



# ADVANCED INSTRUMENTS DIVISION

## AMERICAN GEM SOCIETY

U.S. Patent 7336347

### The American Gem Society Performance Grading Software®

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# Introduction

Thank you for choosing the American Gem Society Performance Grading Software. This software package includes a proprietary ray-tracing engine that evaluates the light performance factors of faceted diamonds. *Each license is to be used by the primary purchaser or purchasing firm only. Read the license agreement fully (included with the software) to avoid illegal or terminable activity. The American Gem Society reserves the right to terminate a lease at its discretion.*

## Loading the Software

Insert the disc and wait for the computer to respond. Follow the onscreen instructions until complete. You will need to restart your computer up to two times so make sure all work is saved and programs closed during installation. This software can not exist on the same computer as the AGS Performance Grading Software® and works with later model computers. If the software does not work as intended, it may be necessary to upgrade your computer.

## Fundamentals

The new American Gem Society Cut Grade System is based on Light Performance and utilizes the actual geometry of diamond to produce the grading data. This ray-tracing engine analyzes, among the eleven subcategories, the trajectory and coordinates of every facet making physical symmetry important. Optical Symmetry will be affected by physical symmetry i.e. facet pitch, yaw, or twist. The most common cause of poor optical symmetry is misalignment or trajectory of apposing facets.

## Getting Started

The American Gem Society Performance Grading Software evaluates a scan/wire frame (geometric) model that is produced by a non-contact measuring device. Once the non-contact measuring device has completed its process, - **Save As...** -.stl or .srn file by clicking on -**Save As Type:** - and place it in a designated folder. *The quality of the scan is important, make sure to follow the manufacturer's instructions for use, maintenance, and calibration.* Refer to your non-contact measuring device instructions for saving the appropriate file.

Buttons	
<b>Select</b>	<ul style="list-style-type: none"><li>• Press <b>Select</b> to access the diamond .stl files you wish to process. Select a single file or a batch of files to process. Once selected, the files will be placed in the <b>Selected File(s)</b> window.</li></ul>
<b>Clear</b>	<ul style="list-style-type: none"><li>• Press <b>Clear</b> to remove all files from the <b>Selected File(s)</b> window.</li></ul>
<b>Save</b>	<ul style="list-style-type: none"><li>• Press <b>Save</b> to save the image ASET that is displayed. You may also click directly on the <b>image</b> to save it. <b>Note</b> Images can only be saved when using the “<b>Single</b>” <b>Process Mode</b>.</li></ul>
<b>Process</b>	<ul style="list-style-type: none"><li>• Press <b>Process</b> to activate the ray-tracer.</li></ul>
<b>Report</b>	<ul style="list-style-type: none"><li>• Press <b>Report</b> when the process is complete to access the report page.</li></ul>
<b>Help</b>	<ul style="list-style-type: none"><li>• Press <b>Help</b> to access any help topics.</li></ul>
<b>Stop</b>	<ul style="list-style-type: none"><li>• Press <b>Stop</b> to deactivate the ray-tracer. <b>CAUTION</b> doing this at anytime during the process will erase all data from that run.</li></ul>
<b>Exit</b>	<ul style="list-style-type: none"><li>• Press <b>Exit</b> to leave the program.</li></ul>

## Single Mode Processing

When this feature is active, diamonds are processed one at a time. There can be one or many files in the **Selected File(s)** window. This feature allows the user to save the ASET image of the diamond you just processed successfully.

## Batch Mode Processing

When this feature is active, diamonds are processed in batches. The ray-tracer will process all of the diamond files present in the **Selected File(s)** window.

### Note

Images cannot be saved when using the batch mode.

