2022-08-17 - HP Carbon 1.5.3

Here you can find information about what is new in HP Carbon version 1.5.3.

This version is available for **download** from the Octonus official web site.

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Executive summary

There is continuing growth of interest in fancy diamonds in such specific markets like India and the West. It is expected that consumers in the key Asian markets will follow the trend quite soon. Our goal is giving our clients the opportunities not just to supply the new demand smartly but also to build robust long-term positions with development of their distinctive signature products in fancies in a very commercially efficient way.

With the current release we offer manufacturers a unique chance to consistently build all-company's in-house know-how to make best performing fancies with bigger yield. With every successful cut highly appreciated by sales team and consumers, the aggregated company’s knowledge expands and provides more winning options for the future cut searches. Important that starting from this release the models’ parameters are kept secret, so, nobody can copy them from your company’s database.

Before this release

Polishers always used available technologies and tools in the best possible way. The combination of Smart Recut, X-ray and Compass technologies provided great results for round shapes at the semi-polished stage because of the relatively limited number of parameters which describe an RBC.

The situation was quite different for fancies. The fancy shapes optimization algorithms provided solutions which were used to estimate Carat weight of future stones (to set target weight).

These solutions could not be effectively used as a direct Galahad plan for the following reasons:

- It was almost impossible to create DLL cuts with a large number of parameters because of the huge diversity of cut patterns.
- Because of this, manufacturers were forced to use ASCII cuts that had a very limited set of parameters that included just Crown and Pavilion heights, but not slopes (for example, in ASCII cut it is not possible to control the slopes for different pavilion tiers).
- With such ASCII cuts parametrization, it was impossible to obtain the maximum weight for those combinations of proportions that the client considers optimal in terms of the cut quality.

Usually, polishers finally worked out how to get more out of the stones on the basis of the recommended solutions (deciding on Slopes and Azimuths of facets). They considered a certain Crown-Pavilion range around the centers of recommended solutions. So, the result (Diamond Carat Weight and Performance) significantly depended on polishers' skills: every polisher built his mastership, but this experience could be hardly used by other colleagues and was doubtful to become the company's long-term asset.

After this release

The new release offers a new format of fancy cut description/identification: it is possible now to change not just the height but also every separate angle. The models appear now in a “multilayer” mode, which allows to change every layer independently. This gives more freedom and potential to the search of the best performing proportions.

Successful models found by polishers or as results of in-house Cut Evolution projects are to be stored in an aggregated in-house database to be used in the future optimization searches. So, with every successful model company builds its expertise incrementally. Important that for the commercial security reason the saved models will be used by optimization algorithms only, they are protected in a way that they cannot be extracted from database as sets of parameters.

In-house cut appraisers define deviation ranges for selected successful in-house models. In this way company builds own multidimensional space of recommended models with corresponding appraisers. The natural selection process guided by choice of sales team and consumers results in survival of the best spices. No bad stock with high discounts anymore. The best cut pedigrees make up the golden fund of your company, its highly valuable intangible asset, which consistently brings tangible sales and orders. Your skillful polishers contribute to in-house database, but your company does not depend on every polisher so much anymore because their craftmanship is continuously accumulated for future in-house usage. Even novice polishers can deliver great results based on in-house stored expertise.

In-house cut allocation takes place in the following way:

- Optimization algorithm picks up the best suitable cut combinations from in-house incremental database.
- After this apply all allocation forms to find the best solution for every Rough/Semi-polished stone and optimize within a range of parameters (including Crown slope and Pavilion slope in new introducing Goodwin type of cut) according to in-house cut appraisers.

Such optimization selects solutions with maximum mass and performance close to actual proportions that were already polished in-house and approved by the sales team. These solutions are designed for direct execution by Compass.

This approach provides company management and sales team with effective tools for directing and controlling polishers’ job in order to reach the lucrative market segments and avoid bad stock and huge discounts.

Start to maintain the cycle of continuous building and improvement of your company’s in-house incremental database right now. Every successfully polished stone secures future company’s position in this highly competitive market. Secure your market share with your signature in-house cuts.

Technical details

There are more detailed description of new important tools and features of the release:

Goodwin Cut. Process flow

Goodwin cut is an advanced type of in-house cut which compared to the previous generation of cuts (aka ASCII-cuts) has more precise control over the cut geometry when changing the parameters, and also allows controlling the slopes of main facets.

Control angles for in-house cuts

To achieve excellent optical performance for in-house fancy shape cuts, it is necessary to control the Crown slope and Pavilion slope parameters, SweetLine parameter of your models.

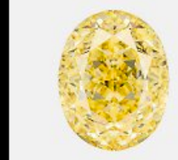
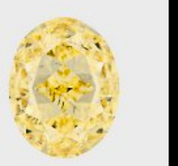
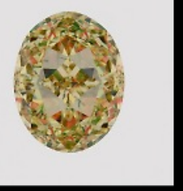
Previously registered new in-house cuts could be only of ASCII type (limited set of parameters) - now you can select a new in-house cut to be of the Goodwin type. In addition to ASCII parameters, for such cuts, you will be able to control:

- Crown slope
- Pavilion 1 and 2 slopes
- For rectangular cuts - these slopes along width and length

In-house cuts			
ASCII	Goodwin		
Basic	1C1P	1C2P	2C3P
Parameter	Parameter	Parameter	Parameter
GirdleRatio	GirdleRatio	GirdleRatio	GirdleRatio
Table	Table	Table	Table
CrownHeight	CrownHeight	CrownHeight	CrownHeight
GirdleBezel	GirdleBezel	GirdleBezel	GirdleBezel
PavilionHeight	PavilionHeight	PavilionHeight	PavilionHeight
TotalHeight	TotalHeight	TotalHeight	TotalHeight
	CrownSlope	CrownSlope	CrownWidthSlope
	Pavil1Slope	Pavil1Slope	CrownLengthSlope
		Pavil2Slope	Pavil1WidthSlope
			Pavil1LengthSlope
			Pavil2Slope
SweetLine	SweetLine	SweetLine	SweetLine

Below is an example of the benefits Goodwin type cut provides comparing to ASCII:

SR with ASCII produced bigger windows which ***makes them actually unacceptable***. Goodwin model does not contain such windows due to control over angles. This is also reflected by metrics.

	ASCII	Goodwin
	19	24
	0.60ct $1,188	0.60ct $1,188
Product SKU	19-oval_84570400...	24-oval_84570400...
Office		
Table Color UV Free		
Pavilion Color UV Free		
ASET		
Chroma	69.9	74.1
Histogram	Intense 43.1% Fancy 56.9%	Intense 63.1% Fancy 36.9%
Color	Fancy	Fancy Intense
Price	$1,188	$1,188
Price Per Carat	$1,980/ct	$1,980/ct
Carat Weight	0.60ct	0.60ct
Optical	3.20	4.15

Example

See this example details in the Goodwin fancy color example article.

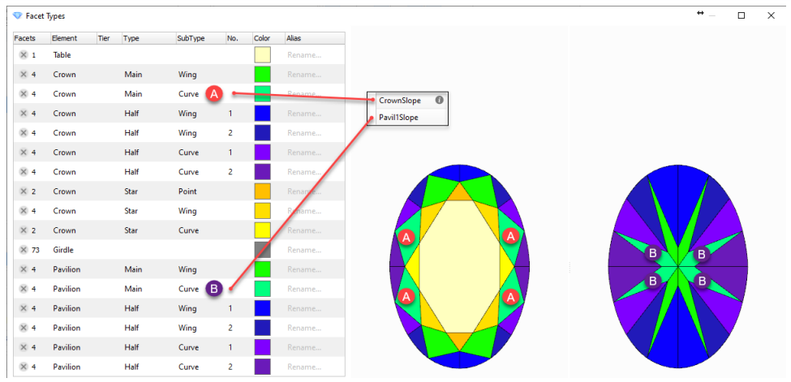
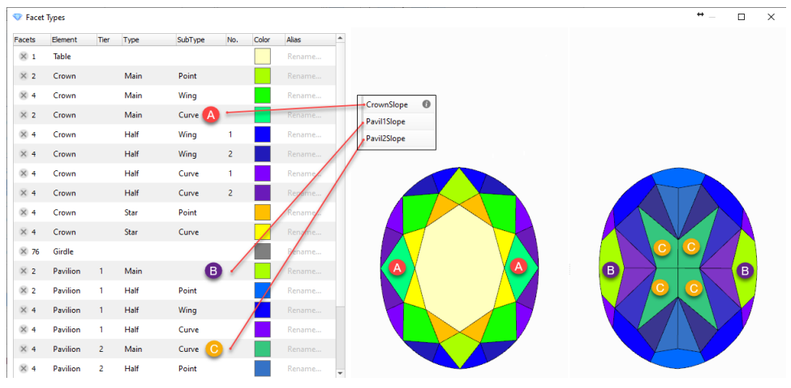
To register your model as a new cut of Goodwin type:

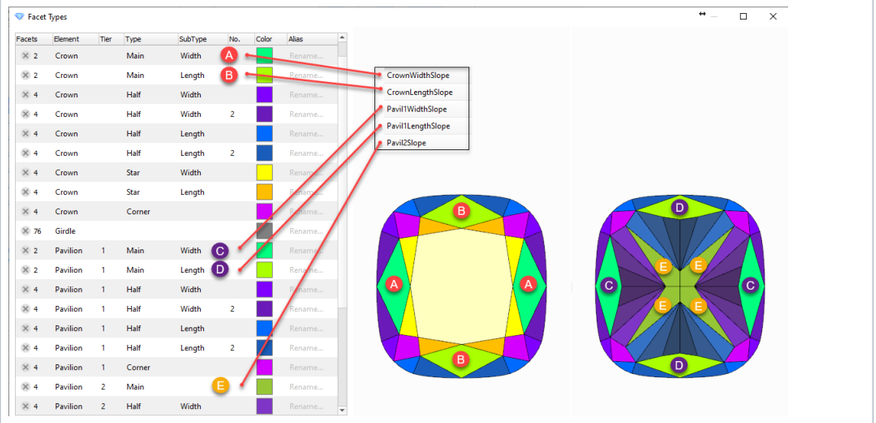
1. Make sure your model has the appropriate facet types.
2. Normalize your model.
3. In **Plans & Scans**, right-click the *best normalization result** and then, from the context menu, select **Register as new cut**. The **Register new cut** dialog is displayed.

   * Usually, the "1. High_Sym_CFM" Smart Normalize preset (magenta colored) provides a result most suitable for further registration as a cut.

4. In the **Register new cut** dialog, specify **Cut name**.
5. Select the **Goodwin** option.
6. Make sure, the **Create appraiser for your new cut from the selected template (recommended)** option is selected.
7. In the list, click the appropriate template.

   Which template to choose?

Template	Description	Cut sample*
1C1P	For cuts having 1 tier for a pavilion. Allows controlling one angle of a crown (1C) and one angle of the pavilion (1P). The template is suitable for most cuts.	
1C2P	For cuts having 2 tiers for a pavilion. Allows controlling one angle of a crown (1C) and two angles of the pavilion (2P).	

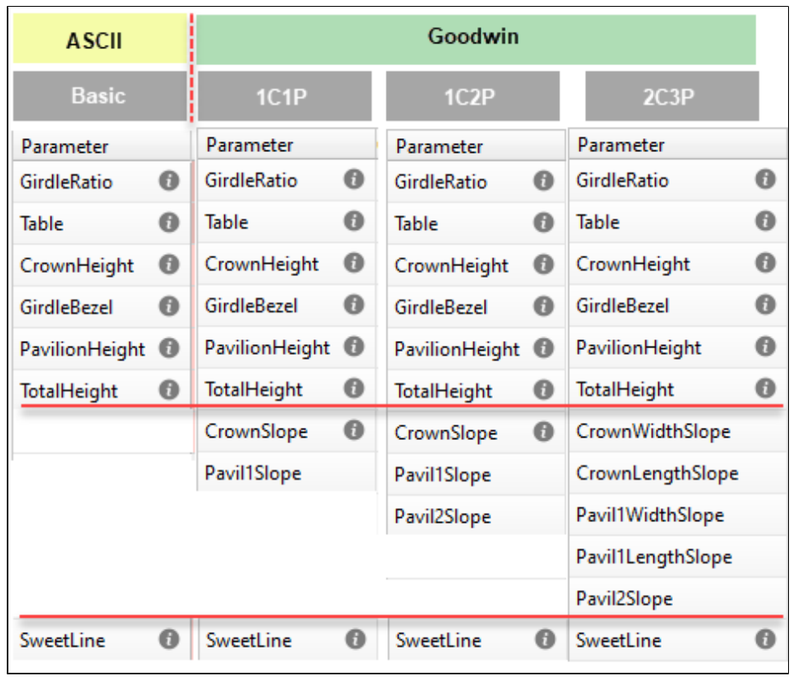
2C3P	For rectangular cuts with 2 tiers for a pavilion. Allows controlling: * separately of two angles of a crown (2C) * three angles of the pavilion (3P): * two on the 1st tier of a pavilion * one on the 2nd tier of a pavilion	

* Note that if you have several "Main" groups on the same **Tier** but different **SubType**, the priorities are used to define which group will be controlled by the parameters.

(higher priority)

EMPTY
WIDTH
CURVE
DIAGONAL
WING
SHOULDER
LENGTH
HEAD
POINT

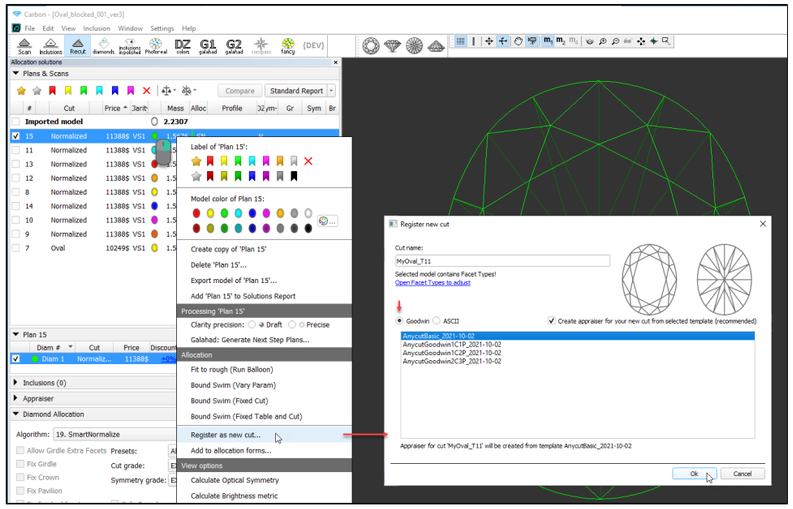
(lower priority)



Goodwin type cuts support AnyCutBasic appraiser as well, but with the lack of important advantage of having slope angles in the appraiser.

Note that selecting a template is not enough - later you must edit profiles manually.

8. Click **Ok**.



The new cut of the Goodwin type is created. It is added to the **Diamond Allocation** section, **Cutbook** > **in-house Cuts**. Also, from the selected template, a new hybrid appraiser is created for this new cut.

> **Important**
>
> This is not the end, but just the beginning of the process. The next two "big steps" are obligatory to make your new cut/appraiser work effectively. The details about why it is important to populate a cut with the allocation forms and set your own boundaries for the linked hybrid appraiser you can find in the In-house cut registration, Hybrid appraisers, and related articles.

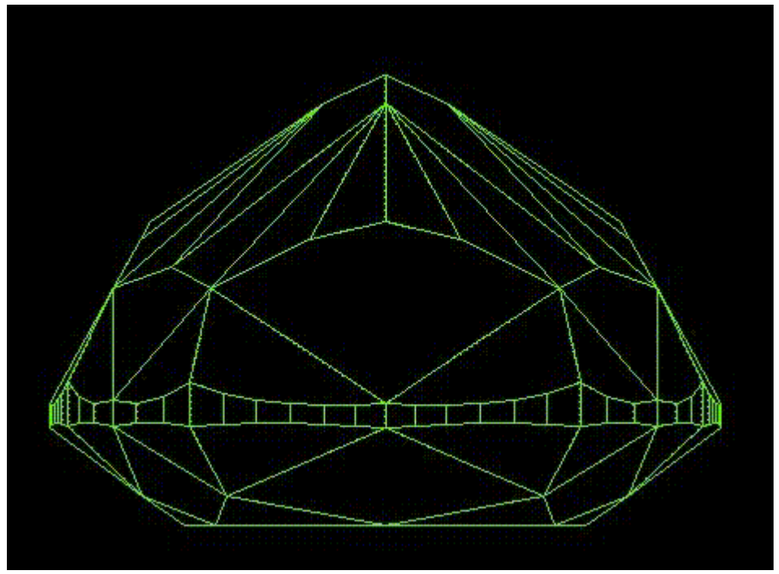
9. ***Add allocation forms to your cut.***
10. ***Edit the boundaries of your appraiser profiles.***

> It is recommended to coordinate set boundaries of your appraiser with the allocation forms:
> 1. Select **Manual appraiser selection**.
> 2. Set the **Appraiser** and **Profile** to the one you are editing.
> 3. In the **Diamond Allocation** section, **Cutbook** > **In-house Cuts**, right-click your cut and select **Show allocation forms**. In **Plans & Scans**, allocation forms are displayed. They are graded by your appraiser/cut.
> 4. Make sure, grades are EX. If not edit the boundaries and repeat the estimation or consider deleting some forms.

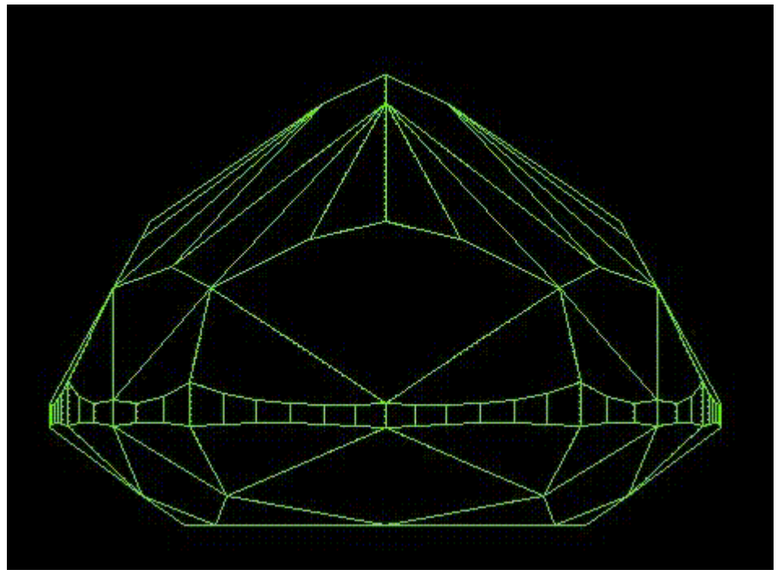
Goodwin improvement for 2-tier pavilion cuttings

Improvement of Goodwin cutting technology with the use of intermediate layers.
Goodwin cuts registered with the Goodwin_GoldStar1C1P appraiser template now have an intermediate layer on pavilion during Recut optimization. If previously only the overall height of the pavilion changed, which proportionally changed the height of each layer, now each layer for 2-tier pavilion changes independently.

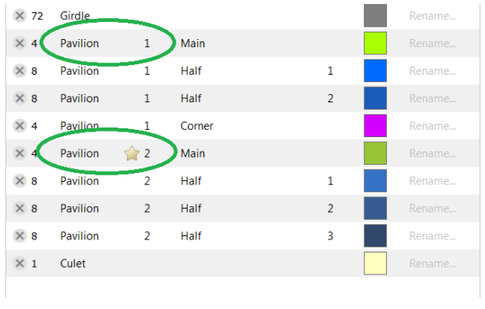
Before: overall pavilion depth

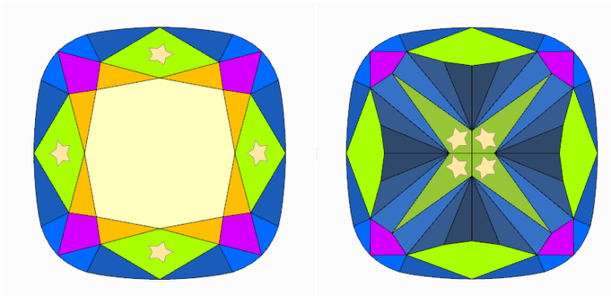


After: overall pavilion depth and independent 2 tiers



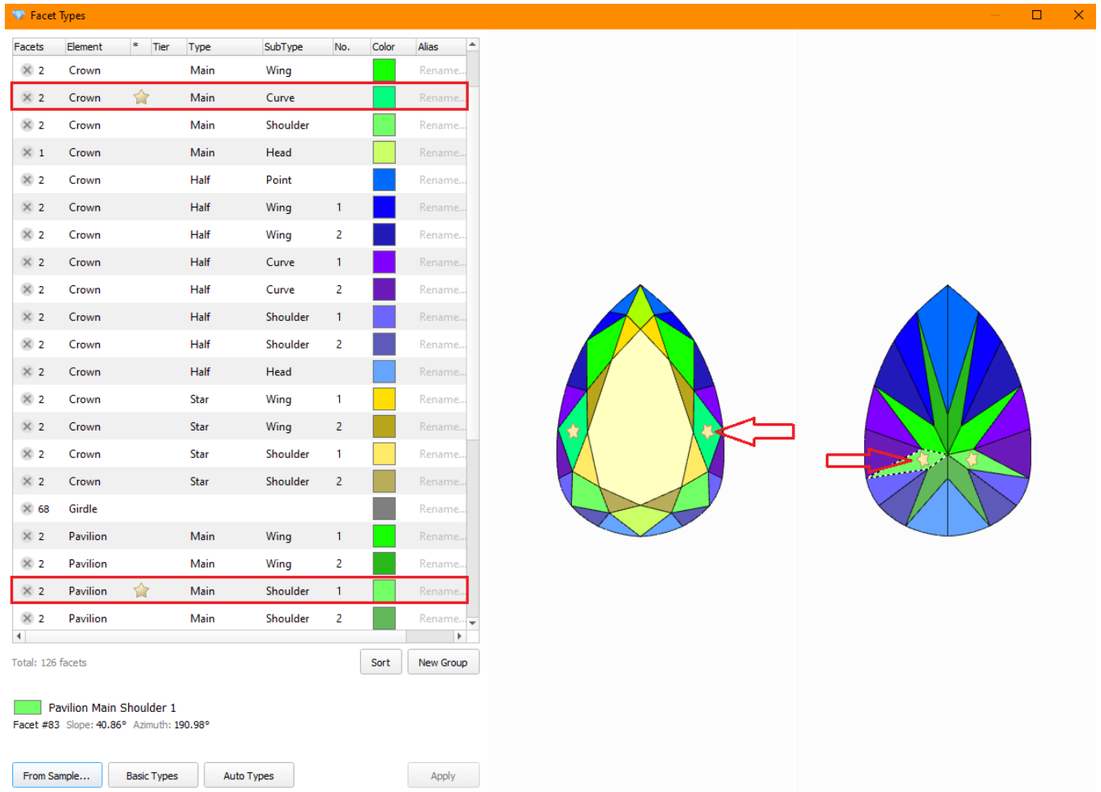
For automatic definition of new tier parameters facets on pavilion should be marked as Pavilion 1 and Pavilion 2 with Main or Corner type.





Gold Stars - new attribute for Facet Types

For many cuts, it is not always clear which facets are involved in the calculation of generalized parameters "Crown angle" and "Pavilion angle". At the same time, these parameters often play an important role in assessing the value of gems when they are chosen by buyers in the market. For clear work with these parameters, a new attribute has appeared in Facet Types - a gold star. The cut may have two gold stars. One on the crown and one on the pavilion. Gold stars symbolize the primary facets of the crown and pavilion.

