤ 5.0</td>
<td>≤0.10</td>
<td>0.1 ≤ d ≤ 0.5</td>
<td>0.5 ≤ d ≤ 1.0</td>
</tr>
<tr>
<td>1</td>
<td>*</td>
<td>100</td>
<td>1</td>
<td>10</td>
<td>≤70</td>
<td>≤70</td>
<td>≤70</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
<td>100 000</td>
<td>1000</td>
<td>10</td>
<td>≤-40</td>
<td>≤-40</td>
<td>≤-40</td>
</tr>
<tr>
<td>3</td>
<td>*</td>
<td>*</td>
<td>10000</td>
<td>500</td>
<td>≤-20</td>
<td>≤-20</td>
<td>≤-20</td>
</tr>
<tr>
<td>4</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

As specified by the equipment user or supplier and more stringent than class 1.