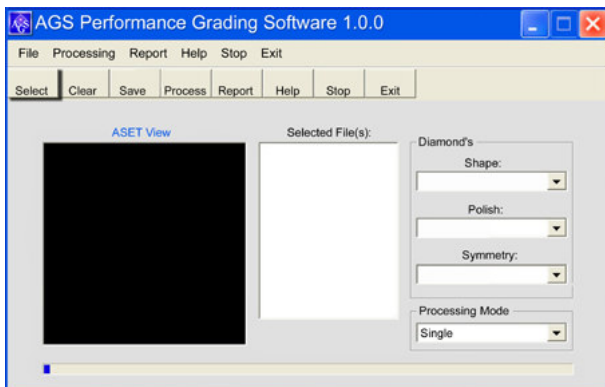
## Usage Instructions

1. Select file(s) to be processed
2. Select the appropriate shape from the **Shape** dropdown box
3. Select the appropriate polish grade from the **Polish** dropdown box
4. Select the appropriate symmetry grade from the **Symmetry** dropdown box
5. Select “**Single**” or “**Batch**” processing mode
6. Press the **Process** button
7. Wait for the **Finished Processing** message to appear
8. **Save** all desired data

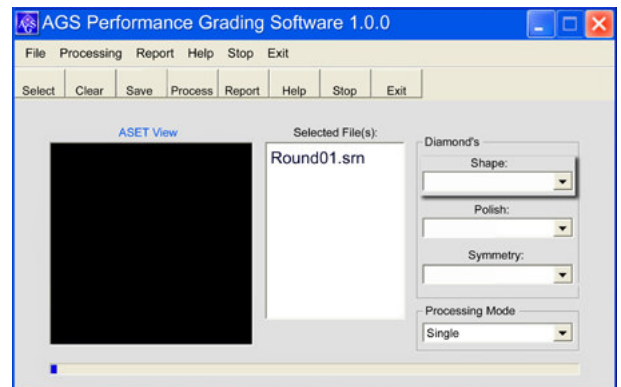
### Note

*All images and data will be lost if a new process is initiated or you exit the software. It is recommended that any desired image or data be saved immediately following the “**Process Finished**” message.*

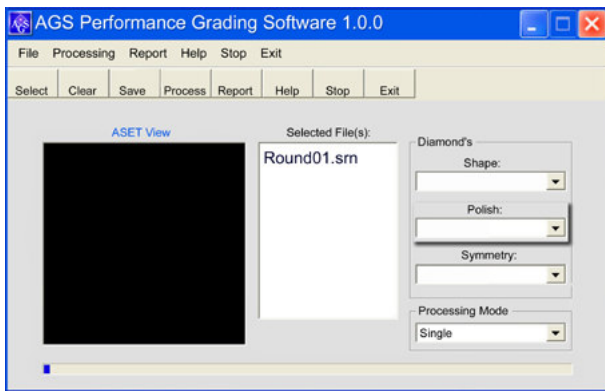
9. Clear the files in the **Selected File(s)** window and repeat steps 1-8



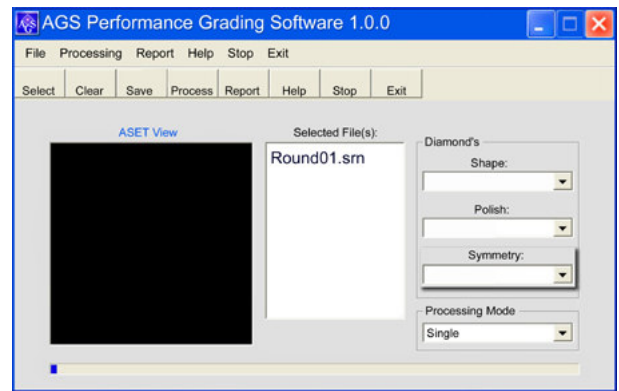
Step 1. Select a diamond to be processed