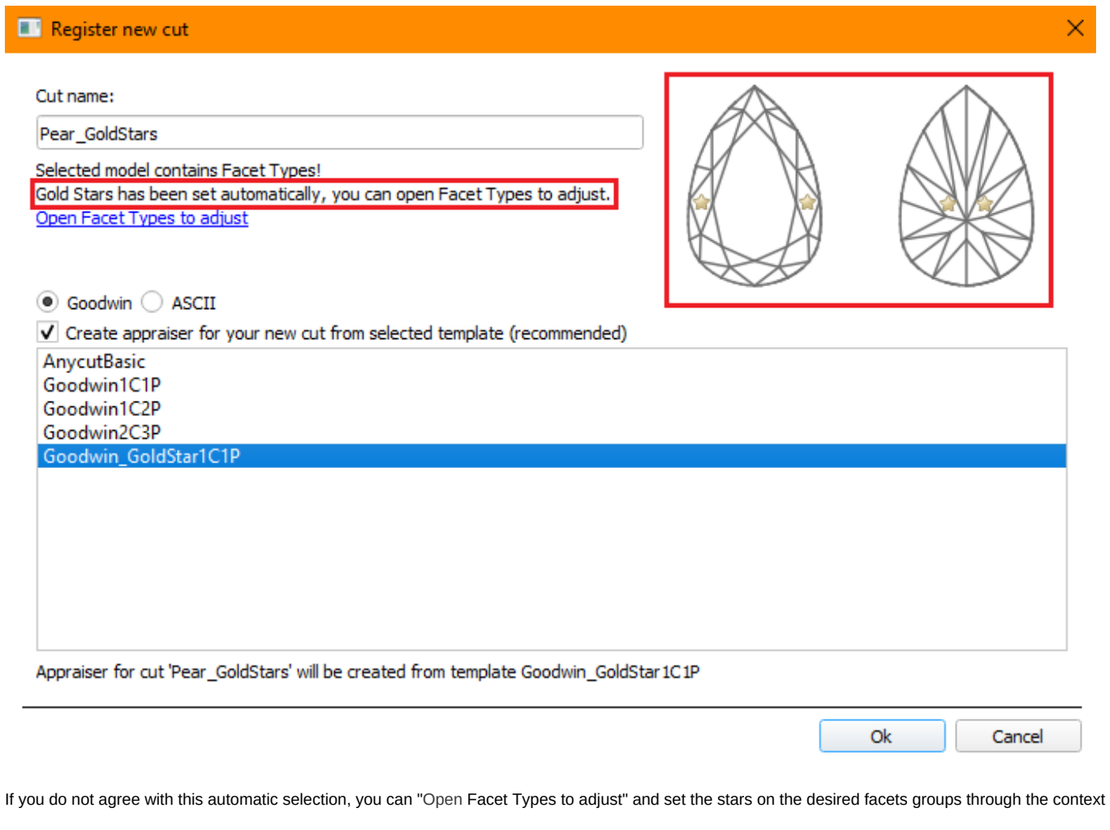


If a cut has gold stars in Facet Types, then the parameters "Crown angle avg" and "Pavilion angle avg" are calculated by the facets marked by gold star groups. To calculate "Crown angle dev" and "Pavilion angle dev" from the gold star groups, Tier and Type are taken, most often Type will be Main. For all groups of faces with these Tier and Type, but various Subtype and/or "No.", their angle dev is calculated. And it is taken maximum of these devs in "Crown angle dev" and "Pavilion angle dev". Parameters "Crown angle" and "Pavilion angle" for example are found in Standard Report for AnyCut and other reports; in Cutwise data; in appraisers created by the new template Goodwin_GoldStar1C1P under the names "Crown Slope" and "Pavilion Slope".

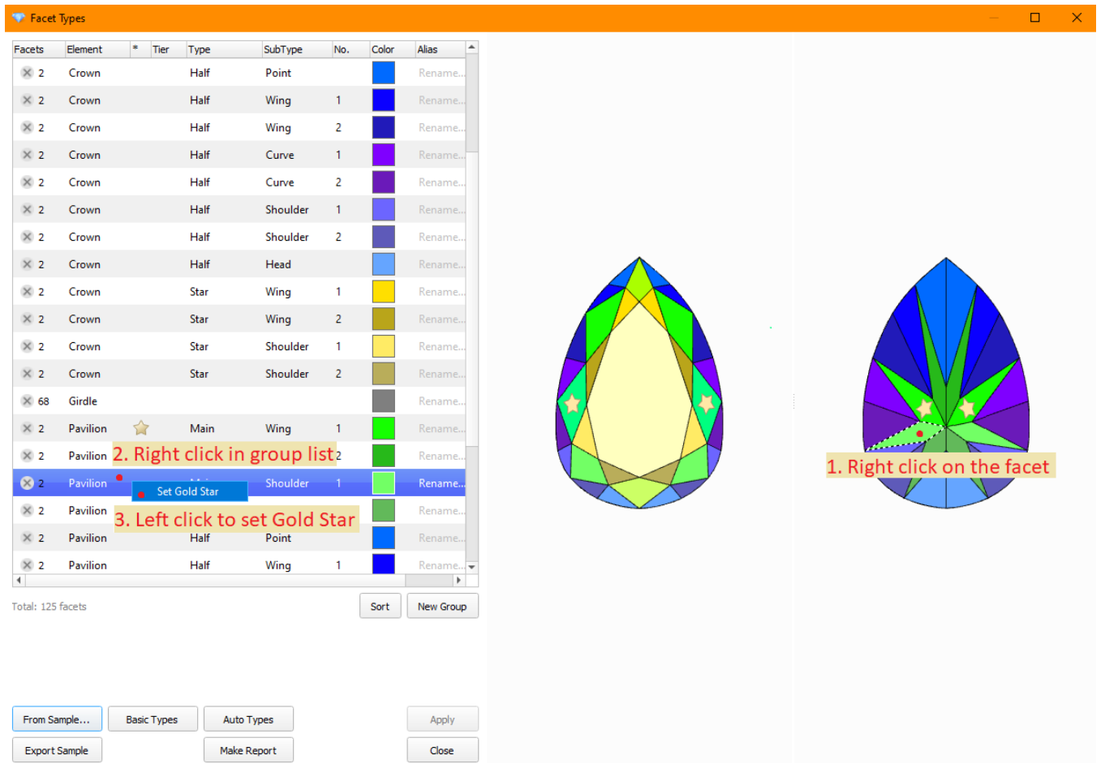
Registration of Cuts with gold stars

When registering a new Goodwin cut, you can select the new Goodwin_GoldStar1C1P template. The following cases are possible:

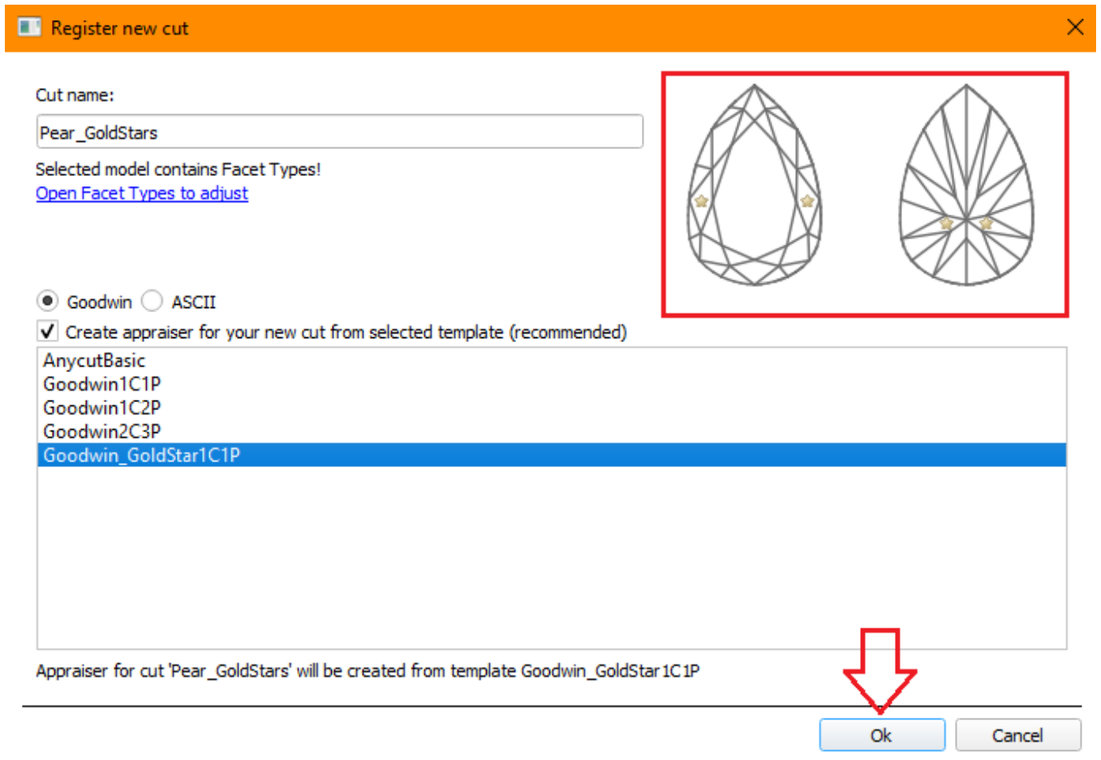
Case 1. Most often you will see the message "Gold Stars has been set automatically, you can open Facet Types to adjust". Also, on the thumbnail on the right will be shown the facets marked with stars.



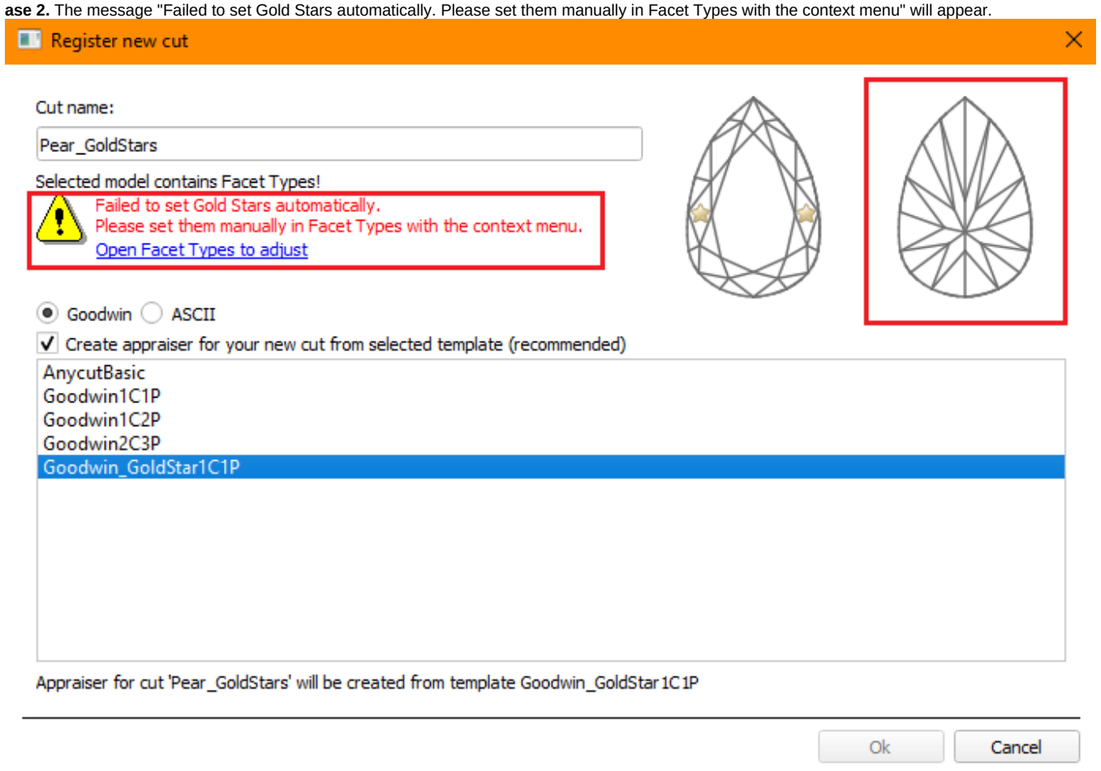
If you do not agree with this automatic selection, you can "Open Facet Types to adjust" and set the stars on the desired facets groups through the context menu. You can choose a group in the list or firstly select group on the model with Right click.



Then click Apply, close the Facet Types window and register your cut.



ase 2. The message "Failed to set Gold Stars automatically. Please set them manually in Facet Types with the context menu" will appear.



In this case, you must open the Facet Type and manually set the stars on the desired facets groups through the context menu. In this case, we recommend checking your Facet Type, as stars should be placed automatically on normal Facet Types.

ase 3. If your cut already has stars on the desired facet groups, go through the normal cut registration steps (see In-house cut registration). This can happen if you create a new cut from solution with cut that already had stars.

> **Important:** once you have created cut with gold star, the stars cannot be removed or rearranged. All preforms, optimization solutions, and SmartNormalize solutions derived from them will inherit the stars from the first master preform.

The Sweetline calculation for Goodwin_GoldStar1C1P appraisers uses values "Crown angle avg" and "Pavilion angle avg" calculated from gold stars groups.

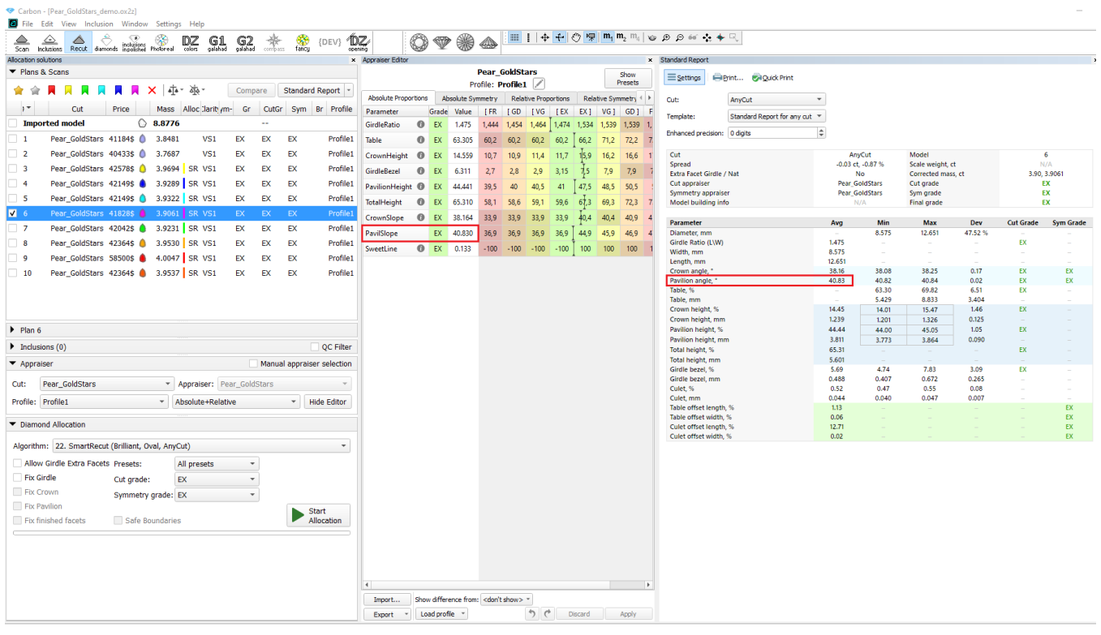
Registration of Cuts without gold stars

When registering a cut according to the old templates, you can also set the stars manually or registered solution may already have them. You can save them. But in this case, you need to understand that the parameters from the appraiser in the optimization will be calculated according to the principles laid down in the program, and not according to the gold stars. But the "Crown angle" and "Pavilion angle" in reports and Cutwise will still be considered by the gold stars. This may create some disaccords. Such a cut has certain advantages in the hands of an experienced user, but some danger in the hands of an inexperienced one.

If you want to avoid this, then at the time of registration of the first form, you can remove the gold stars if there are any. Gold stars are removed in the menu Facet Types via the gold star marked group context menu.

Reports for cut with gold star

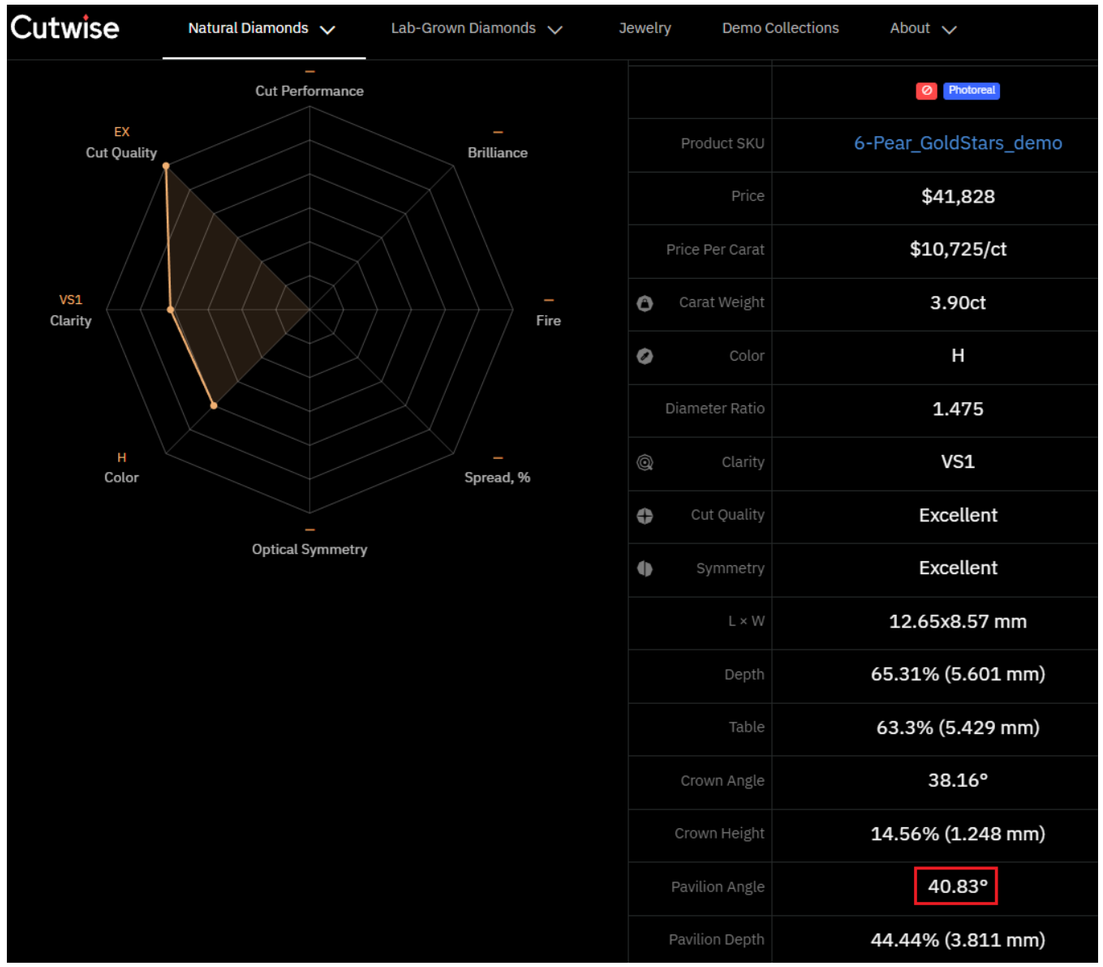
Starting optimization on a new cut. Make sure that the values in the appraiser and in the Standard report match. We consider the pavilion as its gold star was set on a non-standard group.



In the Custom report, we see that the value corresponds to the selected group Pavilion Main Shoulder 1.

Pavilion Main Wing 2 Height (%)	0.35	0.35	0.35	0.00
Pavilion Main Shoulder 1 Slope	40.83	40.82	40.84	0.02
Pavilion Main Shoulder 1 Height (mm)	3.75	3.75	3.75	0.00

And the same value is uploaded to Cutwise.



In-house cut workflow improvements

Individual presets with its individual appraiser for in-house cuts

Every in-house cut has its individual presets along with its individual appraiser.

Advanced users can customize SmartRecut via presets based on the individual cuts characteristics.

Compatibility of in-house cuts and linked appraisers between HP Carbon and Helium Rough/Pacor Client

Currently some allocation algorithms exists only in Helium Rough/Pacor Client but not in HP Carbon. Mainly there are semi-automatic or manual algorithms, that are available in **Tools** mode (like "Fixed Diamond Weight", "Change cut" and so on). Therefore the same project is need to be open in both programs (HP Carbon and HR/PC) and compatibility of cuts and appraisers is required for work convenience.

Previously registered in HP Carbon Cuts and linked Appraisers are automatically loaded to Helium Rough since version 7.4 if Helium Rough is installed on the same computer.

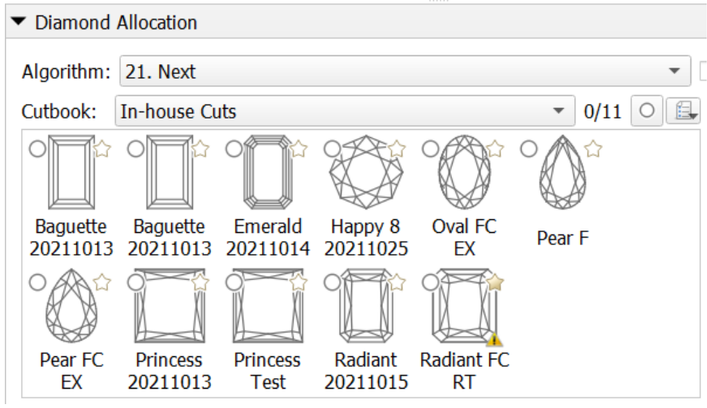
Hybrid Appraisers (with Absolute and Relative parts) has limited compatibility:

1. Helium Rough program version 7.4 doesn't have option to enable/disable Absolute and Relative parts.
2. There is no convenient switch between profiles

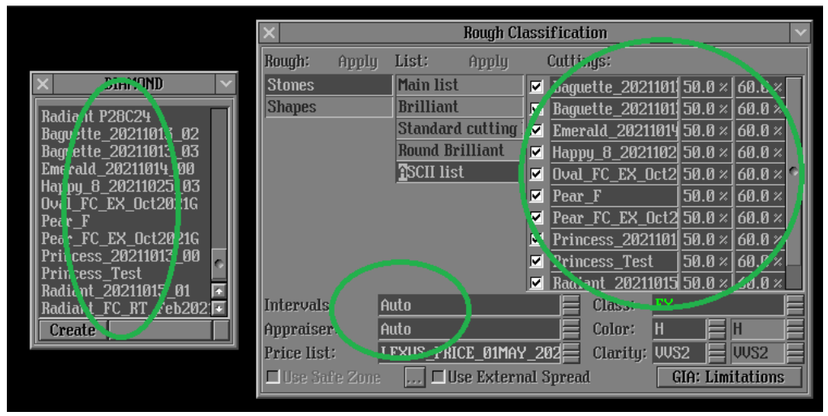
Helium Rough will allocate with the same conditions of hybrid appraiser like they was during exit from HP Carbon. Under conditions we mean absolute, relative parts and profile .

Example of work:

Suppose we have following list of in-house cuts in HP Carbon:



When we run Helium Rough then the same cuts will be available in panel Diamond.



To run allocation with in-house cuts it is required:

- To create new list in Rough Classification panel and add necessary in-house cuts there.
- Select Intervals/Appraiser **Auto**.

Auto Appraiser allows to run allocation with several cuts and their linked different appraisers.

Usability upgrade of in-house cuts presets

To simplify navigation, the parameters in in-house cuts presets are sorted into groups with the addition of prefixes in the names: "Girdle_", "Angles_", "Distances_", "ExtraFacets_"

Integrated documentation is connected for all parameters of the "Girdle_" group.

If you need to reduce the Area Loss of the SmartRecut solution, then decrease the Girdle_PointsAxialSymmetryIdeality via presets and restart the optimization.

Some exceptions are described in the integrated documentation Girdle_PointsAxialSymmetryIdeality or under in program.

utomatic adjustment of appraiser intervals for in-house cut to set start allocation form to EX group

During in-house cut registration program creates appraiser with parameter intervals from the selected template. Start allocation form which is used for cur registration could be out of EX group by some parameters.

There is new feature in software to adjust automatically intervals "Absolute Proportions" to set start allocation form in EX group that is required for correct work of further allocation.

The intervals adjustment is following: intervals from templates are shifted on the some value of parameters ("parallel shift" for parameter intervals of EX, VG, GD, ... groups). The value of the shift is found by software by such way that value of each parameter is exactly in the middle of EX group. Therefore all values of start allocation form are set in the middle of EX group. Intervals size [min, max] for each group are remained the same as in template.

Intervals before adjustment	Intervals after adjustment

Integration with Cutwise

View solutions in 3D interactive space

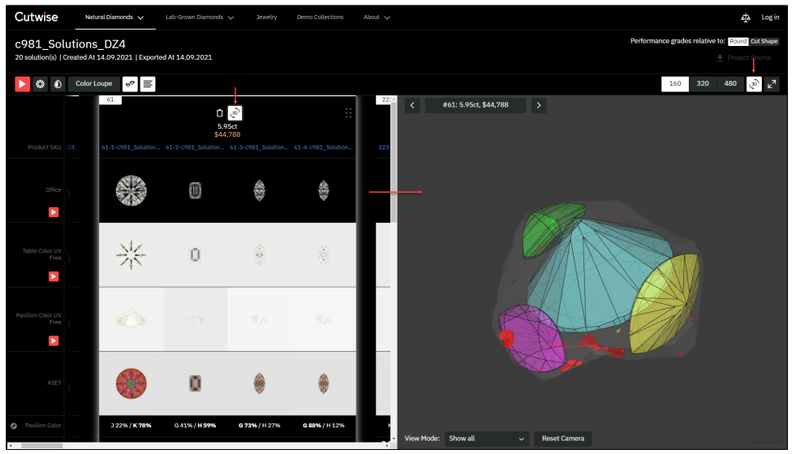
Cutwise online service integrated with HP Carbon allows quick sharing via the Internet information about polishing plans (solutions), including renderings of future stones, indistinguishable from the real DiBox2 films for both Round and Fancy cuttings. Now in addition to visual and parametric representation of plans, Cutwise is able to present solutions in 3D interactive space (like Scene in HP Carbon) - Carbon Viewer.

Thus, ***full information*** about plans (***parameters + media + interactive 3d model***) now can be ***easily shared*** with the remote team members (polishing experts, managers, sales specialists) or customers. The Carbon Viewer provides full and interactive information about:

- number, size, and position of inclusions
- how diamond(s) is positioned relatively to rough and inclusions; if several diamonds in a plan - how they are positioned relative to each other
- distances between rough, diamonds, and inclusions

To view solutions in Cutwise 3D interactive space:

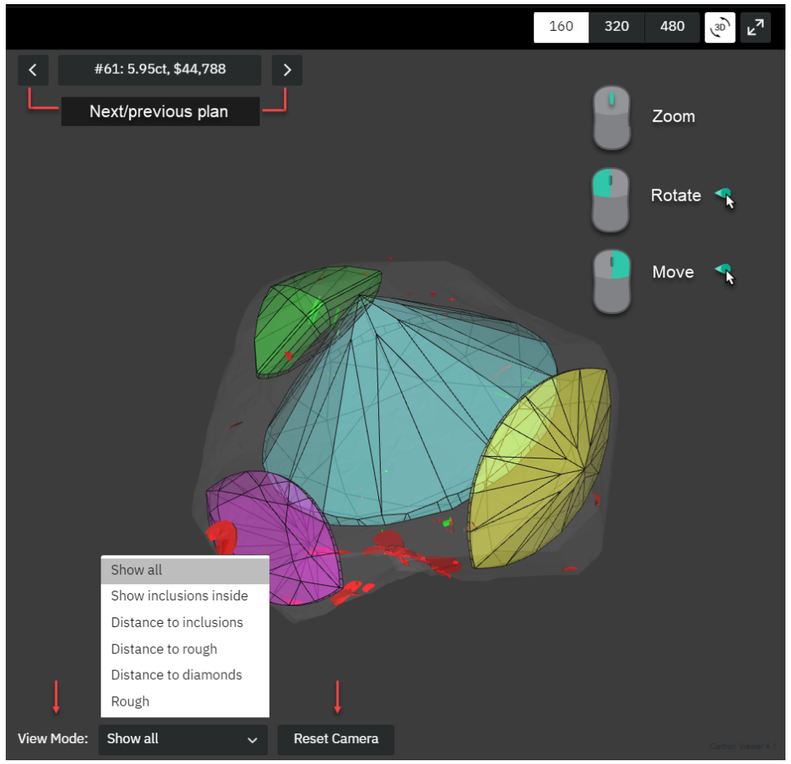
1. In HP Carbon, use the **Upload to Cutwise** feature.
2. In the Cutwise project, related to the uploaded data, on the project toolbar or for a particular plan, click . View button becomes active , 3D interactive space (Carbon Viewer) is displayed.



What can you do in the Carbon Viewer window

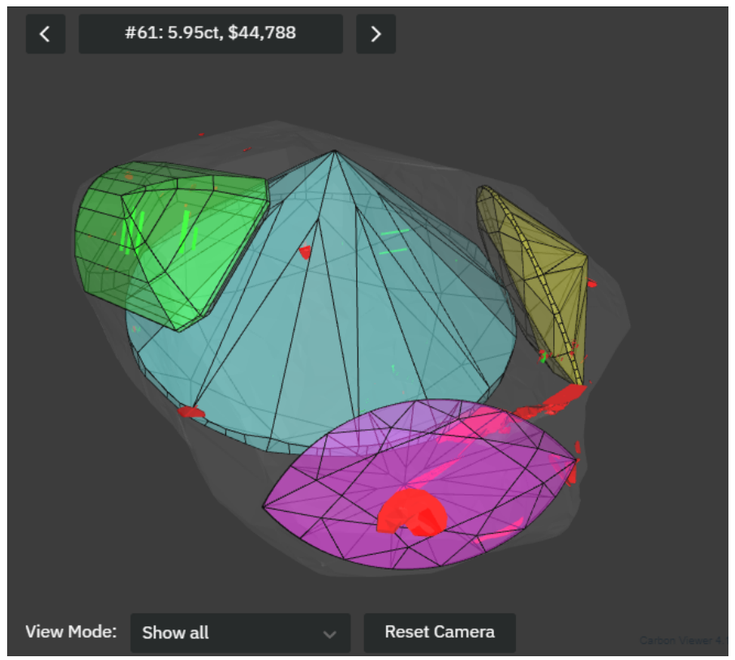
- Switch **View Mode**
- Switch to the next/previous plan
- Reset camera
- Zoom with the scroll mouse button
- Rotate a model with the mouse (hold left + drag)

- Move a model with the mouse (hold right + drag)

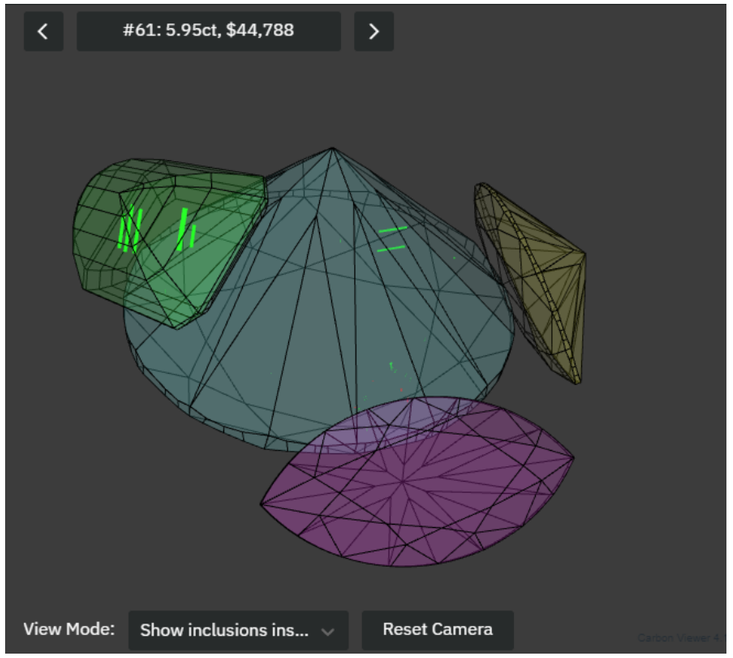
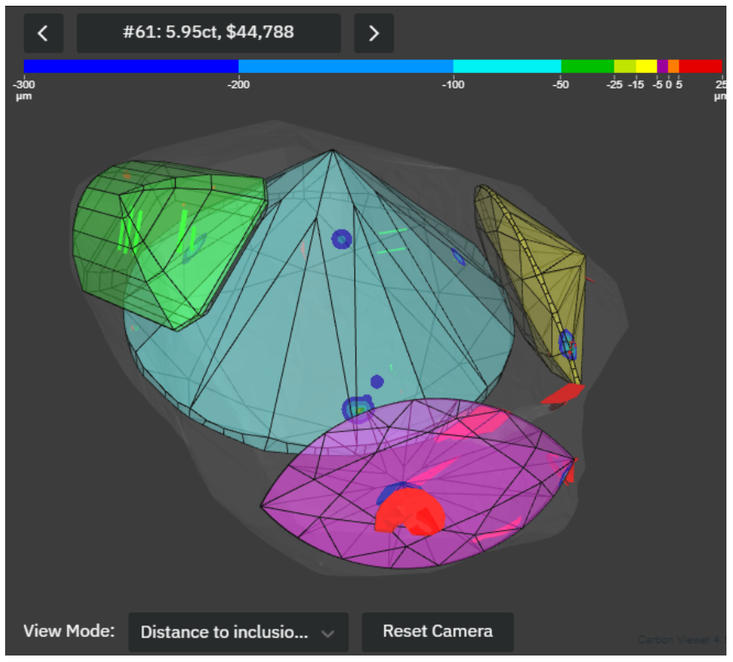


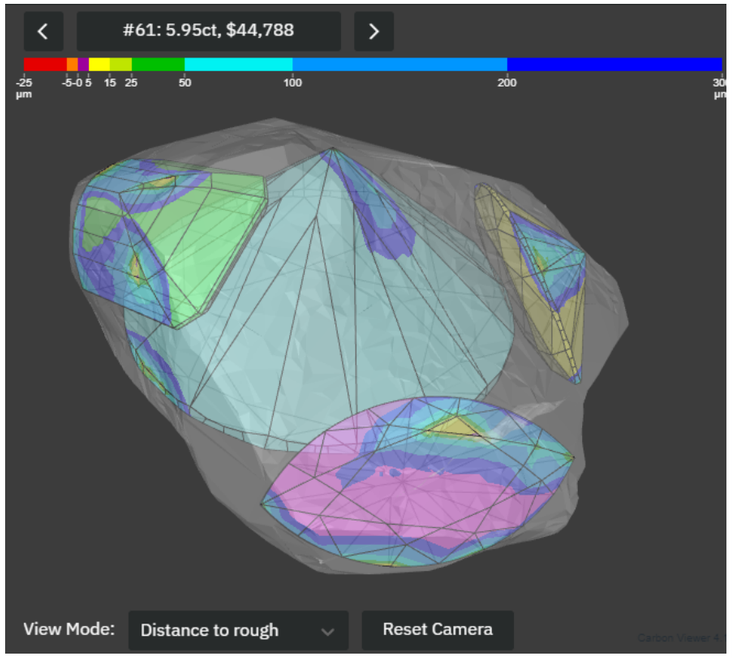
Modes

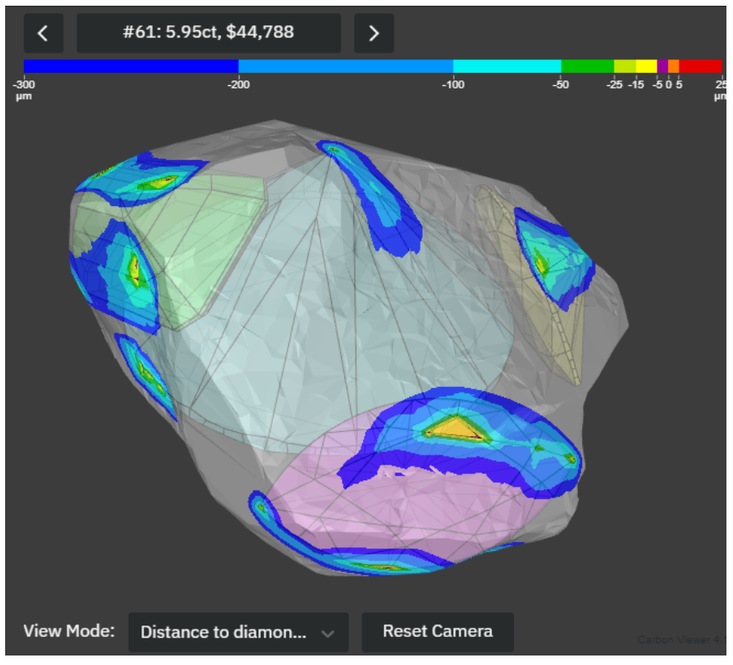
The table below describes available view modes:

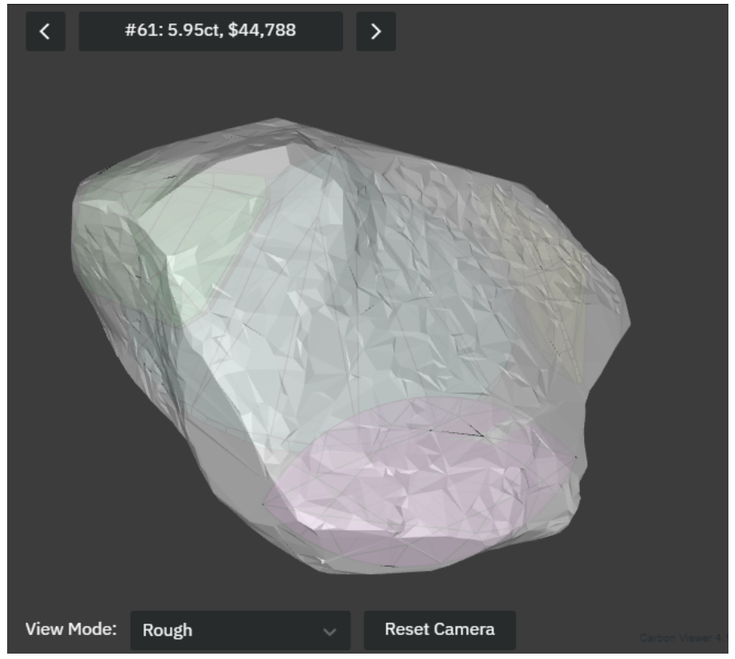
Show all		Shows:
		• Rough
		• Diamond(s)
		• Inclusions (all)
		Notes
		• Diamonds are colored to distinguish them - the colors are equal to the corresponding models' colors in HP Carbon.
		• Default colors:
		  ◦ Diam 1 - blue
		  ◦ Diam 2 - green
		  ◦ Diam 3 - yellow
		  ◦ Daim 4 - purple
		  ◦ Smart Recut - preset color
		• A model may be recolored manually in HPC

Show inclusions inside		Shows:

		• Diamonds • Inclusions inside diamonds **Note** If only some part of inclusion is inside a diamond it will also be displayed. Hides: • Rough
Distance to inclusions		Shows: • Colored distance from diamond(s) to the inner (positive values on the scale) and outer (negative values) inclusions • Distance is drawn on the surface of diamond(s)
Distance to rough		Shows: • Colored distance from diamond(s) to rough • Distance is drawn on the surface of diamond(s) • Negative means diamond goes outside the rough **Note** "goes outside" situation is wrong ("red") and may be caused by manual changes of a model.



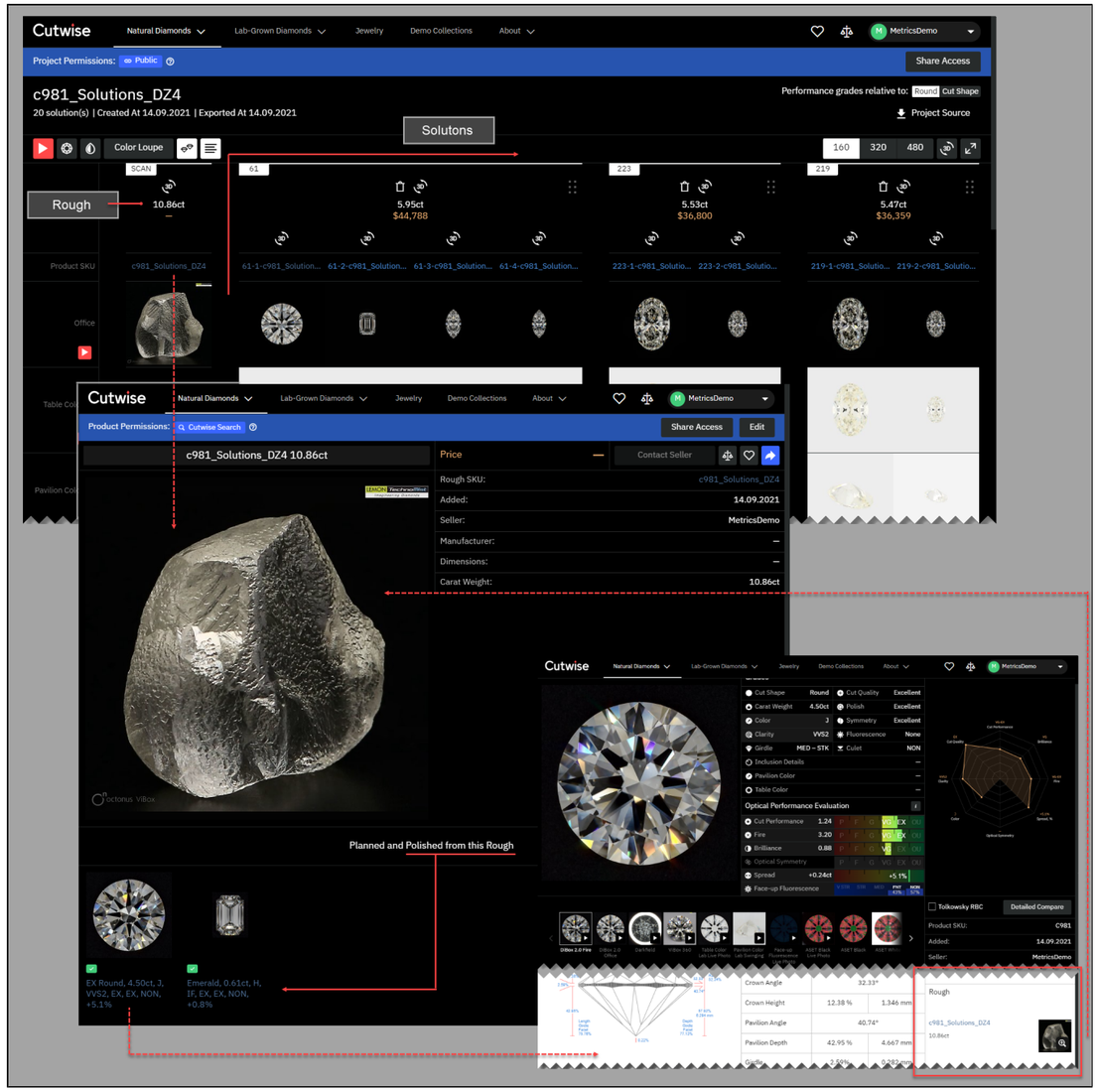
Distance to diamonds		Shows: • Colored distance from rough to diamond(s) • Distance is drawn on the surface of rough • Positive means diamond goes outside the rough **Note** "goes outside" situation is wrong ("red") and may be caused by manual changes of a model.
Rough		Shows: • Surface of rough • Diamond(s) (shaded)



Upload of correct data to Cutwise projects

When uploading from HP Carbon, ViBox, and DiBox to Cutwise, it is important to have data related to the same rough (its scan, solutions, final polished stones) within the same Cutwise project. See current recommendations and examples of how to achieve that in the article:

- How to upload correct data to Cutwise projects



Smart Recut and Smart Normalize updates

SmartRecut: launch of SmartRecut in in-house cut workflow directly on SmartRecut solutions

Since HPC 1.5 it is possible to run SmartRecut in AnyCut workflow directly on SmartRecut solutions. In earlier versions this was available for RBC workflow.

After you have run "22. Single (Recut)" + SmartRecut and have chosen the best solution, you can run SmartRecut on this solution again with all presets or with your favorite one. As a result, you can get a solution with similar performance and more mass, or even a solution with better performance. The workflow is absolutely similar to classic SmartRecut: select the SmartRecut solution you want to increase and Run SmartRecut.

`in AnyCut workflow SmartRecut parameters can be divided into three groups:`

1. Parameters in the appraiser. They are absolute or relative to the allocation form. These parameters are the same in all presets. These parameters are the same for all SmartRecut runned on SmartRecut.

Absolute Proportions | Absolute Symmetry | Relative Proportions | Relative Symmetry | Other | Discounts

Parameter	[FR	[GD	[VG	[EX	EX]	VG]	GD]	FR]
GirdleRatio	1	1	1	1	1,05	1,8	1,8	1,8
Table	50	50	52	54	65	66	67	68
CrownHeight	7	8	9	10	17	18	19	20
GirdleBezel	1,5	2	2,2	2,5	10	11	12	13
PavilionHeight	35	36	36,5	38	49	50	52	54
TotalHeight	46	48	50	52	72	74	76	78
SweetLine	-9	-6	-3	-1,5	1,5	3	6	9
Girdle_Shape1stDerToleranceModule								
Girdle_Shape2ndDerToleranceModule								
Girdle_SquareDeviationTolerance								
Angles_FacetTypesSlopesAverageTolerance								
Angles_MainAzimuthsToleranceModule								
Angles_OtherAzimuthsToleranceModule								
Angles_AdjacentFacetsAnglesTolerance, %								
Angles_AdjacentFacetsAnglesMin, °								
Distances_OtherHeightsTolerance								
Distances_CuletSizesIdeality, mm								
Distances_OtherEdges2DLengthsToleranceModule								
ExtraFacets_HeightsMax								
ExtraFacets_GirdleCrownAmount								
ExtraFacets_GirdlePavilionAmount								

Absolute Proportions | Absolute Symmetry | Relative Proportions

Parameter	EX]
TableOffsetLength	0,5
TableOffsetWidth	0,5
CuletOffsetLength	0,5
CuletOffsetWidth	0,5
Girdle_PointsAxialSymmetryIdeality	
Girdle_JunctionTwistMax	
Angles_FacetTypesSlopesIdeality	
Angles_FacetTypesAzimuthsIdeality	
Distances_CrownHeightsSimilarity	
Distances_PavilionHeightsSimilarity	
Distances_TableSizesSimilarity	
Distances_OtherPointsAxialSymmetryIdeality	

2. Relative parameters in the presets. They are relative to the input solution. In SmartRecut runned on solution of algorithm "22. Single (Recut)" or similar, these parameters don't let the solution stray too far from the cut proportions. Due to them SmartRecut runned on SmartRecut increases the mass, because the input solution is changing. But at the same time, stray from the cut proportions increases.

Absolute Proportions | Absolute Symmetry | Relative Proportions | Relative Symmetry | Other | Discounts

Parameter	[FR	[GD	[VG	[EX	EX]	VG]	GD]	FR]
GirdleRatio	1	1	1	1	1,05	1,8	1,8	1,8
Table	50	50	52	54	65	66	67	68
CrownHeight	7	8	9	10	17	18	19	20
GirdleBezel	1,5	2	2,2	2,5	10	11	12	13
PavilionHeight	35	36	36,5	38	49	50	52	54
TotalHeight	46	48	50	52	72	74	76	78
SweetLine	-9	-6	-3	-1,5	1,5	3	6	9
Girdle_Shape1stDerToleranceModule								
Girdle_Shape2ndDerToleranceModule								
Girdle_SquareDeviationTolerance								
Angles_FacetTypesSlopesAverageTolerance								
Angles_MainAzimuthsToleranceModule								
Angles_OtherAzimuthsToleranceModule								
Angles_AdjacentFacetsAnglesTolerance, %								
Angles_AdjacentFacetsAnglesMin, °								
Distances_OtherHeightsTolerance								
Distances_CuletSizesIdeality, mm								
Distances_OtherEdges2DLengthsToleranceModule								
ExtraFacets_HeightsMax								
ExtraFacets_GirdleCrownAmount								
ExtraFacets_GirdlePavilionAmount								

Absolute Proportions | Absolute Symmetry | Relative Proportions

Parameter	EX]
TableOffsetLength	0,5
TableOffsetWidth	0,5
CuletOffsetLength	0,5
CuletOffsetWidth	0,5
Girdle_PointsAxialSymmetryIdeality	
Girdle_JunctionTwistMax	
Angles_FacetTypesSlopesIdeality	
Angles_FacetTypesAzimuthsIdeality	
Distances_CrownHeightsSimilarity	
Distances_PavilionHeightsSimilarity	
Distances_TableSizesSimilarity	
Distances_OtherPointsAxialSymmetryIdeality	

3. Absolute parameters in the presets. These parameters are different in different presets. If you are running SmartRecut with a narrow preset (eg 1.AllNarrowed) on the solution obtained by a wide preset (eg 8.AllWidened), then SmartRecut runned on SmartRecut may not work because the input solution is too asymmetric. Such launches are not prohibited. But for stable operation, we recommend you keeping or widing the preset during the SmartRecut on SmartRecut process.