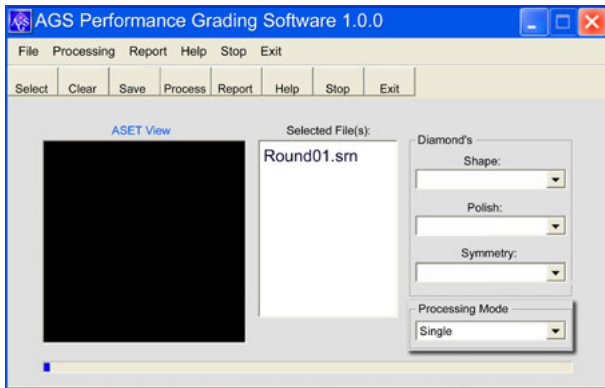
Step 2. Automatically detects the shape



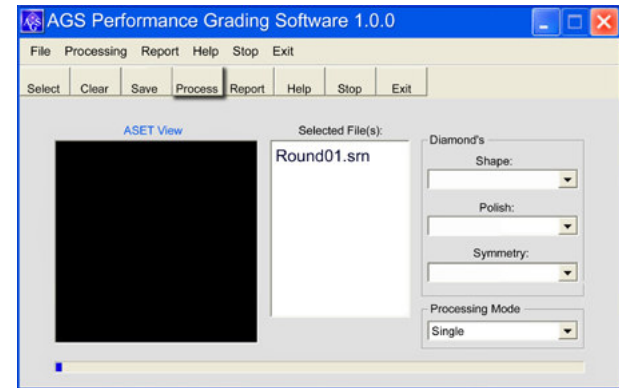
Step 3. Enter your Polish grade



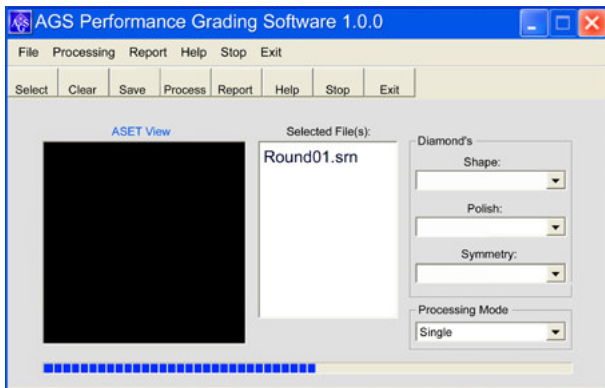
Step 4. Enter your Symmetry grade



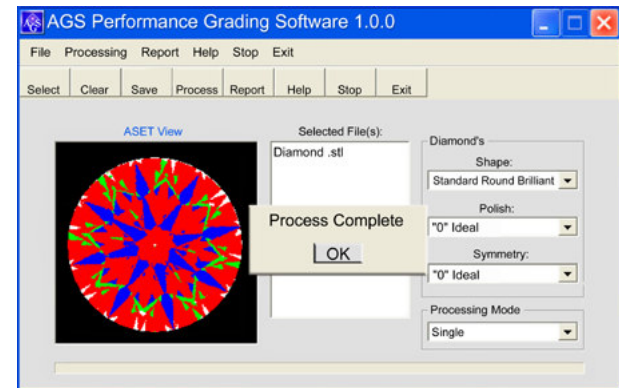
Step 5. Select Single or Batch mode



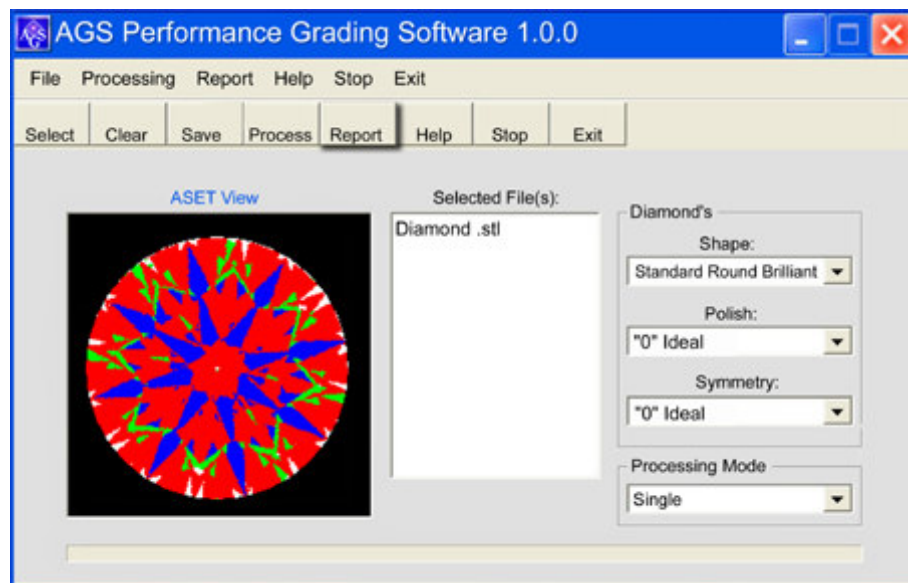
Step 6. Click Process



The progress bar indicates ray-tracing activity



Once complete, click OK



Now click Report to access the results

### Results

Press the **Report** button to access the results of the process you have just completed.

### Note

*Reports **DO NOT** accumulate! You must save the results following each process or you will have to repeat the process.*

### Saving results

You can save the results in one of four formats:

- a. Word Document .doc
- b. Excel Spread Sheet .xls
- c. Adobe Acrobat PDF .pdf
- d. Rich Text Format .rtf

### Interpreting the Results

The report offers two beneficial data sections, one gives the contributing values and the other gives the actual deductions.

UNIT NUMBER	BRIGHTNESS	DISPERSION	CONTRAST	LEAKAGE	WEIGHT RATIO	DURABILITY	TILT	GIRDLE	CULET	POLISH	SYMMETRY	LIGHT PERFORMANCE DEDUCTION	PROPORTION DEDUCTION	FINISH DEDUCTION	DEDUCTION TOTAL
Round 7.stl	2.47	1.43	.14	.20	.00	.00	.00	0	0	"0"	"0"	5	0	0	5
	Contributing Values							Deductions							

**By clicking on the colored categories you can access additional information.**

The *Deduction* columns give the deductions for each category.

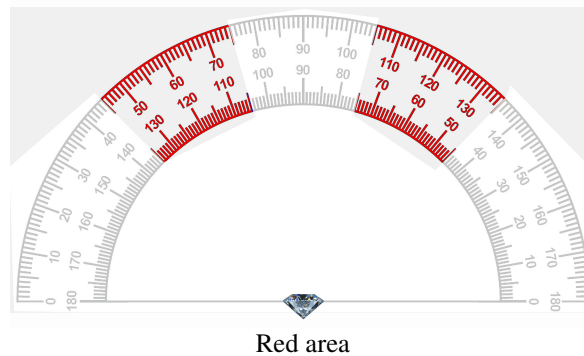
The *Contributing Values* columns indicate deficiencies that contribute to the light performance deduction. The highest value in this area will be highlighted in red. The highest value is the area that most contributed to the deduction. In this example, the *Brightness* of the diamond does not meet the standards and a deduction of 5 is assigned to Light Performance.

**Note**

These values are calculated by the software and are proprietary. They do not reflect any formula and simply identify the category that is most responsible for the deduction.

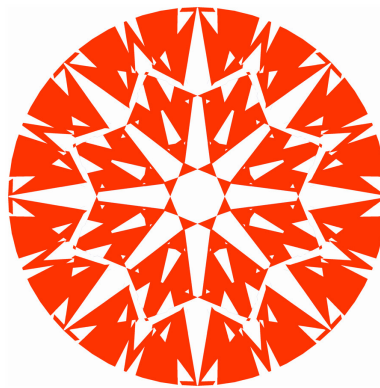
# Brightness

*Brightness* refers to the light that is gathered from 75 to 45 degrees.  
The ASET identifies this area by color-coding this zone in red.



This is where you will usually find direct sources of light.  
Round brilliant diamonds gather a majority ( >60% ) of their light from this region.

Well-cut diamonds exhibit this pattern.