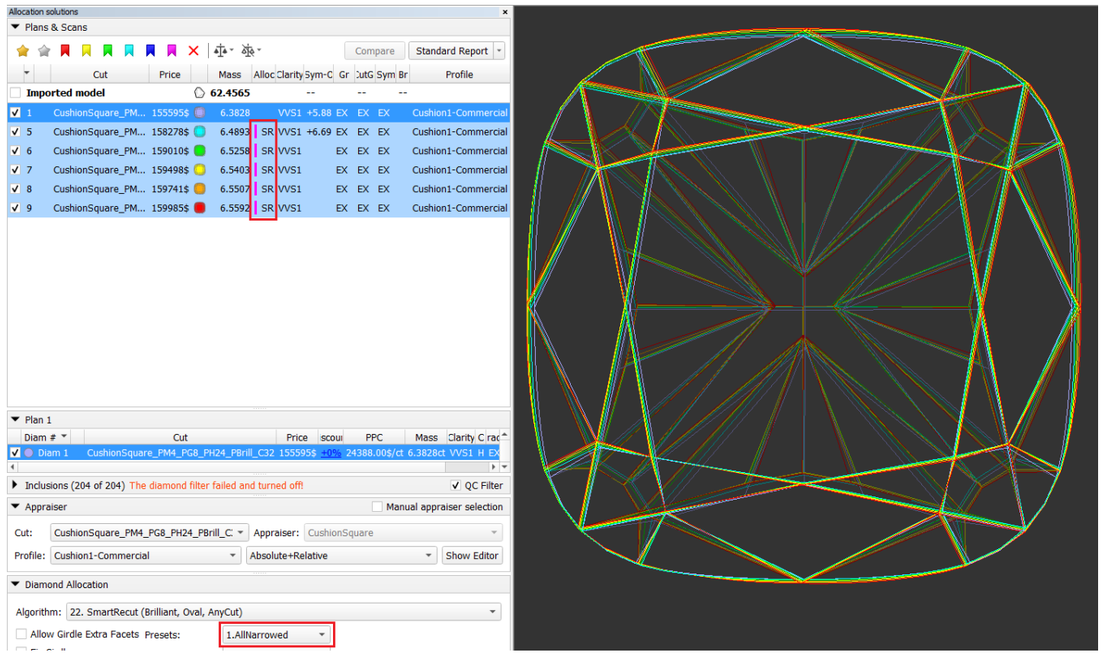
Absolute Proportions | Absolute Symmetry | Relative Proportions | Relative Symmetry | Other | Discounts

Parameter	[FR	[GD	[VG	[EX	EX]	VG]	GD]	FR]
GirdleRatio	1	1	1	1	1,05	1,8	1,8	1,8
Table	50	50	52	54	65	66	67	68
CrownHeight	7	8	9	10	17	18	19	20
GirdleBezel	1,5	2	2,2	2,5	10	11	12	13
PavilionHeight	35	36	36,5	38	49	50	52	54
TotalHeight	46	48	50	52	72	74	76	78
SweetLine	-9	-6	-3	-1,5	1,5	3	6	9
Girdle_Shape1stDerToleranceModule								
Girdle_Shape2ndDerToleranceModule								
Girdle_SquareDeviationTolerance								
Angles_FacetTypesSlopesAverageTolerance								
Angles_MainAzimuthsToleranceModule								
Angles_OtherAzimuthsToleranceModule								
Angles_AdjacentFacetsAnglesTolerance, %								
Angles_AdjacentFacetsAnglesMin, °								
Distances_OtherHeightsTolerance								
Distances_CuletSizesIdeality, mm								
Distances_OtherEdges2DLengthsToleranceModule								
ExtraFacets_HeightsMax								
ExtraFacets_GirdleCrownAmount								
ExtraFacets_GirdlePavilionAmount								

Absolute Proportions | Absolute Symmetry | Relative Proportions

Parameter	EX]
TableOffsetLength	0,5
TableOffsetWidth	0,5
CuletOffsetLength	0,5
CuletOffsetWidth	0,5
Girdle_PointsAxialSymmetryIdeality	
Girdle_JunctionTwistMax	
Angles_FacetTypesSlopesIdeality	
Angles_FacetTypesAzimuthsIdeality	
Distances_CrownHeightsSimilarity	
Distances_PavilionHeightsSimilarity	
Distances_TableSizesSimilarity	
Distances_OtherPointsAxialSymmetryIdeality	

On the picture below there are five solutions obtained by the preset "1.AllNarrower" and recolored in the colors of the rainbow. The algorithm was run one by one 1 5 6 7 8 9. As you can see, the price of the solution is growing, but the gain is decreasing each time



SmartNormalize batch-mode for registration of many (100 and more) allocation forms

To register Goodwin cuts allocation forms, you need to run SmartNormalize algorithm on every model. For hundreds of forms it takes a very long time and inevitable human errors. We have automated this process as much as possible.

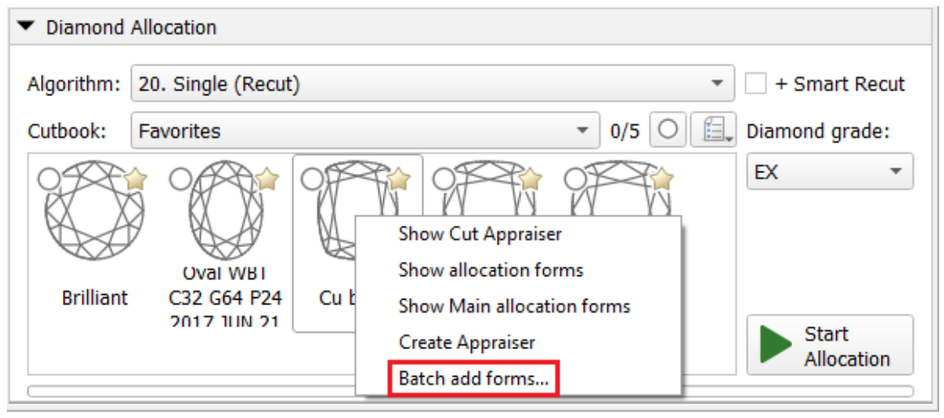
1) Prepare models array for Cut registrations:

- Choose your cut pattern. We recommend registering models with different patterns in different cuts
- Gather together .dmc files with models of the selected pattern. It could be scans or allocation forms of your old In-house cuts.
- Specify Cut grade models in filenames if you have this information. Future allocation forms will have these names

2) Now you need to register yourself the first form

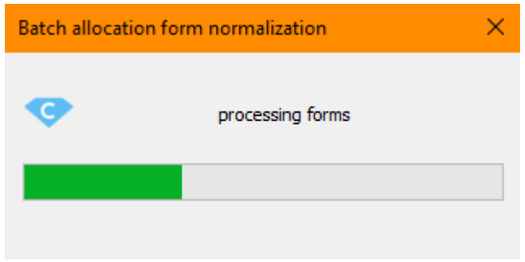
- Register cut using "Register as new cut...". You need not .dmc file for this. For example, .ox2z or .dmx file. For details see In-house cut registration
- Set parameters limits to Absolute Appraiser of your Cut. For details see Appraisers for specific in-house cuts
- Restart HP Carbon.

3) Then you can right-click on this Cut in Cutbook and choose "Batch add forms..."



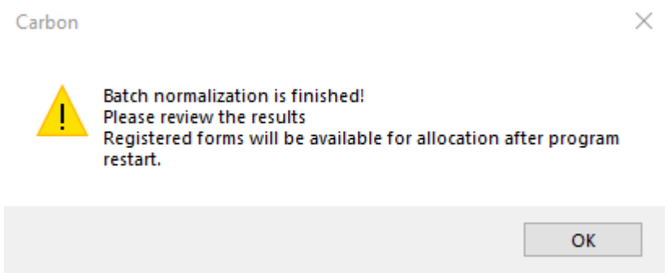
4) Choose your .dmc files in pop-up Windows explorer and press ok. In order not to overload the computer memory and for ease of data recovery in case of any failures, we recommend running 100-500 models

5) You will see progress bar

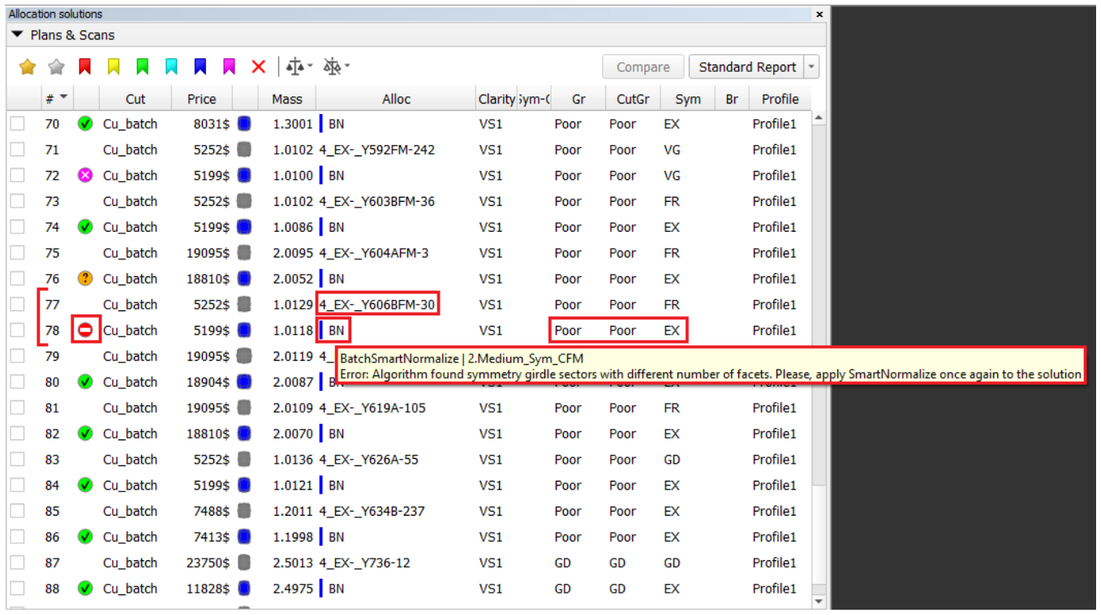


Each selected .dmc file will be loaded into the program. The SmartNormalize algorithm with the preset "2.Medium_Sym_CFM" will be launched on the model from the file. If no significant errors are found in the SmartNormalize process, the solution will automatically register as an allocation form.

6) The following message will appear at the end.



In the Allocation solutions list, all models and BatchSmartNormalize solutions will be in order



Here is the following useful information:

- .dmc file name in "Alloc" column for loaded models
- Tag "BN" and preset color in "Alloc" column for solutions
- Grade by cut Absolute Appraiser
- Errors in "Alloc" column tooltip
- Color labels (details in next chapter)

SmartNormalize auto color labels

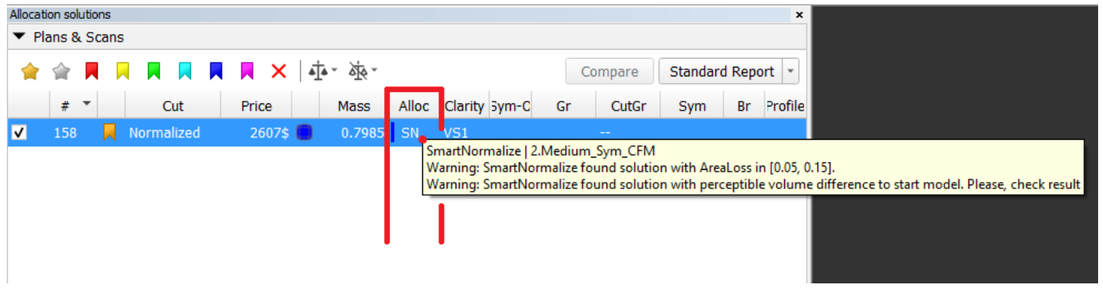
To simplify the choice among SmartNormalize solutions, the algorithm began to place Color labels that warn about the presence of known errors. In SmartNormalize batch mode color labels also determines if the allocation form has been registered automatically.

Color label in SN	What does it mean in separate SmartNormalize	Color label in SN Batch	What does it mean in Smart Normalize batch
	Good solution for registration. No errors found automatically.		`Automatic registration`
	Good solution for registration. Automatically found warnings should not bad affect the work with this preform in the future. Possible Warnings: 1) "SmartNormalize found solution with AreaLoss in [0.05, 0.15]." 2) "SmartNormalize found solution with small edges on the Pavilion or Crown"		Automatic registration. If you like, you can review these solutions, write down their names, and remove them from the allocation forms.
	It means Warning: "SmartNormalize found solution with perceptible volume difference to start model. Please, check result" Volume difference is perceptible but not big. Most likely input model is rather asymmetric, but solution is good for registration. This situation need manual user check.		No automatic registration. We recommend reviewing these solutions and most likely adding them manually to allocation forms. If you don't like the solution, you can run all SmartNormalize presets on these models and maybe get a green solution.
	`The solution contains errors, registration with which is not recommended.`		No automatic registration. Review these solutions and read errors in "Alloc" column tooltip. Try to get the green SmartNormalize solution by following the prompts in the error messages and running all the SmartNormalize presets. Or you can ignore these model.
	Can not be in SmartNormalize without batch mode. First cut form is unknown.		No automatic registration. It means Critical error: "SmartNormalize solution Facet Types is different from first preform Facet Types. Please, check result". Ignore these model. Most likely the .dmc file contains a model with a different pattern or with Extra Facets. We recommend registering models with different patterns in different cuts. In case of Extra Facets you can try to colorize the model Facet Types correct considering Extra Facets and running all the SmartNormalize presets. But remember that checking for violet label will no longer work without a batch and you yourself need to check the identity of the pattern.

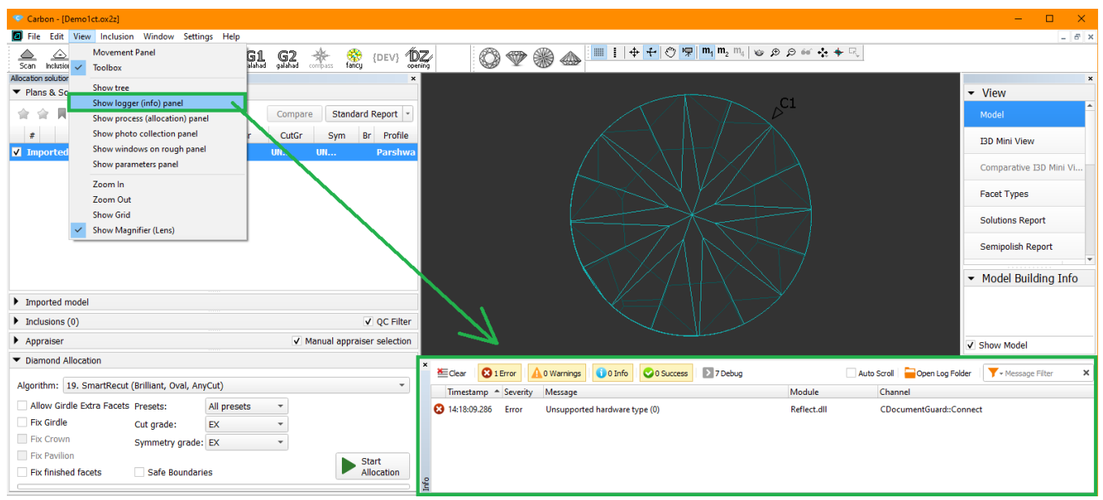
SmartRecut errors log

Sometimes the SmartRecut algorithm does not find a solution, and it is not clear what to do next. In some of these situations, the algorithm can automatically determine the cause of the problem. We have developed an error logging system for SmartRecut, SmartNormalize (/ Lite), SmartZoom algorithms so that users can adjust their actions based on the received information. You can see error messages in two locations:

1) For SmartRecut, SmartNormalize, SmartNormalizeLite solutions errors can be viewed in the Alloc column tooltip



2) In the standard logger panel. To open it you need to press View Show logger (info) panel.



These messages are related to Module SmartRecut.dll. Message always starts with the name of the related preset.

All messages can be divided into 4 groups:
1) Warning. Does not block the work, the algorithm gives some result. Tells the user some information and possibly instructions.

Timestamp	Severity	Message	Module
16:33:49.738	Warning	1M.H&A: There are no GIA red sells. The boundaries of the appraiser in "dead zone". SmartRecut may regularly be wrong in GIA Cut Grade. Please read "Recommendations on Boundaries for main GIA parameters" in documentation	SmartRecut.dll

2) Error Messages containing "Please inform the developer". These are rare technical problems. The user cannot bypass them on his own.

Timestamp	Severity	Message	Module
16:22:33.403	Error	8M.MaxMass: Optimization process not started. Please inform the developer	SmartRecut.dll

3) Error Messages containing instructions for the user.

Timestamp	Severity	Message	Module
16:25:05.706	Error	1.High_Sym_CFM: There are no Facet Types for Input model. Custom Facet Marking parameter is on. Please add Facet Types	SmartRecut.dll
16:25:05.706	Error	2.Medium_Sym_CFM: There are no Facet Types for Input model. Custom Facet Marking parameter is on. Please add Facet Types	SmartRecut.dll
16:25:05.705	Error	3.Low_Sym_CFM: There are no Facet Types for Input model. Custom Facet Marking parameter is on. Please add Facet Types	SmartRecut.dll
16:25:05.705	Error	4.Micro_Sym_CFM: There are no Facet Types for Input model. Custom Facet Marking parameter is on. Please add Facet Types	SmartRecut.dll

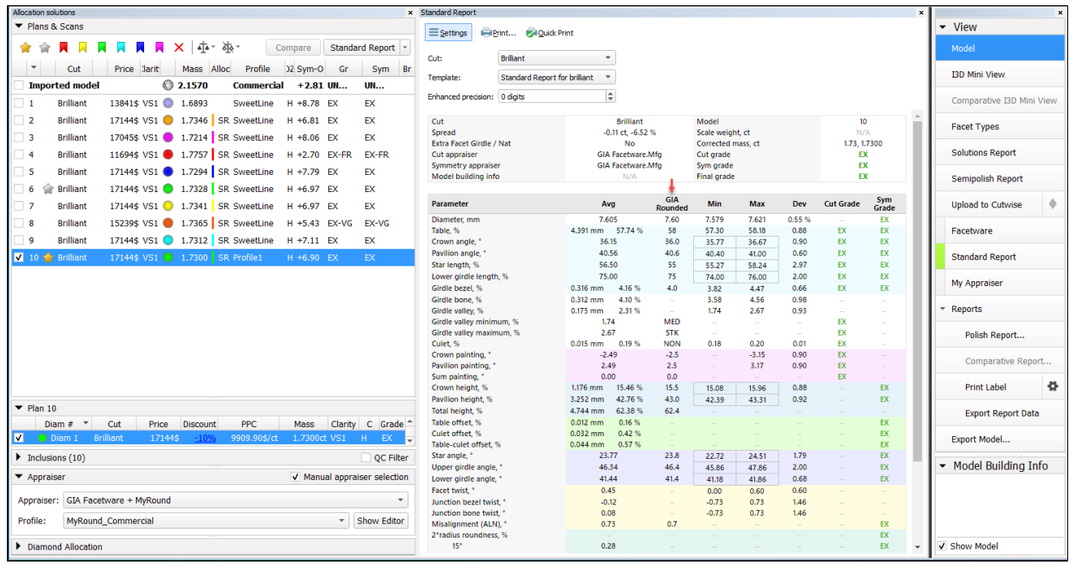
Timestamp	Severity	Message	Module
16:28:23.222	Error	6.H&A5ct: The program could not create a folder in the Temp directory. Please ask your administrator to set up access	SmartRecut.dll

4) The rest of the error messages. There is no instruction in them. From the text of the message, you can sometimes understand what the problem is. For example, a specific cut does not interact correctly with the appraiser or reports.

Timestamp	Severity	Message	Module
16:18:44.299	Error	2M.UltraSym: Not enough data about input plan from appraiser or report data	SmartRecut.dll

Get plans for Brilliant cut that are safe from perspective of GIA cut grade

In HP Carbon, plans for Brilliant cut are allocated with the "GIA Facetware + My Round" appraiser. GIA Facetware rounds the parameters' values.



In some cases, this rounding may cause a problem: when you finish cutting in precise accordance with the plan and the result is scanned, different scanners (for example, yours and GIA lab) may slightly deviate the scanned model. So if our plan was too close to rounding boundaries, the resulting parameter value after rounding may go outside the EX boundaries to VG, etc. This can cause your EX stone from your scanner perspective will unexpectedly become VG from the GIA lab perspective.

To eliminate this risk, for the Smart Recut algorithm, the new **Safe Boundaries** mode is added. It is intended to be used when working with Brilliant cut. The mode sets safe distances to a possible GIA rounding. The values are:

GRID Parameter	Margin	Units
Table	0,008	mm
Crown angle	0,10	deg
Pavilion angle	0,06	deg
Star length	1,5	%
Lower girdle length	1,5	%

Girdle bezel	0,1	%

Example for Crown Angle

A usual SR produced 36.24, it was rounded by GIA to 36.0 which gave . When you scanned after cutting, your scanner gave 36.24, but another one (GIA lab?) produced a model with 36.26. This will be rounded to 36.5 and will give VG. Result: lost money.

Parameter	GIA Rounded	Cut Grade
Table, %	58	EX
Crown angle, °	36.0	EX
Pavilion angle, °	40.6	EX
Star length, %	55	EX
Lower girdle length, %	75	EX
Girdle bezel, %	4.0	EX

OR

Parameter	GIA Rounded	Cut Grade
Table, %	58	VG
Crown angle, °	36.5	VG
Pavilion angle, °	40.6	VG
Star length, %	55	VG
Lower girdle length, %	75	VG
Girdle bezel, %	4.0	VG

And the **Safe Boundaries** mode will step out from the disputed border 36.25 by 0.1 and will produce plan 36.14 instead of 36.24. This may lead to a little mass decrease (probably even not affecting the price). But you are guaranteed to get an EX GIA grade ***at any scanner***.

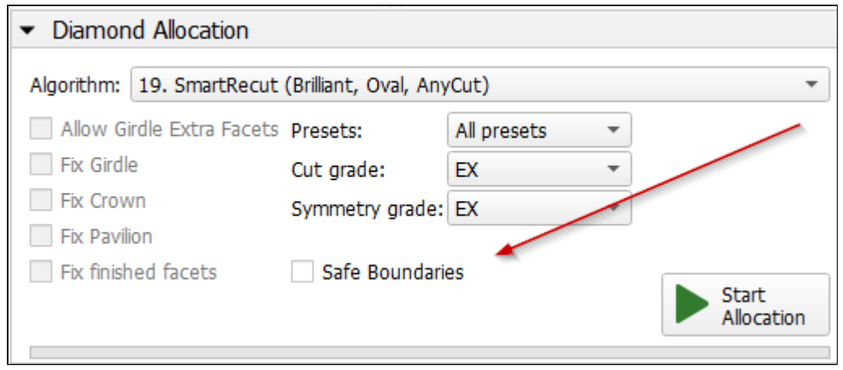
ONLY

Parameter	GIA Rounded	Cut Grade
Table, %	58	EX
Crown angle, °	36.0	EX
Pavilion angle, °	40.6	EX
Star length, %	55	EX
Lower girdle length, %	75	EX
Girdle bezel, %	4.0	EX

Other GIA Cut parameters	Margin	Units
Girdle valley Min	0,1	%
Girdle valley Max	0,1	%
Culet	0,1	%
Crown painting	0,2	deg
Pav painting	0,2	deg
Sum painting	0,2	deg

⚠ At the moment, these values cannot be changed - in the future, it is planned to provide a user interface for viewing/editing.

The mode is turned on by the **Safe Boundaries** checkbox.



The mode can be used when running the Smart Recut allocation from Recut solution. However, if you already have a Smart Recut solution previously obtained without using the **Safe Boundaries** option, it is more effective to run Smart Recut allocation with **Safe Boundaries** from this previous Smart Recut.

⚠ The Table parameter can obtain a value close to the GIA rounding boundary (for example, 58.49%). This means that regardless of rounding up or down (58% or 59%) the required GIA Cut Grade will be produced with the other 5 GRID parameters set.

SmartRecut + Safe Boundaries upgrade

There are two errors when grading diamonds obtained from SmartRecut solutions by GIA. First — the scanned on different scanners model may slightly deviate. Second — GIA before rounding uses a peculiar way of parameters averaging instead of the usual mathematical averaging. But SmartRecut can only use usual mathematical averaging. In the previous version both errors was including in Safe Boundaries margin. Therefore, if we added the full margin to the solution Math values then it was ok. But if we added the full margin to the solution GIA values, then it was possible to go beyond the GIA Cut grade.

Borderline_Exmaple_EX_Cut.ox2z								
From Solu#4			Condition-1		Condition-2		Condition-3	
Parameter	Value	Remark	Value	Remark	Value	Remark	Value	Remark
Table Size	58.67		58.67		58.67		58.67	
Crown Angle	35.65		35.75	0.1 add	35.65		35.75	0.1 add
Pavilion Angle	41.24		41.24		41.30	0.06 add	41.30	0.06 add
Star	51		51		51		51	
Lower	74		74		74		74	
Girdle Bezel	4.14		4.14		4.14		4.14	
G Valley Min	1.79		1.79		1.79		1.79	
G valley max	2.76		2.76		2.76		2.76	
Culet size	0.12		0.12		0.12		0.12	
Crown Painting	0.40		0.40		0.40		0.40	
Pavilion Painting	-0.67		-0.67		-0.67		-0.67	
Sum of Painting	-0.27		-0.27		-0.27		-0.27	
GIA Cut Grade	EX		VG		VG		VG	

In the current version Safe Boundaries margin is responsible only for the possible scanner error. And SmartRecut separately takes into account GIA rounding error (*dead zone*). So you can add the full margin to the solution GIA values, it will be ok.

MyRound boundaries and GIA Cut grade conflict in SmartRecut

SmartRecut sometimes found solutions with bad GIA Cut Grade due to narrow MyRound boundaries on the parameters Table, CrownAngle, PavilionAngle, StarLength, LowerGirdleLength, GirdleBezel. This program behavior has been fixed. However, SmartRecut still cannot use the space close to the Boundaries between two 6D-cells (*"dead zone"*). If this happens then there is error message comes to Log:

	Timestamp	Severity	Message	Module
⚠	16:33:49.738	Warning	1M.H&A: There are no GIA red sells. The boundaries of the appraiser in "dead zone". SmartRecut may regularly be wrong in GIA Cut Grade. Please read "Recommendations on Boundaries for main GIA parameters" in documentation	SmartRecut.dll

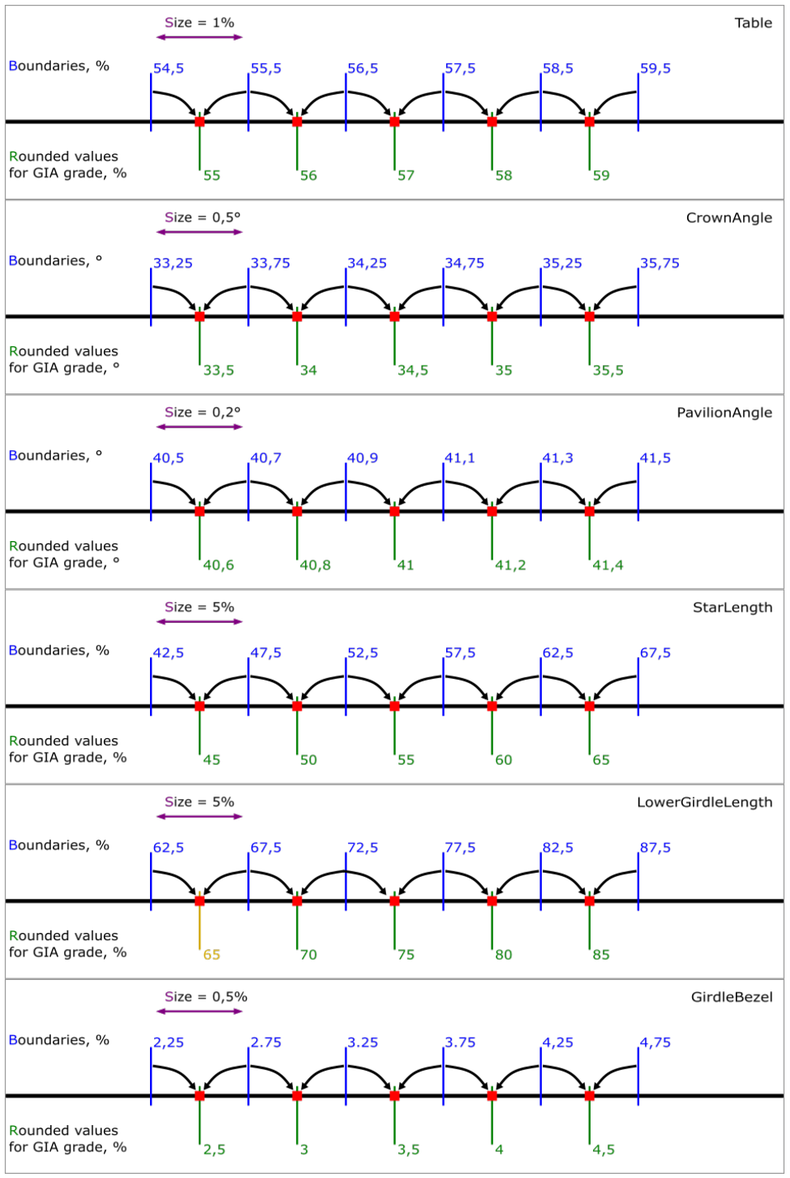
To fix this problem please refer to the new documentation page **Recommendations on Boundaries for main GIA parameters** or open below description:

GIA Cut Grade Boundaries

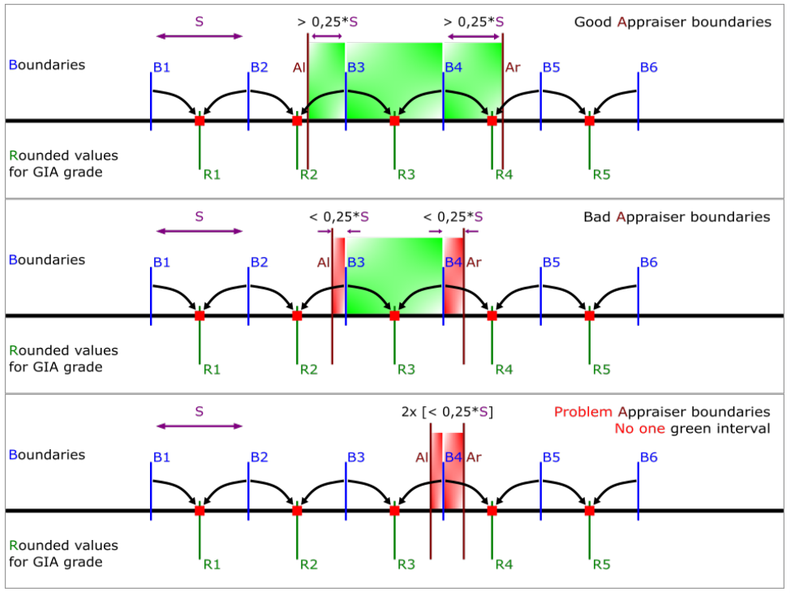
GIA Cut Grade is used during Brilliant Cut optimization with appraiser "GIA Facetware + MyRound". This grade is a complex nonconvex discrete function from 6 parameters: **Table**, **CrownAngle**, **PavilionAngle**, **Star Length**, **LowerGirdleLength**, **GirdleBezel**. The characteristics of this function create problem to use it in optimization algorithms. SmartRecut operates in 2 stages. At the first stage, a solution is sought in a large convex area of the parameters six-dimensional space. Most of the area is of user-defined quality. But there are also parts of the area with less quality. If the optimal by weight solution gets less quality during optimization, then algorithm goes to second stage. At the second stage, the nearest six-dimensional cell of user-defined quality is found and optimization does not go beyond its **Boundaries**.

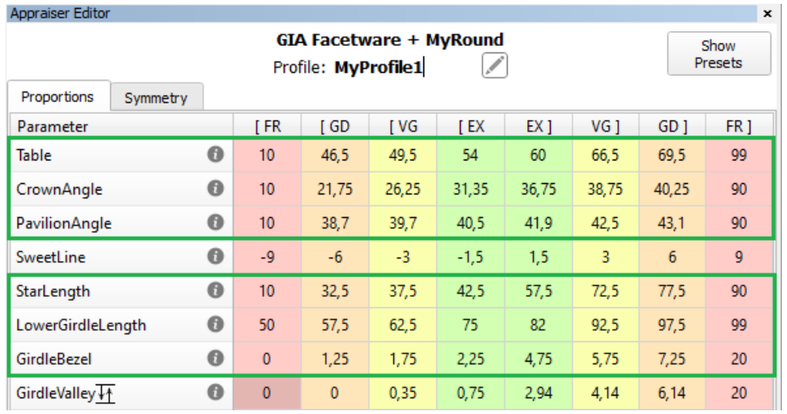
The first figure shows for each of the 6 parameters: **Boundaries** of cells, **Size** of cells, centers of cells — **Rounded values for GIA grade** and rounding of average values to **Rounded values for GIA grade** is illustrated. The values for the figure were taken closer to the center of the EX zone. Exception: There is no EX-combination with LowerGirdleLength = 65.

Another problem with the GIA Cut Grade for optimization algorithms is that the GIA before rounding uses a peculiar way of parameters averaging instead of the usual mathematical averaging. SmartRecut can only use standard mathematical averaging. Therefore, SmartRecut cannot use the space close to the **Boundaries** between two 6D-cells, let's call it a ***"dead zone"*** (below there is detailed description of "dead zone"). Otherwise, SmartRecut may get user-defined quality, but the GIA will rate the diamond with a less quality due to peculiar averaging.



MyRound Boundaries	In addition to the GIA Cut Grade, users can set their own MyRound intervals for each of these parameters via Appraiser editor. And these boundaries can create problems for the SmartRecut algorithm.





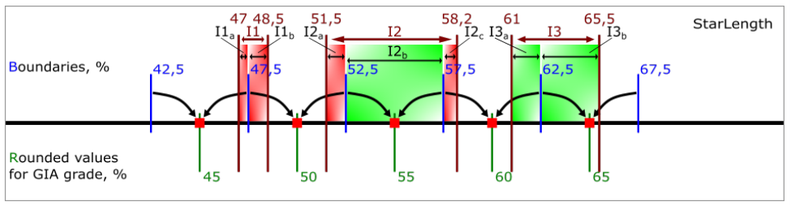
Parameter	[FR	[GD	[VG	[EX	EX]	VG]	GD]	FR]
Table	10	46,5	49,5	54	60	66,5	69,5	99
CrownAngle	10	21,75	26,25	31,35	36,75	38,75	40,25	90
PavilionAngle	10	38,7	39,7	40,5	41,9	42,5	43,1	90
SweetLine	-9	-6	-3	-1,5	1,5	3	6	9
StarLength	10	32,5	37,5	42,5	57,5	72,5	77,5	90
LowerGirdleLength	50	57,5	62,5	75	82	92,5	97,5	99
GirdleBezel	0	1,25	1,75	2,25	4,75	5,75	7,25	20
GirdleValley	0	0	0,35	0,75	2,94	4,14	6,14	20

When setting boundaries, it is important to take into account not only **Rounded values for GIA grade** you want, but also "cells" **Boundaries**. We recommend setting the **Appraiser boundaries** for these parameters so that the distance from the left MyRound boundary (**Al**) to the nearest larger **Boundary** of the "cell" is more than (0,25 * **Size)**. Similarly, the distance from the right MyRound boundary (**Ar**) to the nearest smaller **Bo undary** of the "cell" was more than (0,25 * **Size)**. See "**Good Appraiser boundaries**". Let's call (0,25 * **Size)** it a *"recommended cell size"*.

For most of the parameters, the *"dead zone"* is less than *"recommended cell size"*. But after subtraction of the *"dead zone"* size from *"recommended cell size"*, the optimization has a very small search area, therefore it is statistically more profitable to work in a farther green "cell", and ignore the red "cells". See "**Bad Appraiser boundaries**".

Even more bad situation for optimization when there are no green cells. See "**Problem Appraise boundaries"**. And there are enough one-parameter bad boundaries to make all 6D-cells are red. For example, LowerGirdleLength [77, 78.4] or narrower boundaries create this situation. At the time of Carbon 1.4.4, the second stage of SmartRecut does not correct the quality of the GIA Cut Grade in such situations. In the future, one of the red "cells" will be selected in such a situation, but this does not cancel the recommendation about *"recommended cell size"* = (0,25 * **Size).**

Example



Let's take a look at **StarLength** as an example. For **StarLength** *"recommended cell size"* = 1.25%**.** There are 3 MyRound intervals in the figure

Interval **I1 = [47, 48.5]** is **problem**. It contains two red cells **I1a = [47, 47.5]** of length 0.5% and **I1b = [47.5, 48.5]** of length 1%. Both are shorter than *"recommended cell size"* = 1.25%

Interval **I2 = [51.5, 58.2]** is **bad**. It contains two red cells **I2a = [51.5, 52.5]** of length 1% and **I2c = [57.5, 58.2]** of length 0.7%. And one full green cell **I2b = [52.5, 57.5]**.

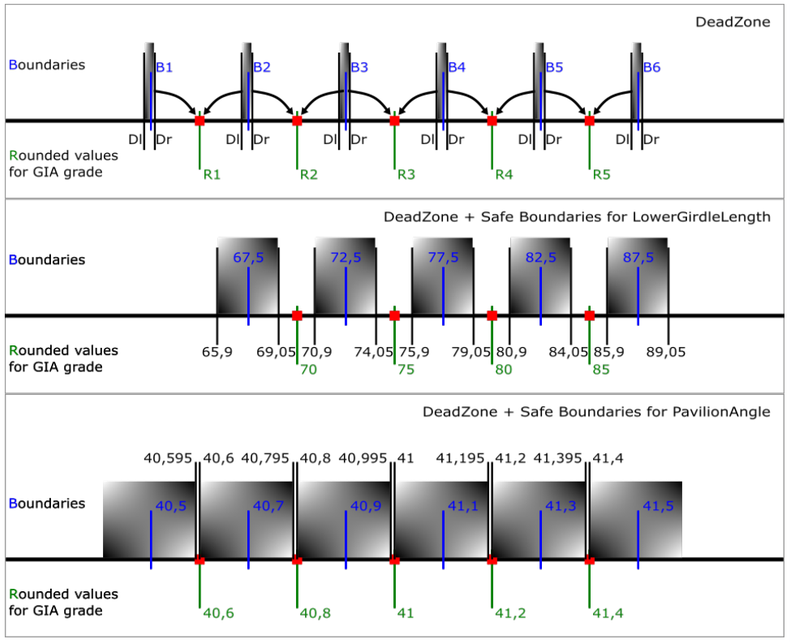
Interval **I3 = [61, 65.5]** is **good.** It contains two green cells **I3a = [61, 62.5]** of length 1.5% and **I3a = [62.5, 65.5]** of length 3%. Both are longer than *"recommended cell size"* = 1.25%. If you reduce **I3** to [61.3, 65.5] it becomes **bad**. If you reduce it to [61.3, 63.7] it becomes **problem**

Dead Zone and Safe Boundaries

The current sizes of the *dead zone* are shown in the table. If you set narrow limits on the parameter in MyGIA, you must take into account the *dead zone* size and not fall completely into it.

Parameter	B_i - Dl	Dr - B_i
Table	0.1%	0.1 %
CrownAngle	0.0501 °	0.035 °
PavilionAngle	0.0501 °	0.035 °
StarLength	0.1001%	0.0501 %
LowerGirdleLength	0.1001%	0.0501 %
GirdleBezel	0.03%	0.015 %

It is important to understand that the "Safe Boundaries" option will increase the size of the *dead zone* by margin. Below are the sizes of the *dead zone* in Safe Boundaries mode.



Parameter	B_i - Dl	Dr - B_i
Table	0.1% + 0.008 mm	0.1% + 0.008 mm
CrownAngle	0.0501 + 0.1 = 0.1501 °	0.035 + 0.1 = 0.135 °
PavilionAngle	0.0501 + 0.06 = ~~0.1101~~ 0.1 °	0.035 + 0.06 = 0.095 °
StarLength	0.1001 + 1.5 = 1.6001 %	0.0501 + 1.5 = 1.5501 %
LowerGirdleLength	0.1001 + 1.5 = 1.6001 %	0.0501 + 1.5 = 1.5501 %
GirdleBezel	0.03 + 0.1 = 0.13 %	0.015 + 0.1 = 0.115 %

For example, in "Safe Boundaries" mode, you cannot require LowerGirdleLength exactly 71 or 72,73,74,76,77,78,79. Of the round values, only multiples of 5 are allowed.
Particular attention should be paid to the Pavilion Angle parameter. Its *dead zone* in "Safe Boundaries" mode occupies almost the entire space. Moreover, there is still a small chance that a GIA Cut grade error will be detected with margin = 0.06. For this parameter, Smart Recut can only technically guarantee safety when Margin < 0.049 (because of red equality in the table)

SmartRecut Girdle control upgrade for in-house cuts

During SmartRecut AnyCut optimization, the Girdle_Shape1stDerToleranceModule and Girdle_PointsAxialSymmetryIdeality parameters can create contradictions. The first one tries to keep the girdle shape of the Recut solution. The second one tries to make the girdle perfectly symmetrical. If the Recut solution girdle is not perfectly symmetrical, then an unresolvable contradiction may result. This is mainly a consequence of user errors during cut registration. Examples of such errors are in Girdle_PointsAxialSymmetryIdeality
In this version, SmartRecut uses Facet Types to determine the symmetrical sectors of the girdle and averages the start girdle shape of the Recut solution over reliable symmetrical sectors. Due to this, the probability of an unresolvable contradiction is significantly reduced. And the correlation between the Girdle_PointsAxialSymmetryIdeality parameter and the AreaLoss value improves.

SmartNormalize automatically fixes simple errors in FacetTypes

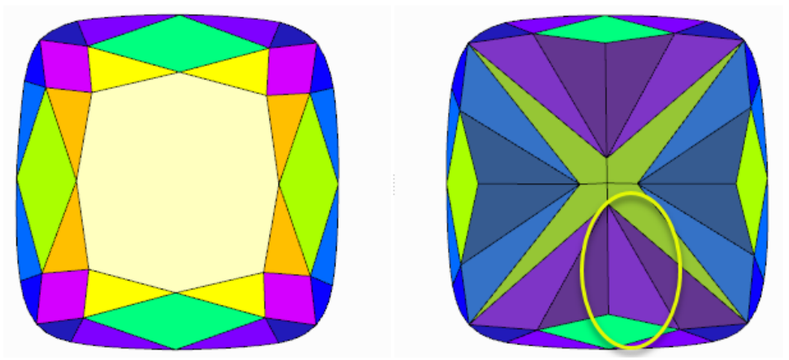
To increase model symmetry and remove excess facets, you can use the Smart Normalize algorithm. Previously, if the model that you were going to normalize had mistakes in its facet types, Smart Normalize could provide non-symmetrical solutions. Now the algorithm is improved: it tries to fix mistakes in facet types and then provides excellent symmetry.

Hint This is especially useful when mistakes are not obvious to an operator.

Technical details:

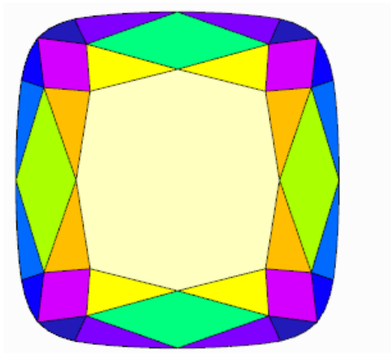
- The algorithm tries to fix facet type mistakes using information about groups of symmetrical facets and which type dominates in a group. If the situation is clear enough, mistakes in facet types are fixed automatically and the algorithm finds the solution with the correct number of symmetry axes. If the case is too complex, the algorithm uses initial facet types without changes.
- Fixing does not change the initial model facet types but does change the resulting model - it will have different (fixed) facet types.

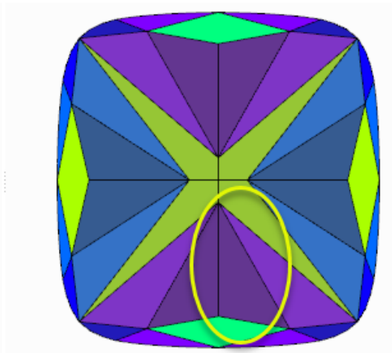
Example:

	Easy to see with the eyes	Not obvious to an operator
Initial model		

Facets	Element	Tier	Type	SubType	No.	Color	Alias
4	Crown		Half	Diagonal	2		Rename...
4	Crown		Star	Width			Rename...
4	Crown		Star	Length			Rename...
4	Crown		Corner				Rename...
72	Girdle						Rename...
4	Pavilion	2	Main				Rename...
2	Pavilion	1	Main	Width			Rename...
2	Pavilion	1	Main	Length			Rename...
4	Pavilion	1	Half	Width			Rename...
4	Pavilion	1	Half	Length			Rename...
3	Pavilion	1	Half	Diagonal			Rename...
1	Pavilion	1	Half	Diagonal	1		Rename...
4	Pavilion	1	Half	Diagonal	2		Rename...
4	Pavilion	2	Half	Width	1		Rename...
4	Pavilion	2	Half	Width	2		Rename...
4	Pavilion	2	Half	Length	1		Rename...
4	Pavilion	2	Half	Length	2		Rename...

Normalized model

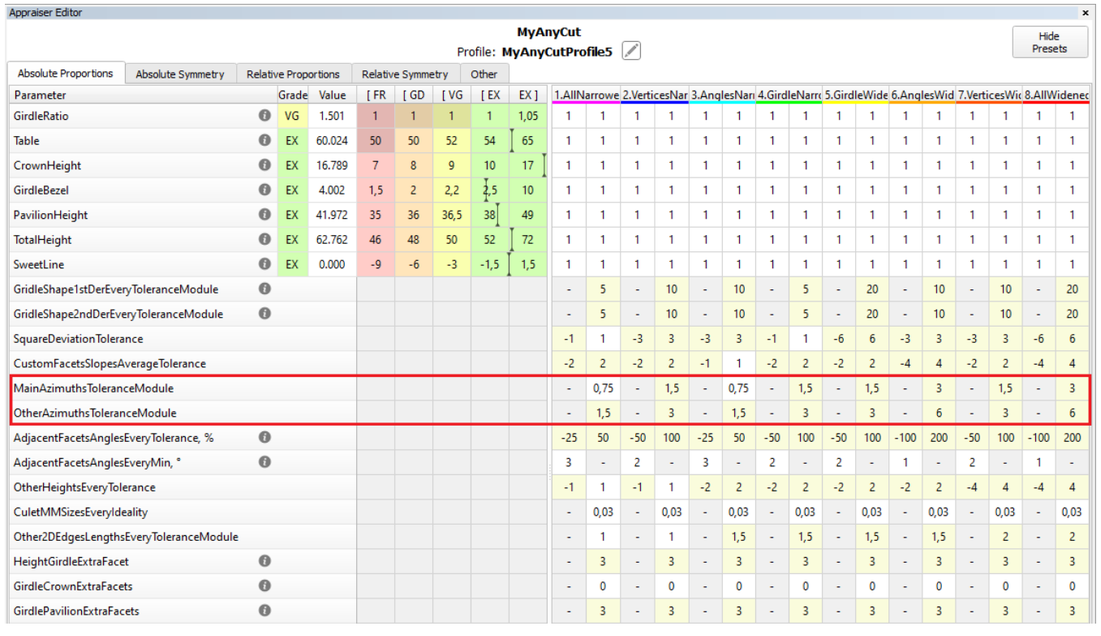


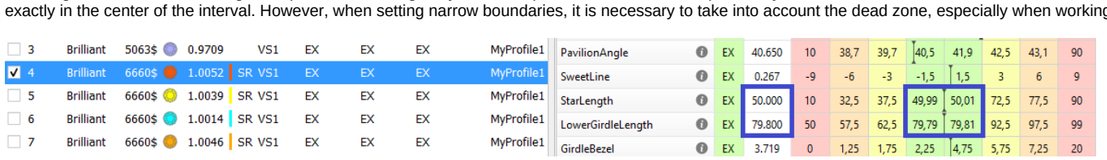


Facets	Element	Tier	Type	SubType	No.	Color	Alias
4	Crown		Half	Diagonal	1		Rename...
4	Crown		Half	Diagonal	2		Rename...
4	Crown		Star	Width			Rename...
4	Crown		Star	Length			Rename...
4	Crown		Corner				Rename...
72	Girdle						Rename...
4	Pavilion	2	Main				Rename...
2	Pavilion	1	Main	Width			Rename...
2	Pavilion	1	Main	Length			Rename...
4	Pavilion	1	Half	Width			Rename...
4	Pavilion	1	Half	Length			Rename...
4	Pavilion	1	Half	Diagonal			Rename...
4	Pavilion	1	Half	Diagonal	2		Rename...
4	Pavilion	2	Half	Width	1		Rename...
4	Pavilion	2	Half	Width	2		Rename...
4	Pavilion	2	Half	Length	1		Rename...
4	Pavilion	2	Half	Length	2		Rename...

Control absolute value azimuths for in-house cuts

In previous versions, for in-house cuts the algorithm 19. SmartRecut (Brilliant, Oval, AnyCut) controlled only the azimuths symmetry of the facets. But a change in the absolute value of azimuths could lead to a big loss of the solutions performance.
Therefore two parameters have been added to control the tolerance of azimuths from the initial values. More "narrow" MainAzimuthsToleranceModule is tuned for only Main facets. Less "narrow" OtherAzimuthsToleranceModule is tuned for other facets.