The area that receives light from this region can be affected by:

- Symmetry / Asymmetry
- Lower girdle facet and star facet lengths
- Crown and pavilion angle combinations
- Indexed or tilted facets
- Table diameter %

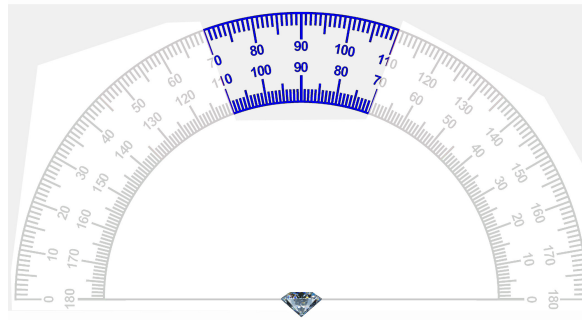
You will also notice that if the red area is increased, the green or blue will decrease.  
Conversely, if the red area is decreased, the green or blue will increase.

Typically, by resolving the red issue, the other values will be corrected.

# Contrast

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*Contrast* refers to the light that is gathered from 75 to 90 degrees.  
The ASET identifies this area by color-coding this zone in blue.



Blue area

This is the light that is blocked by the observer when viewed.  
Well-cut diamonds exhibit this pattern.



The area that receives light from this region can be affected by:

- Symmetry / Asymmetry
- Lower girdle facet and star facet lengths
- Crown and pavilion angle combinations
- Indexed or tilted facets
- Table diameter %

You will also notice that if the blue area is increased, the red or green will decrease.  
Conversely, if the blue area is decreased, the red or green will increase.

Typically, by resolving the blue issue, the other values will be corrected.

# Dispersion

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Table Dispersion



In Bezel Dispersion



Out Bezel Dispersion

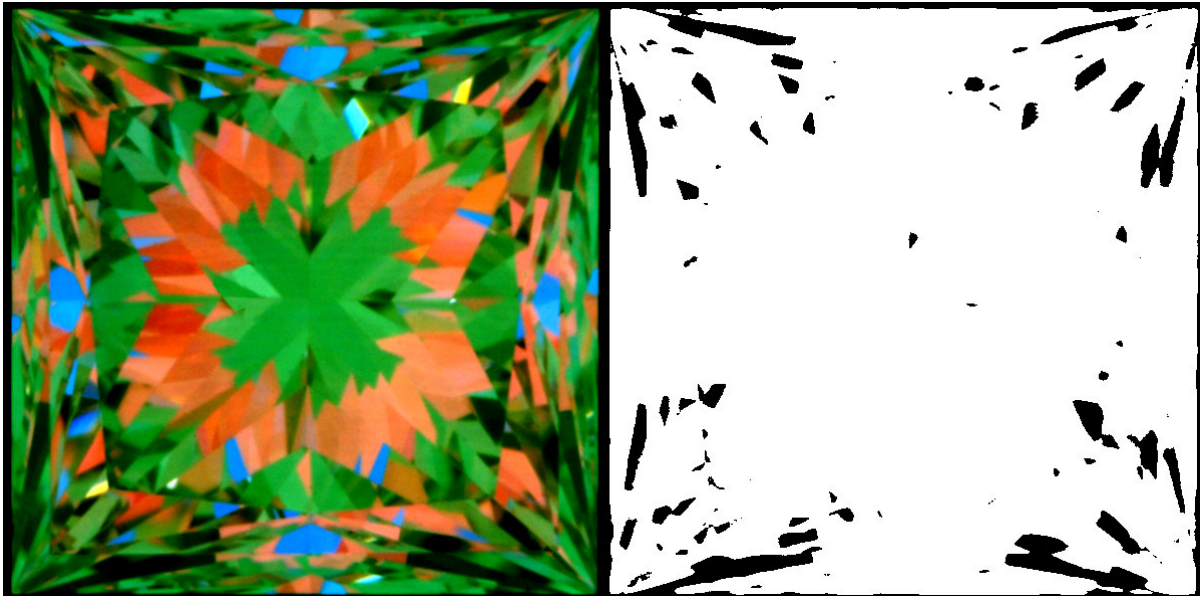
Dispersion is calculated by proprietary formulas in the AGS Performance Grading Software™.