Precise fixation of parameters StarLength and LowerGirdleLength in SmartRecut (Brilliant)

StarLength and LowerGirdleLength are parameters that greatly affect the pattern of the stone, but practically do not affect the mass. Sometimes there is a need to get a specific average value for these parameters. Now you can do this by setting an interval of 0.02 length in MyRound. SmartRecut solutions will have the value exactly in the center of the interval. However, when setting narrow boundaries, it is necessary to take into account the dead zone, especially when working in Safe Boundaries mode. You can find out more information on the new documentation page **Recommendations on Boundaries for main GIA parameters**

Reports improvements

New report type - Rough Report

Objective

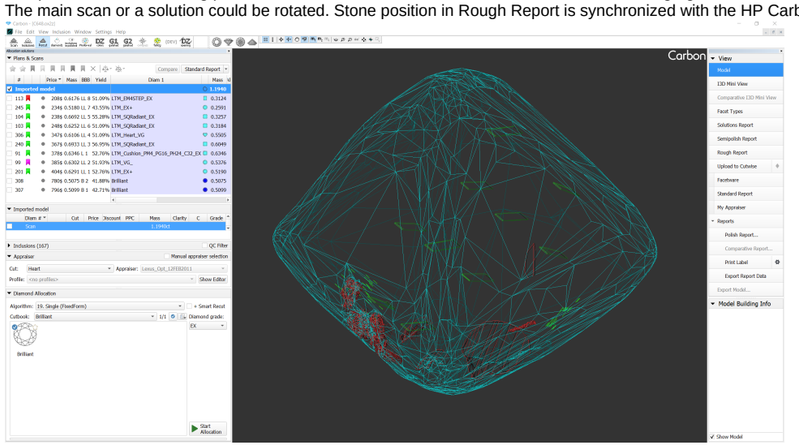
A manager receives a batch of stones, these each are in their own package. A Rough Report is printed in a small size and applied to a package with a stone.

The Rough Report is needed so that the manager can quickly check what was expected to do with the stone not opening its package.

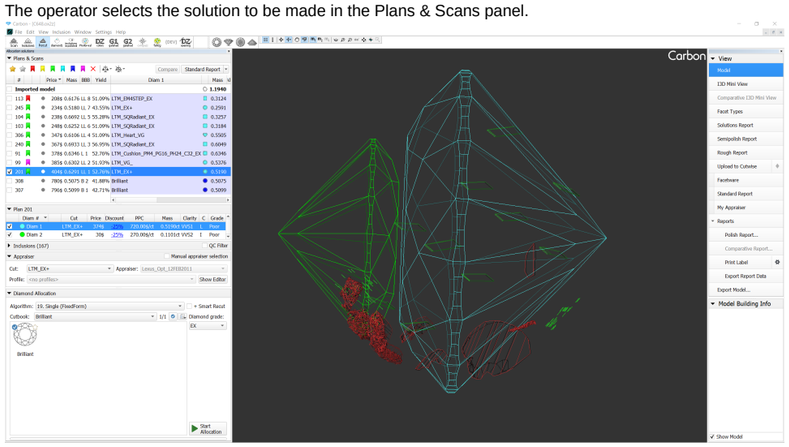
Controlled diamonds' parameters: weight, cut quality, appraisers, Crown and Pavilion angles, etc.

Creation of Rough Report

- An operator sets the starting position of the stone in the HP Carbon scene for further an image generation.
  The main scan or a solution could be rotated. Stone position in Rough Report is synchronized with the HP Carbon Scene.



- The operator selects the solution to be made in the Plans & Scans panel.



- The operator can select diamonds to be included into the report.
  All diamonds are shown in Rough Report by default. Diamonds could be added or removed in opened report it will be updated in this case.
  This is done using the context menu in the panel containing diamonds info for the current solution.

Allocation solutions

Plans & Scans

Compare | Standard Report

#	Price	Mass	BBB	Yield	Diam 1	Mass
Imported model						**1.1940**
113	208$	0.6176	LL	8 51.09%	LTM_EM4STEP_EX	0.3124
245	234$	0.5180	LL	7 43.55%	LTM_EX+	0.2591
104	238$	0.6692	LL	5 55.28%	LTM_SQRadiant_EX	0.3257
103	248$	0.6252	LL	6 51.09%	LTM_SQRadiant_EX	0.3184
306	347$	0.6106	LL	4 51.09%	LTM_Heart_VG	0.5505
240	367$	0.6933	LL	3 56.95%	LTM_SQRadiant_EX	0.6049
91	378$	0.6346	L	1 52.76%	LTM_Cushion_PM4_PG16_PH24_C32_EX	0.6346
99	385$	0.6302	LL	2 51.93%	LTM_VG_	0.5376
201	404$	0.6291	LL	1 52.76%	LTM_EX+	0.5190
308	780$	0.5075	B	2 41.88%	Brilliant	0.5075
307	796$	0.5099	B	1 42.71%	Brilliant	0.5099

Plan 201

Diam #	Cut	Price	Discount	PPC	Mass	Clarity	C	Grade
Diam 1	LTM_EX+	374$	-25%	720.00$/ct	0.5190ct	VVS1	L	Poor
Diam 2	LTM_EX+	30$	-25%	270.00$/ct	0.1101ct	VVS2	I	Poor

Inclusions (167)

Appraiser

Cut: LTM_EX+

Profile: <no profiles>

Diamond Allocation

Algorithm: 19. Single (FixedForm)

Cutbook: Brilliant

Brilliant

Start Allocation

Model color:

Add Diam 1 to Rough Report

Remove Diam 1 from Rough Report

Diamond Color

Estimate color grade

Export Model

Export Model...

Allocation

Fit to rough (Run Balloon)

Bound Swim (Vary Param)

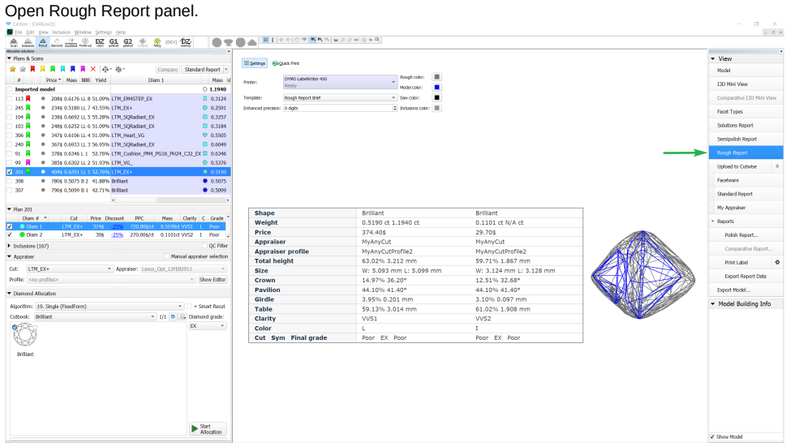
Bound Swim (Fixed Cut)

Bound Swim (Fixed Table and Cut)

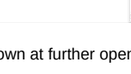
Register as new cut...

Add to allocation forms...

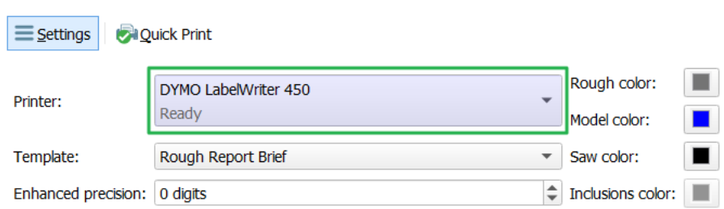
- Open Rough Report panel.



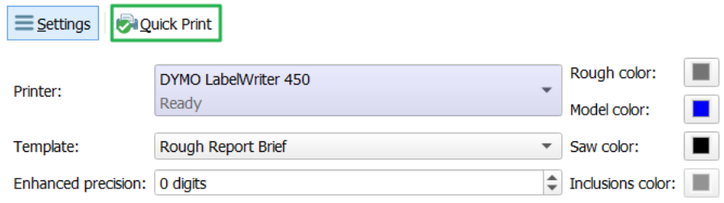
Shape	Brilliant	Brilliant
Weight	0.5190 ct 1.1940 ct	0.1101 ct N/A ct
Price	374.408	29.706
Appraiser	MyAnyCut	MyAnyCut
Appraiser profile	MyAnyCutProfile2	MyAnyCutProfile2
Total height	63.02% 3.212 mm	59.71% 1.867 mm
Size	W: 5.093 mm L: 5.099 mm	W: 3.124 mm L: 3.128 mm
Crown	14.97% 36.20°	12.51% 32.68°
Pavilion	44.10% 41.40°	44.10% 41.40°
Girdle	3.95% 0.201 mm	3.10% 0.097 mm
Table	59.13% 3.014 mm	61.02% 1.908 mm
Clarity	VVS1	VVS2
Color	L	I
Cut Sym Final grade	Poor EX Poor	Poor EX Poor



- Selection of a printer. The selected printer is saved in HP Carbon and will be shown at further openings of Rough Report.

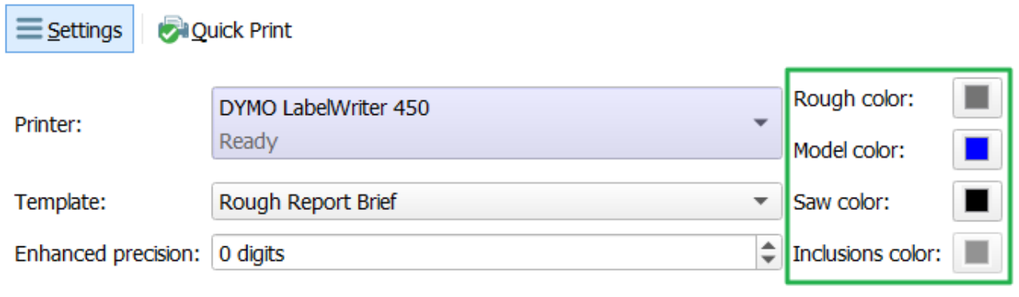


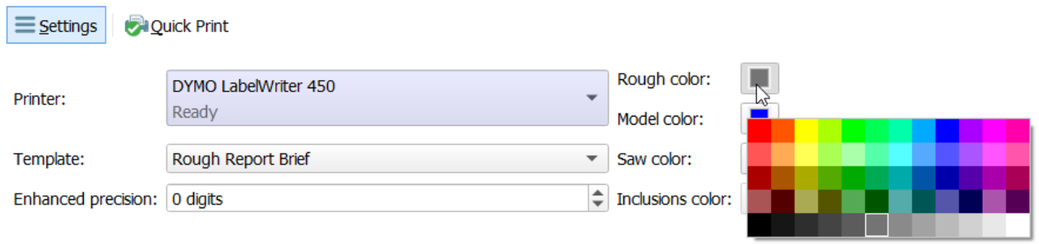
- Print the Rough Report.



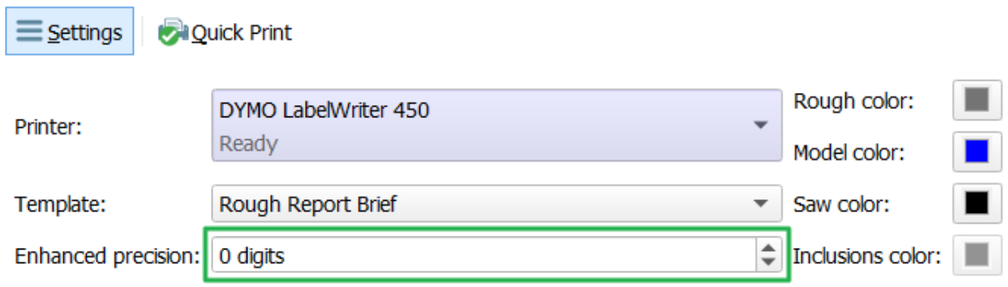
Rough Report features

The operator can change colors in Rough Report (Rough, Model, Saw, Inclusions). It will be updated at a color changing.





Also enhanced precision could be changed in the range [-3, 3] digits. The report will be updated at an enhanced precision changing.



All settings are saved in HP Carbon.

The Rough Report will be updated at selection of another solution.

Inclusions while aren't embedded in Rough Report images.

Illustrated HTML Report templates for many other cuts are available (besides RBC)

The convenient single-page reports in HTML format have been made for most types of cuts (as was previously done for RBC), so that the operator, without the need to use MS Word, could open the main parameters of the model on the screen on one page and transfer them to the clients/auditor/manager:

- Polished HTML Illustrated Report Step Cut;
- Polished HTML Illustrated Report Radiant;
- Polished HTML Illustrated Report Square Radiant;
- Polished HTML Illustrated Report Triangle;
- Polished HTML Illustrated Report Rounded Fancies;
- Polished HTML Illustrated Report Oval-Marquise.

These reports are located in "Polish Report..." for a specific type of cuts, for an example:

Examples of reports:
1) Illustrated HTML Report Step Cut

ILLUSTRATED REPORT FOR STEP CUT

Polished StepCut 15.03.2022

Model	2
Expert name	N/A
Expert code	N/A
Corrected mass, ct	2.30; 2.3074
Spread	0.25cb; 9.72 %
Extra Facet Girdle / Net	No

Width	Length	Ratio (L/W)	Diameter Minimum	Diameter Maximum	MSC
5.760 mm	10.657 mm	1.850	5.760 mm	12.114 mm	5.760 mm

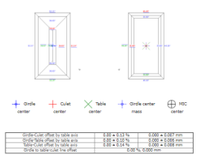
Total height	Crown height	Pavilion height	Table Width/Radius	Girdle	Culet length
3.744 mm 42.18 %	0.776 mm	2.880 mm	4.002 mm	0.180 mm	4.496 mm 40.60 %

Appraiser title	Lexus_Opt_12PEB2011
Overall cut quality	N/A
Symmetry appraiser title	Symmetry
Overall symmetry quality	N/A
Model building info	N/A

Color	
Clarity	
Polish	
Fluorescence	

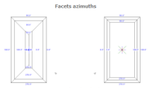
Parameter	Avg	Min	Max	Dev
Crown height, %	13.50	13.50	13.50	0.00
Pavilion height, %	46.55	46.55	46.55	0.00
Table width/diameter, %	69.49			
Table length/index, %	63.51			
Corner angle, degrees	4.95	4.95	4.95	0.00
Corner angle width, %	0.00	0.00	0.00	0.00
Corner angle length, %	0.00	0.00	0.00	0.00
Crown Main 1 height, %	4.05	0.00	8.10	8.10
Crown Main 2 height, %	2.70	0.00	5.40	5.40
Crown Main 3 height, %	N/A	N/A	N/A	N/A
Crown Corner 1 height, %	N/A	N/A	N/A	N/A
Crown Corner 2 height, %	N/A	N/A	N/A	N/A
Crown Corner 3 height, %	N/A	N/A	N/A	N/A
Pavilion Main 1 height, %	8.70	0.00	13.44	13.44
Pavilion Main 2 height, %	11.45	0.00	23.39	23.39
Pavilion Main 3 height, %	3.88	0.00	7.73	7.73
Pavilion Main 4 height, %	N/A	N/A	N/A	N/A
Pavilion Corner 1 height, %	N/A	N/A	N/A	N/A
Pavilion Corner 2 height, %	N/A	N/A	N/A	N/A
Pavilion Corner 3 height, %	N/A	N/A	N/A	N/A
Pavilion Corner 4 height, %	N/A	N/A	N/A	N/A
Crown Main 1 angle, °	46.20	46.20	46.20	0.00
Crown Main 2 angle, °	35.80	35.80	35.80	0.00
Crown Main 3 angle, °	N/A	N/A	N/A	N/A
Crown Corner 1 angle, °	N/A	N/A	N/A	N/A
Crown Corner 2 angle, °	N/A	N/A	N/A	N/A
Crown Corner 3 angle, °	N/A	N/A	N/A	N/A
Pavilion Main 1 angle, °	53.31	53.31	53.31	0.00
Pavilion Main 2 angle, °	39.63	39.63	39.63	0.00
Pavilion Main 3 angle, °	39.62	39.62	39.62	0.00
Pavilion Main 4 angle, °	N/A	N/A	N/A	N/A
Pavilion Corner 1 angle, °	N/A	N/A	N/A	N/A
Pavilion Corner 2 angle, °	N/A	N/A	N/A	N/A
Pavilion Corner 3 angle, °	N/A	N/A	N/A	N/A
Pavilion Corner 4 angle, °	N/A	N/A	N/A	N/A
Girdle facet angle, °	90.00	90.00	90.00	0.00

Facets angles



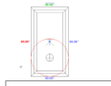
Girdle-Culet offset to table axis	0.00 ± 0.13 %	0.000 ± 0.007 mm
Girdle-Table offset to table axis	0.00 ± 0.13 %	0.000 ± 0.008 mm
Table-Culet offset to table axis	0.00 ± 0.14 %	0.000 ± 0.008 mm
Girdle to table-culet line offset		0.00 %; 0.000 mm

Facets azimuths

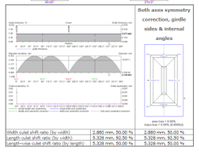


Facets heights (%)

Girdle facets angles & MSC

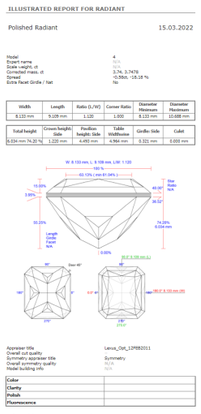


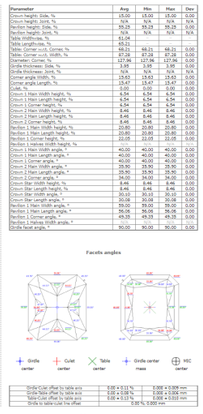
Girdle facets azimuths & MSC



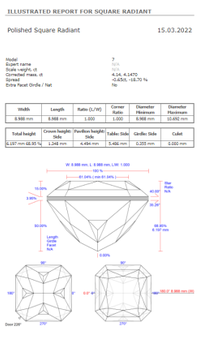
Width culet shift ratio (by width)	2.880 mm, 50.00 %	2.880 mm, 50.00 %
Length culet shift ratio (by width)	5.328 mm, 50.00 %	5.328 mm, 50.00 %
Length-wide culet shift ratio (by length)	5.328 mm, 50.00 %	5.328 mm, 50.00 %

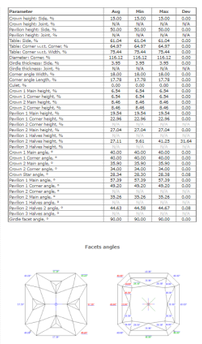
2) Illustrated HTML Report Radiant



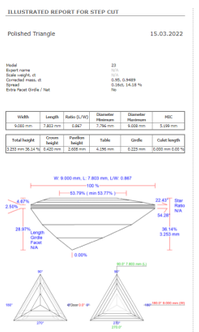


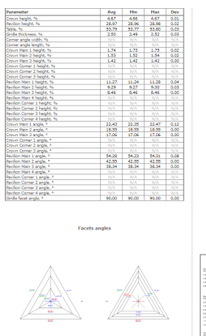
3) Illustrated HTML Report Square Radiant



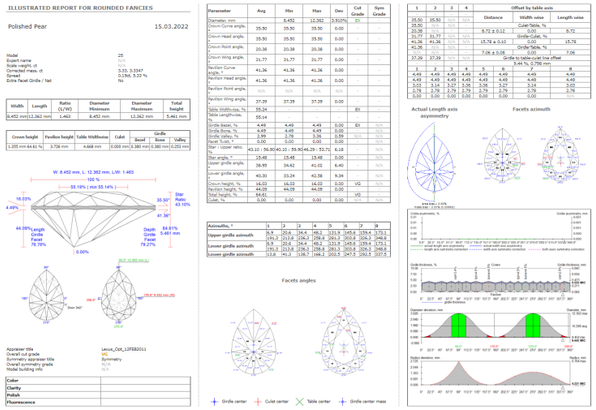


4) Illustrated HTML Report Triangle

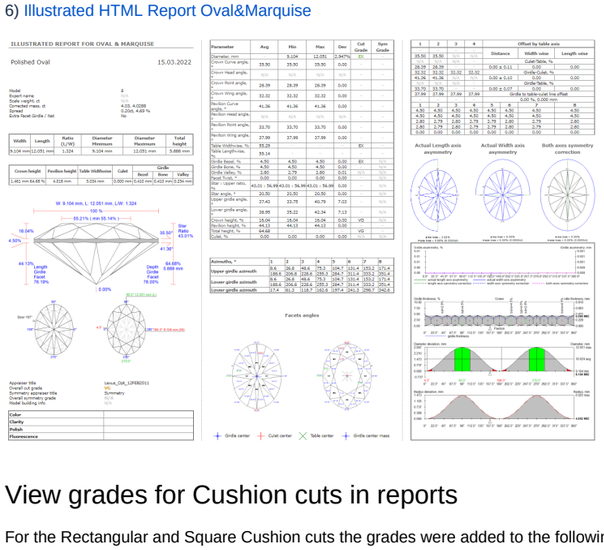




5) Illustrated HTML Report Rounded Fancies



6) Illustrated HTML Report Oval&Marquise



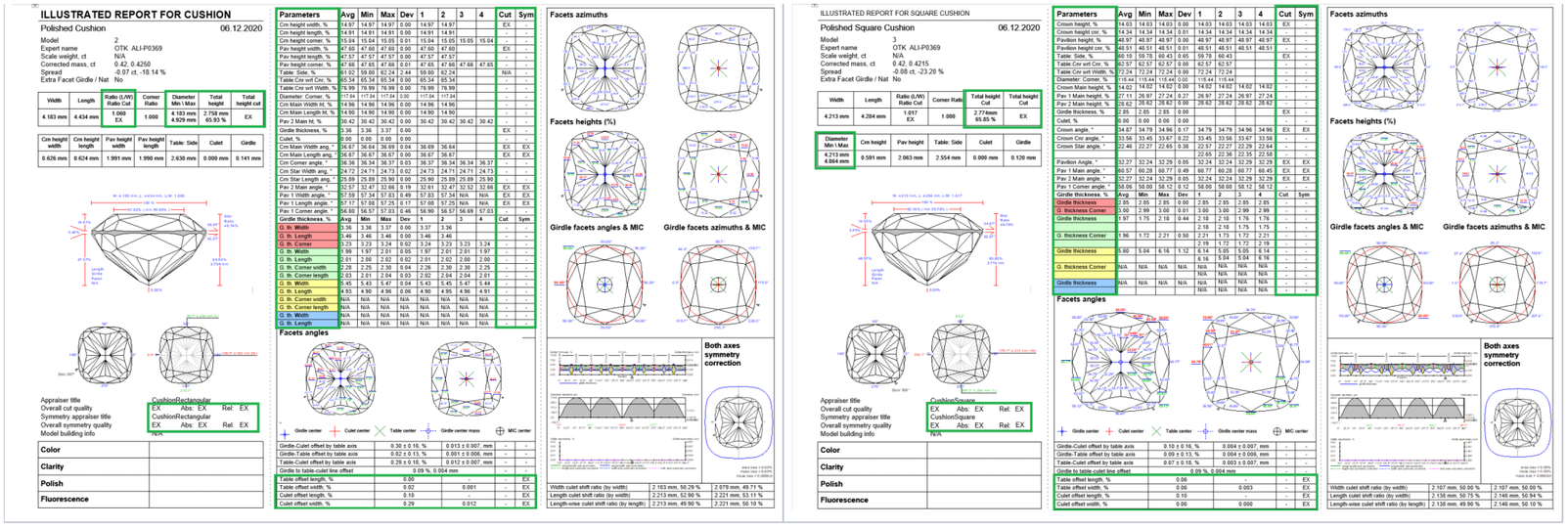
View grades for Cushion cuts in reports

For the Rectangular and Square Cushion cuts the grades were added to the following reports:

- Standard report
- HTML Illustrative report
- RTF Illustrative report
- Label report

Some minor layout changes were caused by this change (shorten parameter names and display positions.

Rectangular Cushion	Square Cushion

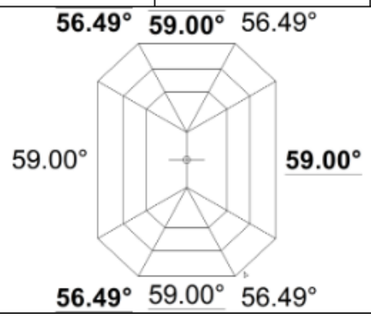


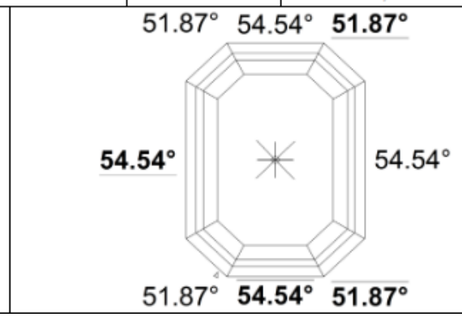
View with and length for lengthened cuts

Information about the width, length, and girdle ratio is added to:

- Label and Semipolish reports for all cuts.
- Standard reports for all cuts except Brilliant.