In order to achieve acceptable values for dispersion across the entire face of the diamond, ensure that the Blues, Reds, and Greens are within limit and symmetrical.

# Leakage

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Leakage is defined as areas that do not return light.



Leakage is undesirable and should be minimized.

Well-cut diamonds maximize light that is returned to the eye through the crown.

Contributing most to leakage are:

- Asymmetry
- Crown and Pavilion angle combinations

## Weight Ratio

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**The result for weight ratio is an estimation and must be verified by the grader!**

Weight ratio refers to the condition where a finished diamond weighs more than is reasonable for its face-up footprint or spread.

A diamond will receive a weight ratio deduction if its weight exceeds the standard by more than 5%.

### **Example:**

The Tolkowsky proportion set with a 6.47 mm diameter and 2.6% girdle thickness will weigh 1.00 carat.

A round brilliant, normalized to the above dimensions, receives a deduction if it weighs more than 1.05 carats.

## Durability

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**The result for durability is an estimation and must be verified by the grader!**

Durability refers to the condition where a finished diamond has a shallow crown angle that is susceptible to chipping or breaking.

**Crown angles less than 30 degrees receive a deduction.**

## Tilt

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**The result for tilt is an estimation and must be verified by the grader!**

Tilt refers to a condition where a finished diamond exhibits a girdle reflection under its table when tilted.

For round brilliant cuts this is set at 14 degrees.

# Girdle

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The result for the condition of the girdle is an estimation and must be verified by the grader!

Verify the thinnest and thickest spots on the girdle.  
The grader must confirm the thickness of the girdle.

<b>Net Lowering</b>	<b>Description</b>	<b>Thickness</b>	<b>Measurement Used</b>
<b>3</b>	<b>Extremely Thin</b>	<b>0% or knife edge</b>	<b>Thinnest @ any point</b>
<b>1</b>	<b>Very Thin</b>	<b>&gt;0.0% AND &lt;0.5%</b>	<b>Thinnest @ any point</b>
<b>0</b>	<b>Thin</b>	<b>&gt;=0.5% AND &lt;3.0%</b>	<b>Thinnest @ any point</b>
<b>0</b>	<b>Medium</b>	<b>&gt;=3.0% AND &lt;4.0%</b>	<b>Thickest @ any point</b>
<b>0</b>	<b>Slightly Thick</b>	<b>&gt;=4.0% AND &lt;5.0%</b>	<b>Thickest @ any point</b>
<b>3</b>	<b>Thick</b>	<b>&gt;=5.0% AND &lt;6.0%</b>	<b>Thickest @ any point</b>
<b>5</b>	<b>Very Thick</b>	<b>&gt;=6.0% AND &lt;7.0%</b>	<b>Thickest @ any point</b>
<b>7</b>	<b>Extremely Thick</b>	<b>&gt;=7.0% AND &lt;8.0%</b>	<b>Thickest @ any point</b>
<b>8</b>	<b>Extremely Thick</b>	<b>&gt;=8.0% AND &lt;9.0%</b>	<b>Thickest @ any point</b>
<b>9</b>	<b>Extremely Thick</b>	<b>&gt;=9.0% AND &lt;10.0%</b>	<b>Thickest @ any point</b>
<b>10</b>	<b>Extremely Thick</b>	<b>&gt;=10.0%</b>	<b>Thickest @ any point</b>

# Culet

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The result for the condition of the culet is an estimation and must be verified by the grader!

Culet refers to the condition and/or size of the culet.  
The culet is the tiny facet on the tip of the pavilion.  
The size can affect the cut grade.  
The grader must confirm the condition of the culet.

<b>Culet Size</b>	<b>Deduction</b>
<i>Pointed, Very small, Small, Medium</i>	0
<i>Slightly large</i>	1
<i>Large</i>	3
<i>Very large</i>	5
<i>Extremely large</i>	7,8,9,10

# Polish and Symmetry

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Polish and Symmetry are handled traditionally and input manually by the operator.