Stone ID: Project R01			StepCut	05.10.2021 16:32		HPO11+	
Width	5.595 mm		**Lenght**	7.330 mm	**Total weight**	**1.53 ct**	
Parameter	**Avg**		**Min**	**Max**	**Dev**	**Cut Grade**	**Sym Grade**
Girdle Ratio	1.310		–	–	–	N/A	–
Crown angle, °	54.54		54.54	54.54	0.00	N/A	N/A
Pavilion angle, °	59.00		59.00	59.00	0.00	N/A	N/A
Table Widthwise, %	3.632 mm	64.91 %	–	–	–	N/A	–
Table Lengthwise, %	5.366 mm	73.21 %	–	–	–	–	–
Crown height, %	0.796 mm	14.23 %	14.23	14.23	0.00	N/A	–
Pavilion height, %	2.788 mm	49.82 %	49.82	49.82	0.00	N/A	–
Girdle bezel, %	0.249 mm	4.45 %	4.45	4.45	0.00	N/A	–
Total height, %	3.833 mm	68.50 %	–	–	–	N/A	–
Table offset Length, %	0.00		N/A	Width, %	0.00	–	N/A
Culet offset Length, %	0.00		N/A	Width, %	0.00	–	N/A
						N/A	**N/A**
Table Processing parameters							
Table allowance before	N/A mm			incline	39.69 °		
Reference Line parameters							
Marking for Crown	C8 before		N/A mm		C8 after	N/A mm	
Marking for Pavilion	P8 before		N/A mm		P8 after	N/A mm	





Algorithms of allocation

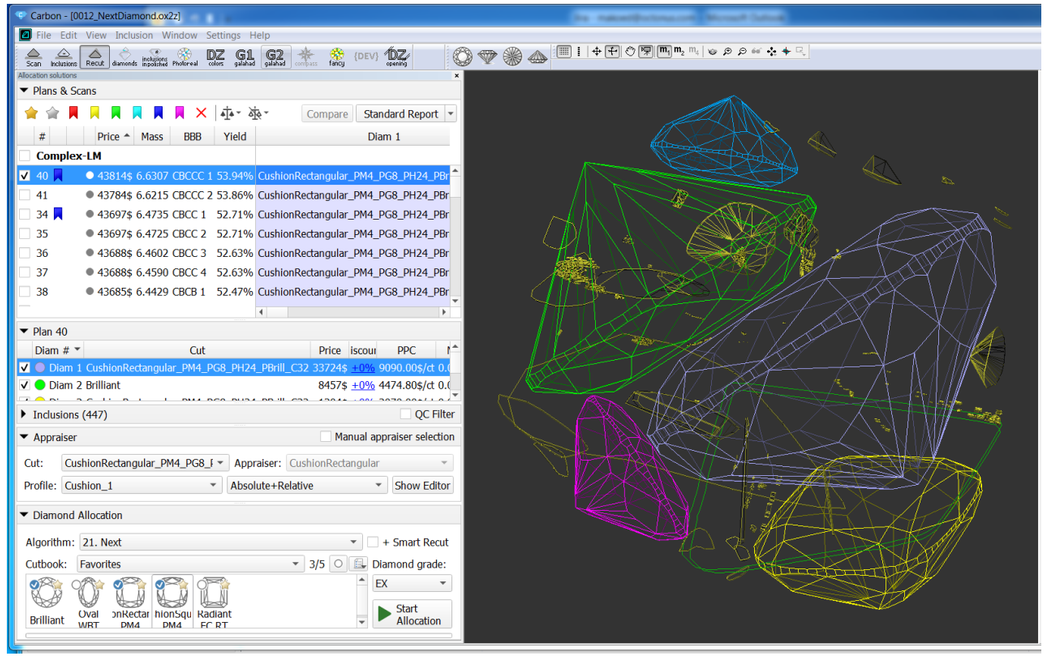
New algorithm "21. Next" for allocation

To add one more diamond to already created solution you can use algorithm "**21. Next**". The next diamond will be added in maximal possible free zone of rough volume which is not occupied by created before diamonds. A position of existing diamonds is not changed.

Important! Algorithm **"21. Next"** during work takes into account allocation forms of Cut that allows to find better solutions for in-house cuts. Note that algorithm **Find Next Diamond** in Helium Rough / Pacor Client doesn't work with many allocation forms so we recommend to use **"21. Next"** and HP Carbon to find next diamond.

Before run of algorithm please make sure that you select one or several solutions where you want to add one more diamond and cut types from **Cutbook**.
There is possible to create solutions composed of 2, 3, 4 and so so diamonds.

There is a sample of algorithm "21. Next" work:



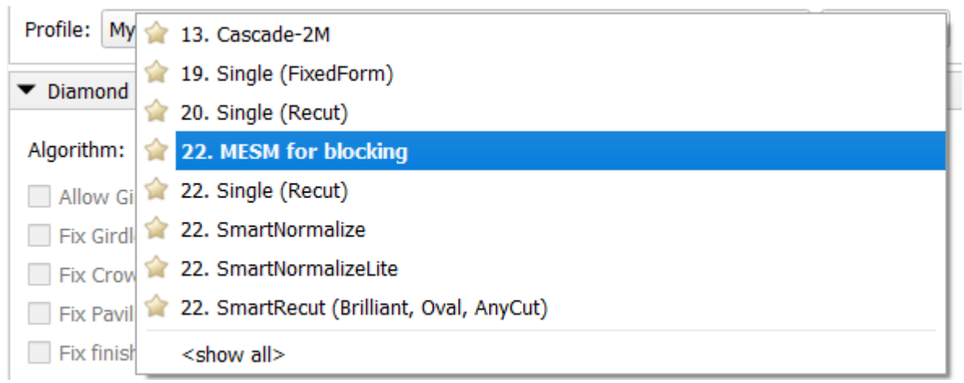
0012_NextDiamond.ox2z
Sol. #40 contains 5 diamonds, it was allocated sequentially from sol. #24, 30, 34.

New algorithm "22. MESM for blocking"

We have implemented a new algorithm: Minimum Enclosing (Encompassing) Symmetrical Model - "22. MESM for blocking"

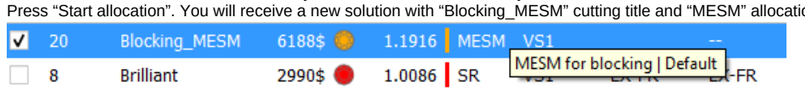
The algorithm finds the Minimum Enclosing Symmetrical Model. Then inflates this model by allowances from presets. Then it offsets 0-3 adjacent faces on the pavilion and on the crown, which are in almost perpendicular directions. From these faces, you can determine the orientation of the model after blocking in the space of the SmartRecut solution.

New algorithm is available in the allocation algorithms as a new line "22. MESM for blocking":



The usage of the new algorithm is very similar to “20. MEC for round bruting “:

- Choose "22. MESM for blocking" algorithms
- Select the SmartRecut solution for which you want to obtain enclosed symmetrical model
- Press “Start allocation”. You will receive a new solution with “Blocking_MESM” cutting title and “MESM” allocation mark:



The MESM algorithm is adjusted via presets

Appraiser Editor

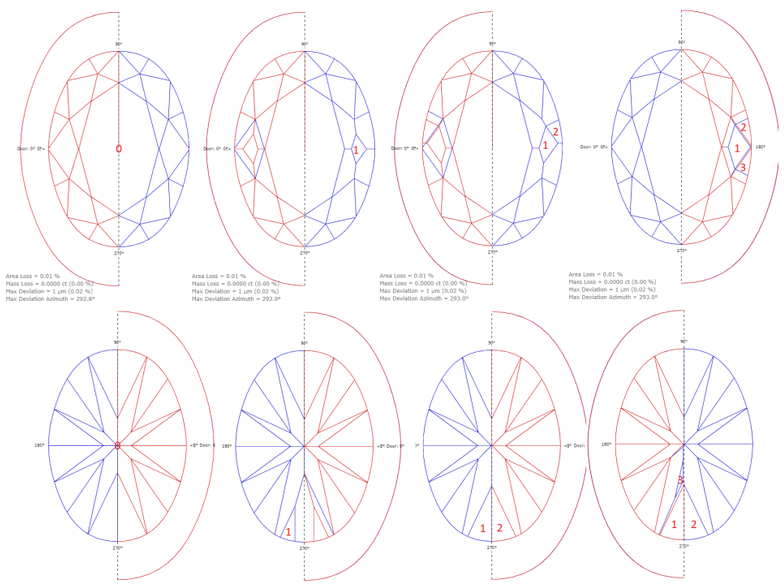
MyOvalPerformanceWare
Profile: **OvalPW2**

Hide Presets

Proportions | Symmetry | Other | Discounts

Parameter	Grade	Value	1.NoFacetsForRecognition	2.OneFacetForRecognition	3.TwoFacetsForRecognition	4.ThreeFacetsForRecognition
Shift			10	10	10	10
TimeLimit			3	3	3	2
DistanceLimit			10	10	10	10
EquableGirdle			10	10	10	10
Custom Facet Marking Using			1	1	1	1
AdjacentFacetsAnglesEveryMin			1	1	1	1
MESM Girdle facets allowance, µm			20	20	20	20
MESM Crown & Pavilion facets allowance, µm			60	60	60	60
MESM Special facets for recognition			0	1	2	3

- There are two allowances for Girdle facets and for Crown & Pavilion facets. It measured in microns. If necessary, they can be set to zero.
- "MESM Special facets for recognition": in any case, on the crown and on the pavilion, one set of close facets selects in perpendicular directions. This parameter specifies the number of facets in sets

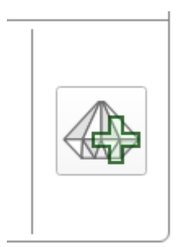


Methods of model building

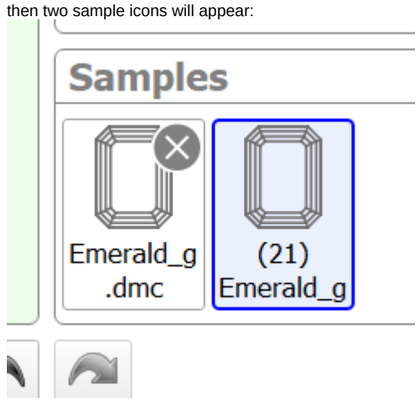
Method “Sample21”: new Model Building method by Sample

“Sample21”: new Model Building method with Sample.

To use this new building method you need to add a sample as usual with "Add sample button":

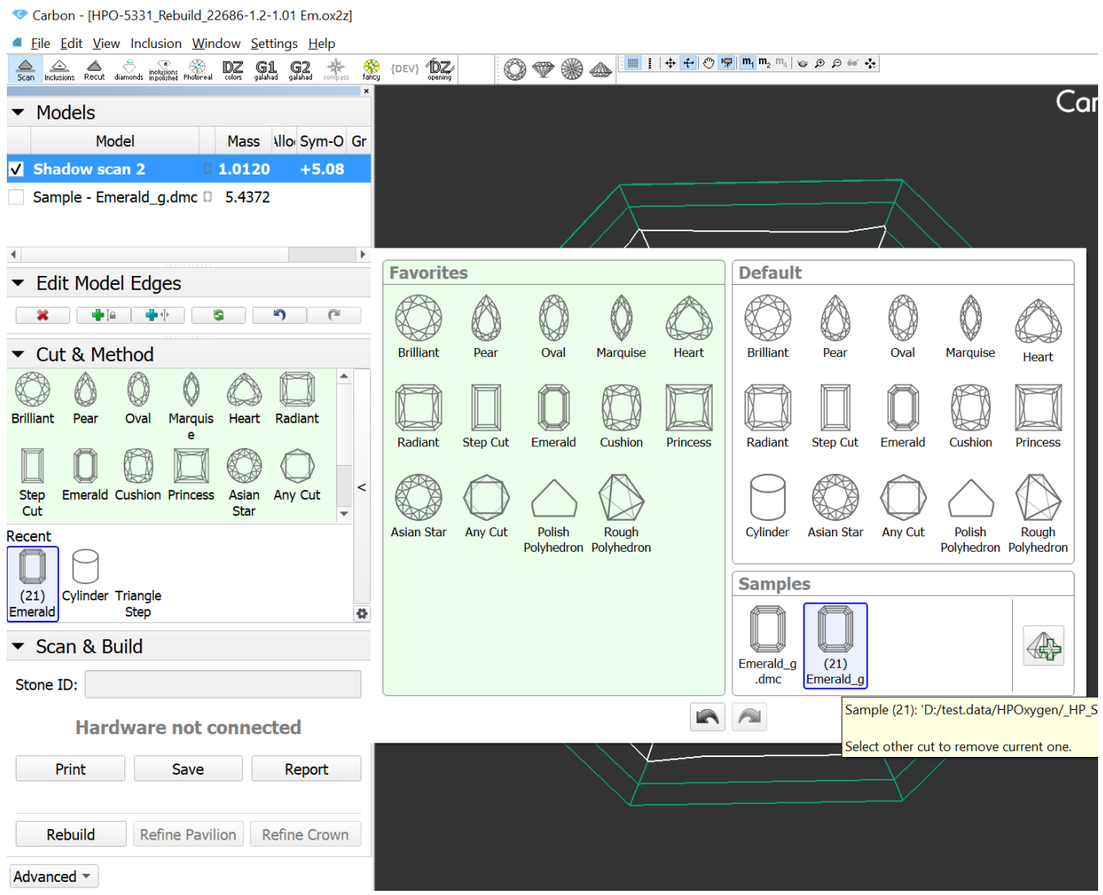


then two sample icons will appear:



One is for classic Sample building method and another with "(21)" marker is for Sample21 building method.

Choose "(21)" -marked sample to use Sample21:

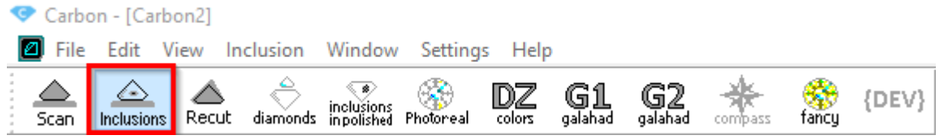


Inclusions mode

Now you can plot cavities manually on your model using the new

Inclusions mode. To switch to the **Inclusions** mode, on the top panel, click

Inclusions.



The following scenarios can be implemented in this mode:

- Plot cavities in live mode
- Plot cavities via photo sets
- Quickly prepare quality photo(s) of your rough

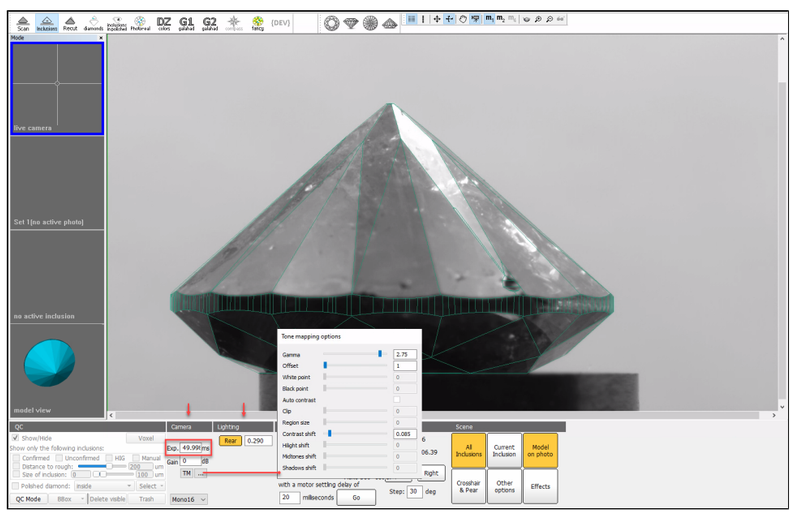
See details in the sections below.

Plot cavities in live mode

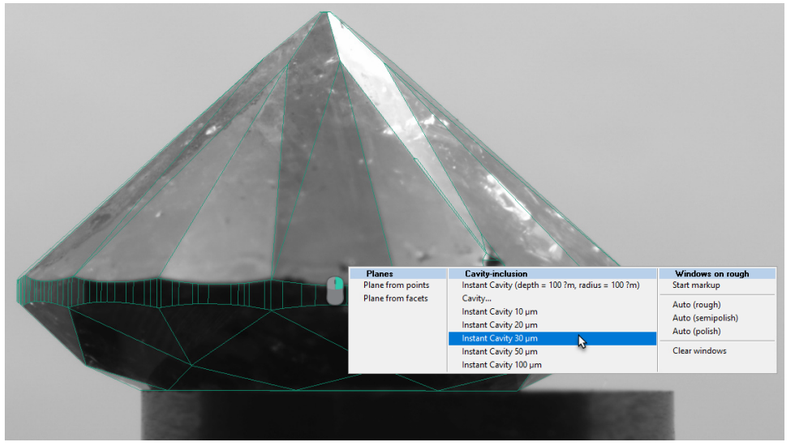
To plot cavities in live mode:

1. Prerequisites: Shadow scanner is connected
2. Scan your semipolished diamond, then go to **Inclusions** mode.
3. In your scanner (hardware), change the lighting.

4. In the **Inclusions** mode, "live camera" **Mode**, adjust the **Camera** (specifically, exposure **Exp.**) and **Lighting** settings to have the best view of your diamond.



5. Rotate your diamond via mouse drag, and then above the "live camera" view of it, for your model, add cavities and adjust facets using Boundary Plane Tool.



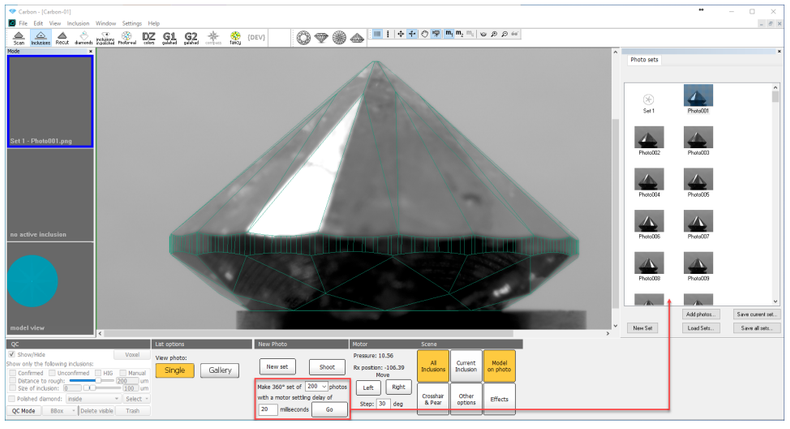
6. Save your project.

Plot cavities via photo sets

> **Note**
>
> In the following description, 2 operators are acting - this is optional, all the activities described may be performed by the same operator.

To plot cavities via photo sets:

1. Operator 1:
2. Prerequisites: Shadow scanner is connected on the first stage (not needed on the second)
3. Scan your semipolished diamond, then go to **Inclusions** mode.
4. In the **Inclusions** mode, "live camera" **Mode**, you adjust the **Camera** and **Lighting** settings to have the best view of your diamond.
5. Make a new 360° photo set.



6. Save your project along with the photo set and send them to Operator 2.
7. Operator 2:
8. In HP Carbon, open the project, go to **Scan** mode.
9. On the right panel, use the **Photos** section to open the photo set.
10. Go to **Inclusions** mode, use photo **Mode**.
11. Rotate your model via mouse drag, and then above its "lifelike" view, for your model, add cavities and adjust facets using Boundary Plane Tool.
12. Save your project.

Quickly prepare quality photo(s) of your rough

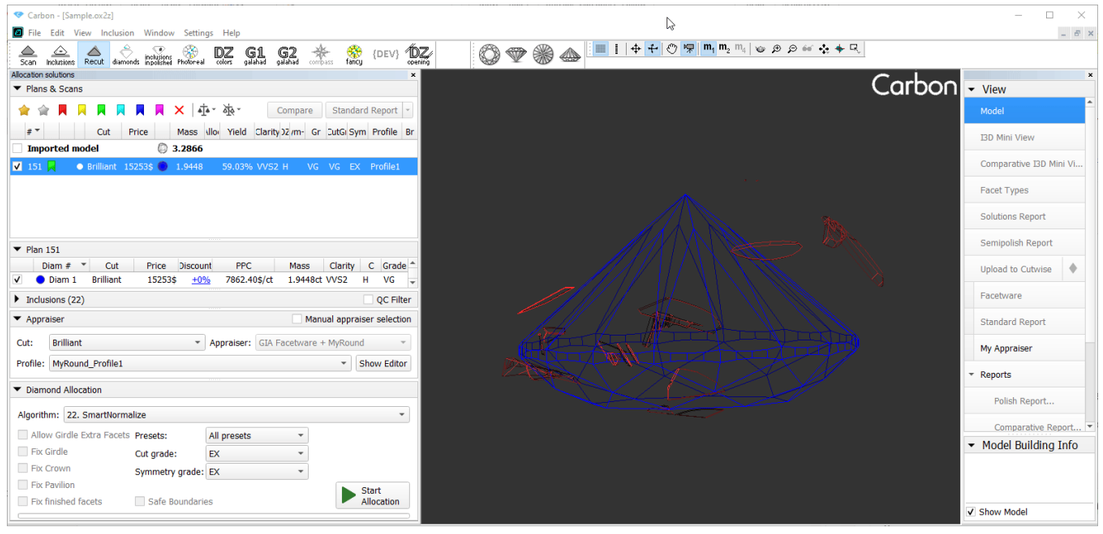
To quickly prepare quality photo(s) of your rough:

1. Prerequisites: Shadow scanner is connected
2. Go to **Inclusions** mode.
3. In the **Inclusions** mode, "live camera" **Mode**, you adjust the **Camera** and **Lighting** settings to have the best view of your rough.
4. Shoot any number of photos or photo sets.

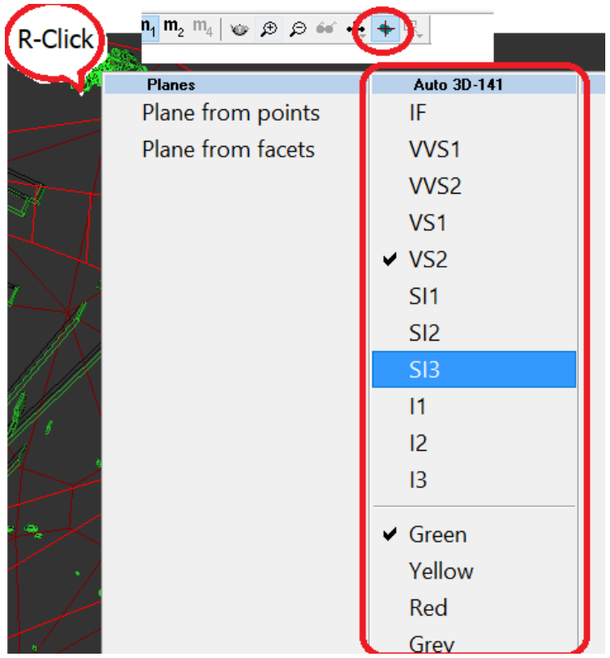
5. Save photo sets to disk.
6. If necessary, use any tool to convert series of images into a video for a "motion" presentation of your rough.

Handy change of clarity or status of inclusions from scene

There is option to change clarity or status of inclusions from scene by two clicks:



1. Go to "Recut" mode.
2. Activate tool of inclusion selection in the main top menu of program.
3. Right click on inclusion and you will see context menu where you can tick clarity and optimization status (color of inclusion - green. yellow, red, grey)



Holder replacement in a scanner

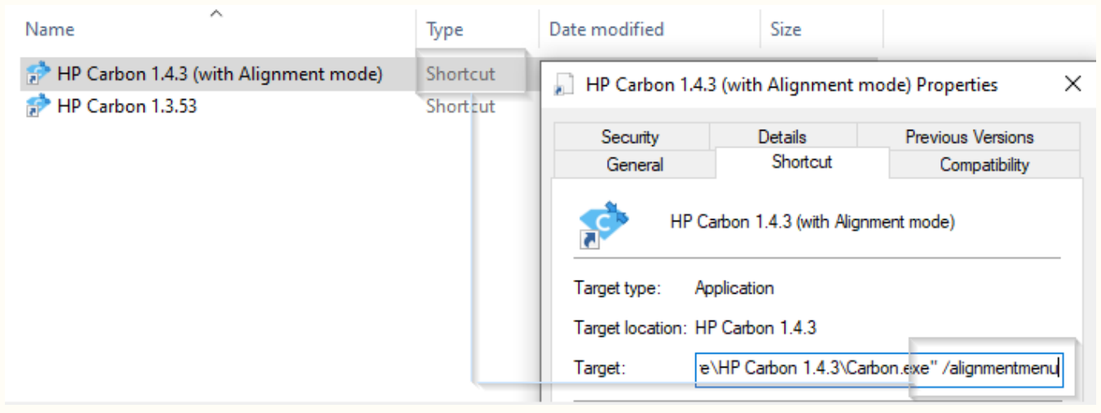
Holder deterioration requires it's replacement sometimes to get correct results of scanning. Now this procedure is accessible for users with special "Alignment" license bought from supplier.

You can order brand-new holders from scanner supplier too.

A procedure of holder change is described in **Manual about holder change**.

⚠ To use this functionality all the conditions should be met:

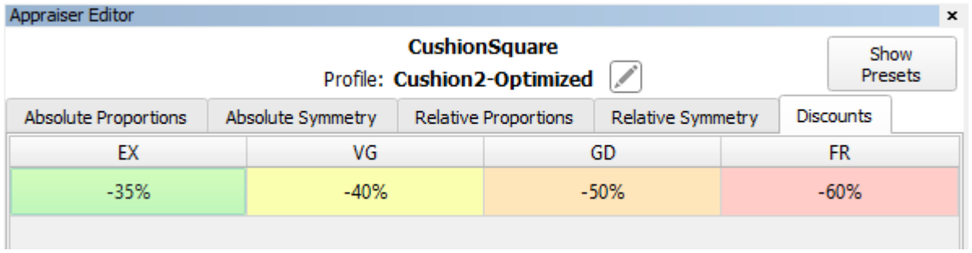
- You should use the system with HASP key with "Alignment" option,
- The system should be launched by the shortcut of Carbon.exe with the "/alignmentmenu" flag.



Cut Quality groups discounts

There are price discount for cut quality groups defined in appraiser. Initial discount that we provide "from a box" may not correspond actual market demand and specific customer needs.

There is a new **Discount** tab to edit discounts for Cut Quality groups (EX, VG, GD etc.) in **Appraiser Editor** panel:



Fancy Color workflow improvements

> ⚠ The below functionality is available only with product/license "FancyColor" bought from supplier and activated in your HASP key.

OctoNus library with cuts optimized for color performance

There is a library of specially designed and optimized for enhanced fancy color performance Goodwin cuts:

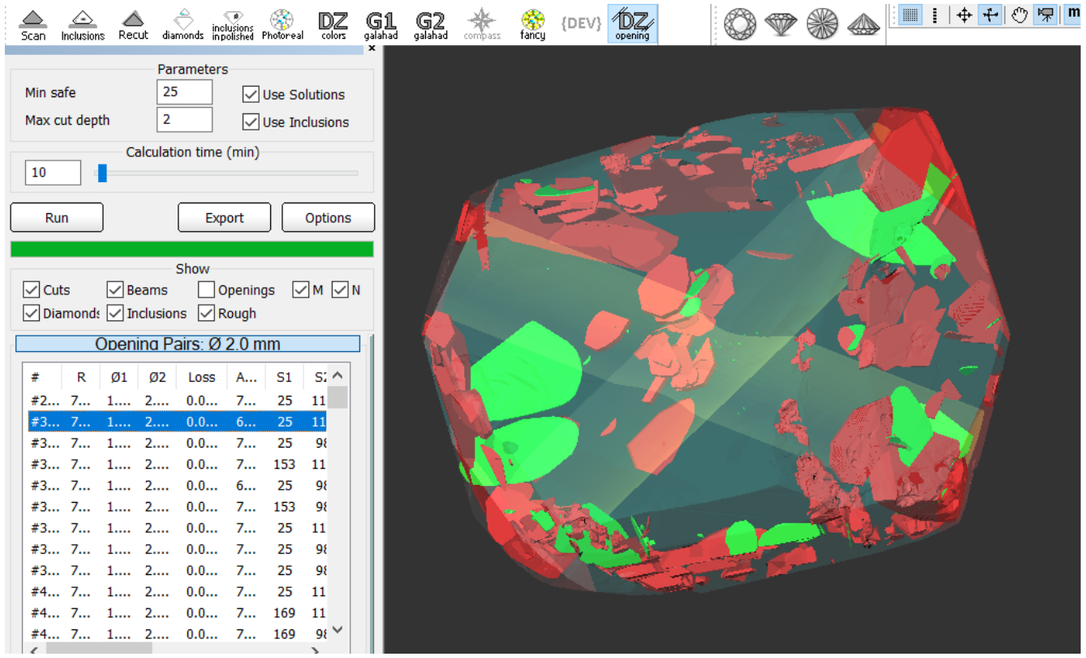
Cushion_FC_RT1_1_EX_Oct2021G, Cushion_FC_RT1_2_EX_Oct2021G, Oval_FC_EX_Oct2021G, Pear_FC_EX_Oct2021G, Radiant_FC_EX_Sep2021G, Radiant_FC_RT_Oct2021G

Every cut in the library is packed with a protected set of allocation forms and preliminary tuned appraiser. Effective set of optimized allocation forms is especially important for fancy color diamond allocation.

Spectrum opening calculation

Since HP Carbon 1.4 you can use a mode for calculation pairs of parallel windows or "openings" required for absorption spectrum measurement.
There is "opening" button in the top toolbar:

The function of the Openings mode is similar to former "Oxygen DZ" software.

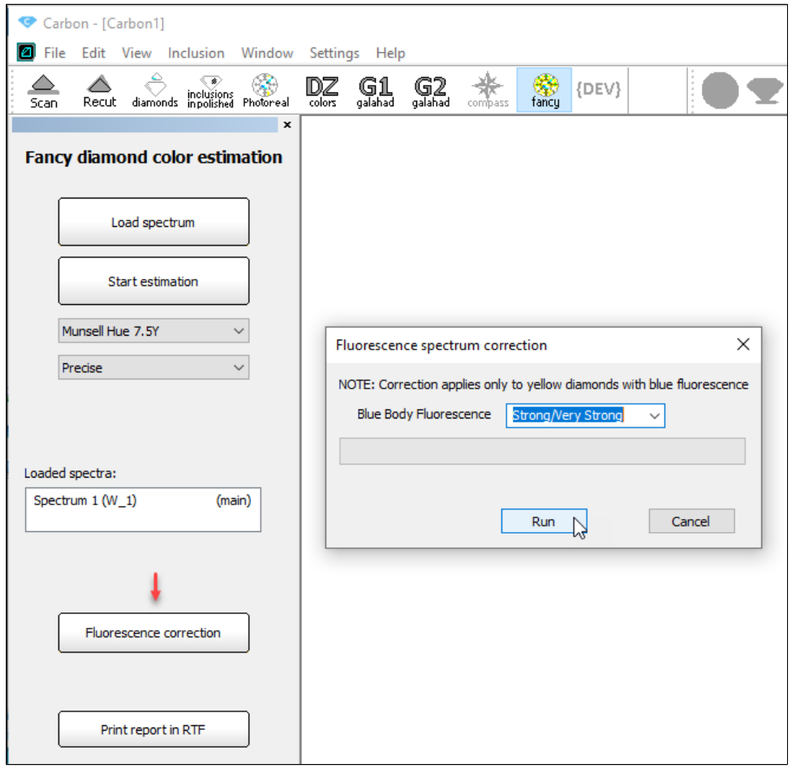


Get corrected color estimation for diamonds with fluorescence

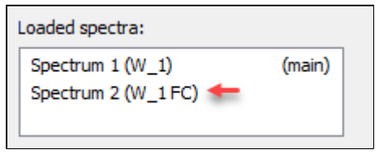
For the stones with the fluorescence, for the Fancy diamond color estimation, you are now able to get the estimation corrected in accordance with the fluorescence effect level.

⚠ Correction can only be applied to the yellow diamonds with the blue fluorescence.

1. Click **Fancy**.
2. Click **Load Spectrum**, import your absorption spectrum from a file.
3. Click **Fluorescence correction**. The **Fluorescence spectrum correction** dialog is displayed.
4. In the dialog, from the **Blue Body Fluorescence**, select the level of fluorescence, then click **Run**.



The calculation starts, as soon as it finishes, to the **Loaded spectra** list, the corrected spectrum is added.



Galahad mode - Generate Faceting Stage with facets of united type

Since version 1.4.9 during generation of Faceting Stage in ***G1 (Galahad)*** mode operator can select all facets of one united type without separation to subtypes. For example, operator can select all facets of Crown Main or Pavilion Main facets simultaneously .

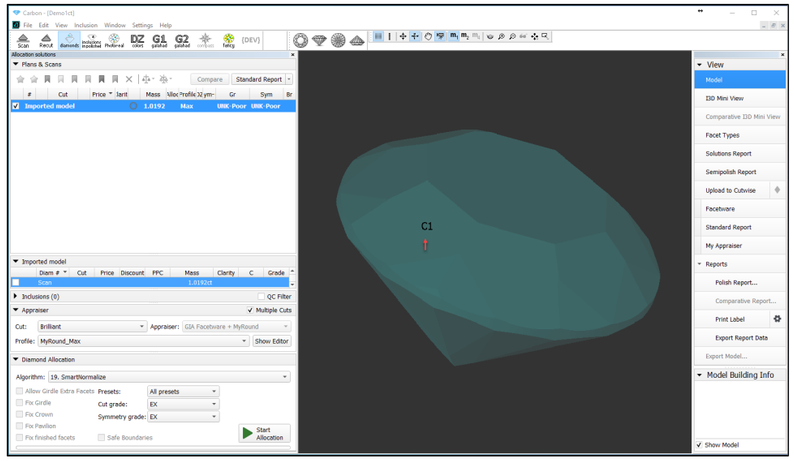
Thera are types added to list of facet types which combine subtypes and numbers. For example, for Oval Cut type Crown Main has 3 subtypes: Wing, Point, Curve. Operator can select either one of subtypes or common typ Crown Main:

Checking of Facet Types presence is added to ***Generate Next Stage*** panel of ***G1 (Galahad)*** mode:

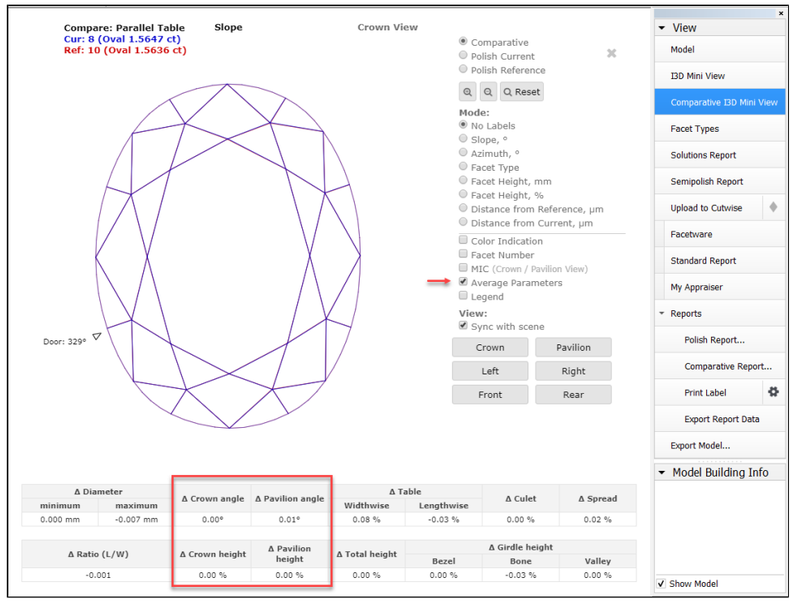
Fixed problems and improvements

The following fixes for the known problems and improvements are implemented:

- Now you can view the first facet of the stone right in the Scene (marker is added).

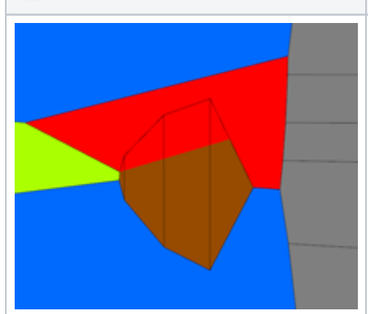
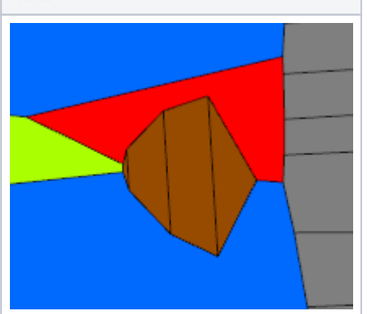


- In **Comparative I3D Mini View**, for **Average Parameters**, some deltas were calculated incorrectly - now this is fixed.



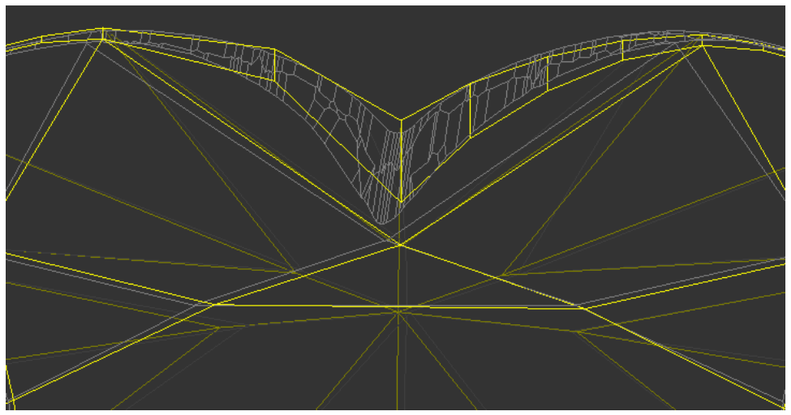
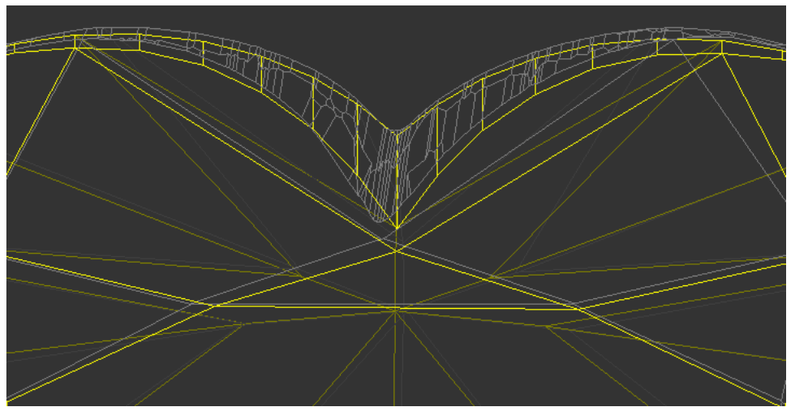
- In **Facet Types**, the way of displaying non-convex facets is fixed.

  Before the fix, some problems with displaying of such facets could occur:

Was	Now
	

- A perfect square cut has equal "Table along Width" and "Table along Length". Previously, only the "Table Widthwise" ("Table along Width") value was controlled in the appraiser "SquareCushion" by Absolute / Relative Proportions Table parameters. "Table Symmetry" parameter has been added to appraiser "SquareCushion" to control "Table along Length" value.
- Algorithm Smart Normalize had different problems with Heart grooves. Algorithm Smart Normalize enhanced for Heart Cuts.

Example:

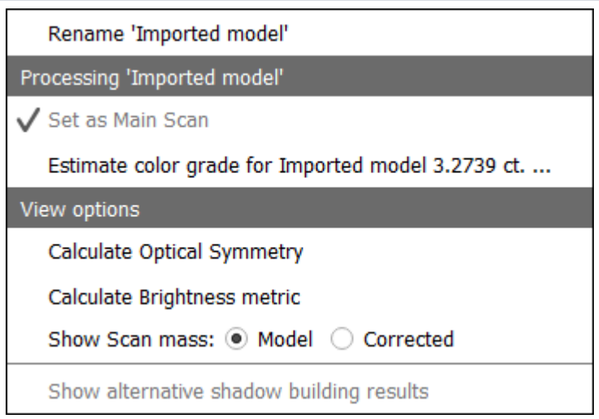
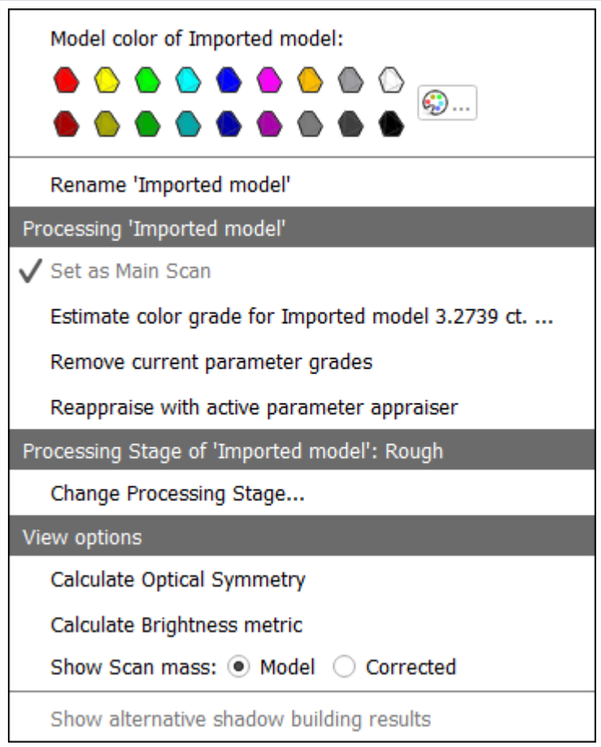
Was	Now
	

- The DZ color estimation in some cases froze the system because the rough scans were mistakenly treated as semipolished. Now:
  - the scans have the **Processing Stage** parameter (Rough - Saw - Bruted - Semipolished - Polished) and DZ color estimation never starts for Rough - Saw - Bruted.
  - the mechanism of automatic detection of the **Processing Stage** is improved

  ...which solves the "freeze" problem for most cases. In rare cases when automatic detection of **Processing Stage** is not correct, it can be changed manually (context menu of the scan > **Change Processing Stage**).

- For projects with multi-diamond solutions, in the context menu of a scan, some items (for example, **Processing Stage**) were missing - now this is fixed.

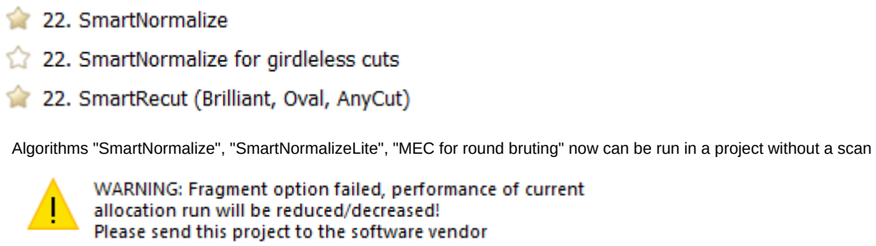
  Elements were missing when clicking on some cells.

Was	Now
	

- **Contrast of Inclusion** (Faint, Slight, Medium, Dark, Very Dark) for visualization can be now specified in HP Carbon to have correct visualizations of Inclusions in photoreal media generation in Cutwise.
- Improvement of refinement algorithm for building of models in HP Crown Reflect scanner. This improve the accuracy for some semi-RBC models.
- In **I3D Mini View** Report now slopes of girdle facets are displayed in the range [0, 180] degrees. Before the range was [0, 90] degrees.
  Slopes of other facet types are still displayed in the range [0, 90] degrees.

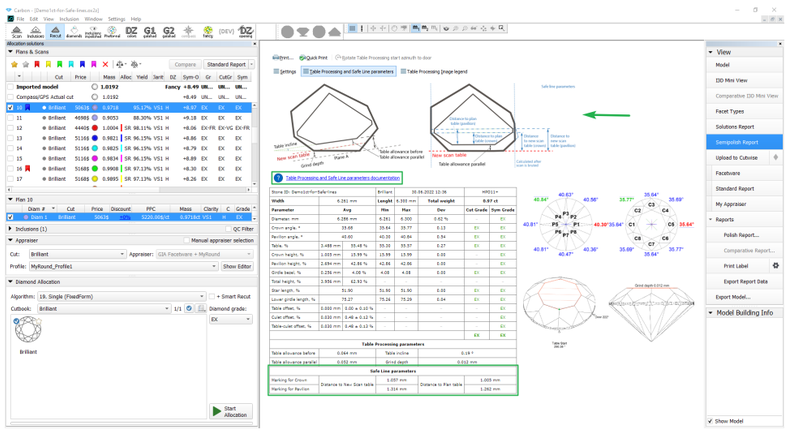
Was	Now

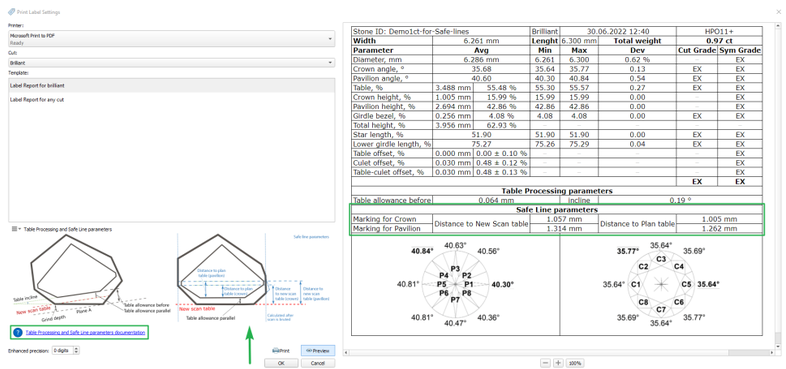
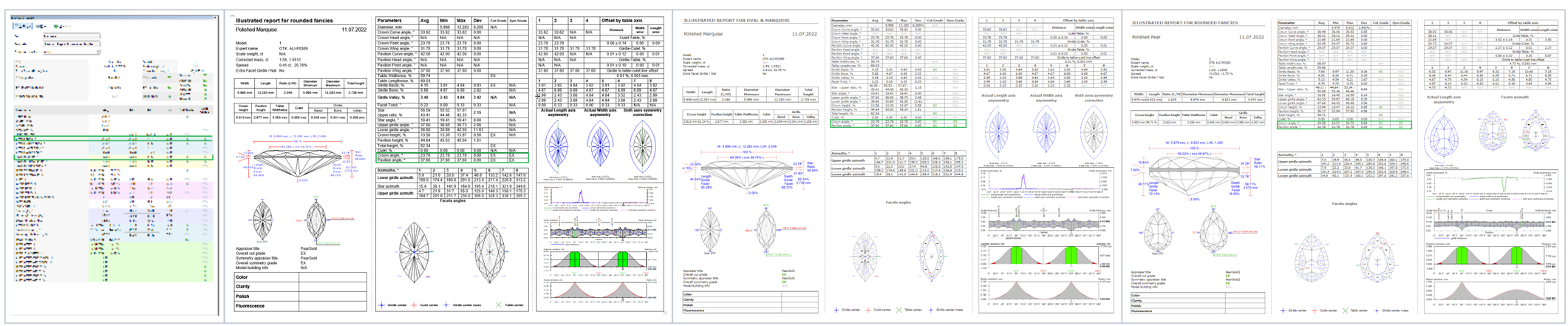
- The algorithm "SmartNormalizeLite" is renamed to "Smart Normalize for girdless cuts" to avoid improper or unrelated usage of this algorithm.SmartRecut algorithms names (year of version) are updated in GUI.



- Algorithms "SmartNormalize", "SmartNormalizeLite", "MEC for round bruting" now can be run in a project without a scan model. In addition, for these algorithms, a warning will never appear:

- Fixed bug with 'N/A' values for Crown Main Width/Length and Pavilion Main Width/Length parameters in the Full report for steps cut template
- Fixed bug with different girdle marking data in reports and in Galahad1 mode:
  - Reference Line parameters are replaced with Safe Line parameters in Semipolish and Label Reports.
  - The picture described Safe Line parameters is updated in Semipolish and Label Reports.
  - The associated documentation Table Processing and Safe Lines Parameters is updated





- Reference Line and Safe Line documentation is updated with information about *Safe line: Distance to scan table*, *Safe line: Distance to plan table*, *Reference line: Distance to scan table*, *Reference line: Distance to plan table* parameters calculation.
- GIA Symmetry GD|FR limits updated according to actual data
- SmartNormalize doesn't delete facets in .asc models that are formally cavities
- Crown angle and Pavilion angle parameters are added for rounded fancy and oval & marquise reports: