



Release Notes

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Bug Fixes

LightTools 4.0 Service Release 1 (SR1) contains numerous bug fixes, as well as a variety of enhancements. Two of the bug fixes, described below, are especially important to note and to implement by applying this service release.

- **Ray Tracing:** This service release fixes a bug that caused a substantial slowdown in ray tracing speed. The bug affects all users who use a green (parallel port) dongle as a *LightTools* security device. If you use a green dongle as your *LightTools* security device, we encourage you to apply *LightTools* 4.0 SR1 as soon as possible.
- **Reflective Scatter Model (non-Lambertian):** This service release also fixes a bug that affects some models with reflective scattering surfaces. In previous versions, when rays were incident from a material with an index of refraction greater than 1, *LightTools* scaled the scatter distribution using the refractive index of the material. With this fix, when a ray is incident on a reflective scattering surface, the ray is reflected using a distribution that is independent of the material the ray is in. (Transmissive scatter models and models in which rays are scattered from a material with an index of 1 are not affected by this bug.)

Enhancements

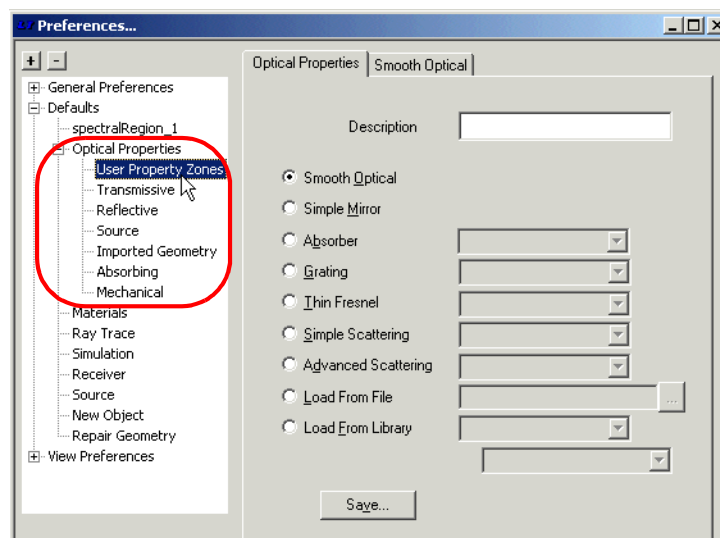
Enhancements to the *LightTools* product are described in the following sections.

New Preference Options

On the Preferences dialog box, new options under the Defaults heading allow you to control the default values for materials and optical properties of elements you will be creating in your *LightTools* session.

Additional Options for Optical Properties Defaults

Seven subheadings were added under the Optical Properties heading on the Preferences dialog box, as shown in the following figure.



Dividing Optical Properties default settings into separate tabs allows you to vary the default values for each of the surface types, as described below.

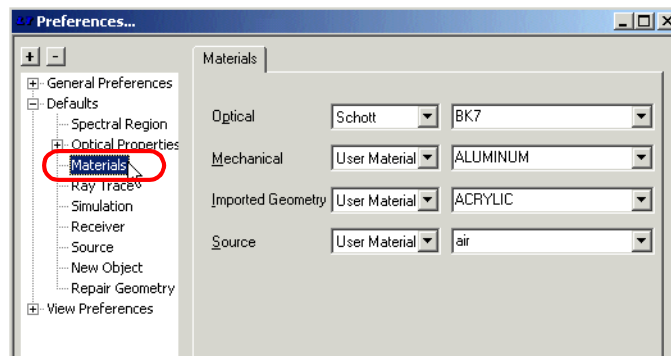
- **User Property Zones** for newly created property zones. This replaces the (only) default Optical Properties option in the previous *LightTools* release.
- **Transmissive** for the front and rear surfaces of lenses and the transmissive surfaces of other optical elements.
- **Reflective** for the front surfaces of new mirrors and the reflective surfaces of prisms.
- **Source** for all surfaces of new light sources.
- **Imported Geometry** for all surfaces of all objects created from a new import of SAT, IGES, STEP, or CATIA formats.
- **Absorbing** for edge and flat surfaces of new lenses, the end cap surfaces of new prisms, etc.
- **Mechanical** for all surfaces of new mechanical elements.

New Default Page for Materials

The Materials page, displayed when you click Materials under the Defaults heading on the Preferences dialog box, allows you to specify the catalog and material to be used as a default when you create new elements of the type listed below.

- Optical -- for lenses, prisms, or other elements created using the buttons on the Elements palette
- Mechanical -- for elements created using the buttons on the 3D Objects palette, such as MBlock, MSphere, etc.
- Imported Geometry -- for materials of elements imported from other CAD formats
- Sources -- for light sources

The default catalog and value provided for each element type when you install *LightTools* is shown in the following figure.



Changes to Default Values on Preferences Dialog Box

Default values for the following options have changed, as shown in the following table.

Option	Location	Old Value	New Value
Probabilistic Ray Split for scattering surfaces For more information about the effects of this change, see <i>Probabilistic Ray Tracing Option for Scattering Optical Properties</i> on page 3.	Defaults > Optical Properties > Scattering Surface tabs: Lambertian Scattering, Cos Nth Scattering, or Gaussian Scattering tab)	Off	On Note: The new value applies only when the Ray Propagation Direction is set to Both.
Ray Fan Spacing	Defaults > Ray Trace tab	Linear	Equi-angle
Ray Grid Spacing	Defaults > Ray Trace tab	Linear	Equi-angle
Ray Trace Info	Defaults > Simulation tab	Show Simulation Rays	Preview Rays (only the name of the option changed)
Ray Trace Info	Defaults > Simulation tab	Show Simulation Info	Show Ray Report (only the name of the option changed)
Units (for receivers)	Defaults > Receiver tab	Radiometric Power	Photometric Flux
Units (for light sources)	Defaults > Source tab	Radiometric Power	Photometric Flux
Enable Foci Rendering	General Preferences > System tab	On	Off

Probabilistic Ray Tracing Option for Scattering Optical Properties

For scattering surfaces, you can set the Ray Propagation Direction to Reflect, Transmit, or Both. When you select Reflect or Transmit, *LightTools* traces rays in only one direction after they interact with the surface. When you select Both, *LightTools* can trace both reflected and transmitted rays, but you also have the option of activating the Probabilistic Ray Split option, which causes *LightTools* to randomly choose and trace only one of the two rays, (either reflected or transmitted) at each split. Probabilistic ray tracing is done in such a way that, for a large number of rays traced, a proper power balance is observed for both transmitted and reflected rays. For many systems, probabilistic ray splitting may greatly improve performance.

In previous releases, the default setting for Probabilistic Ray Split option was *off*. In this release, when you set the Ray Propagation Direction to Both, the default setting for Probabilistic Ray Split is *on*, and the message, “Probabilistic ray tracing is activated” is displayed in the Console Window.

This change does not affect existing *LightTools* models. If you restore a *LightTools* model in which the Ray Propagation Direction is set to Both and the Probabilistic Ray Split option is turned off, the Probabilistic Ray Split option remains off.

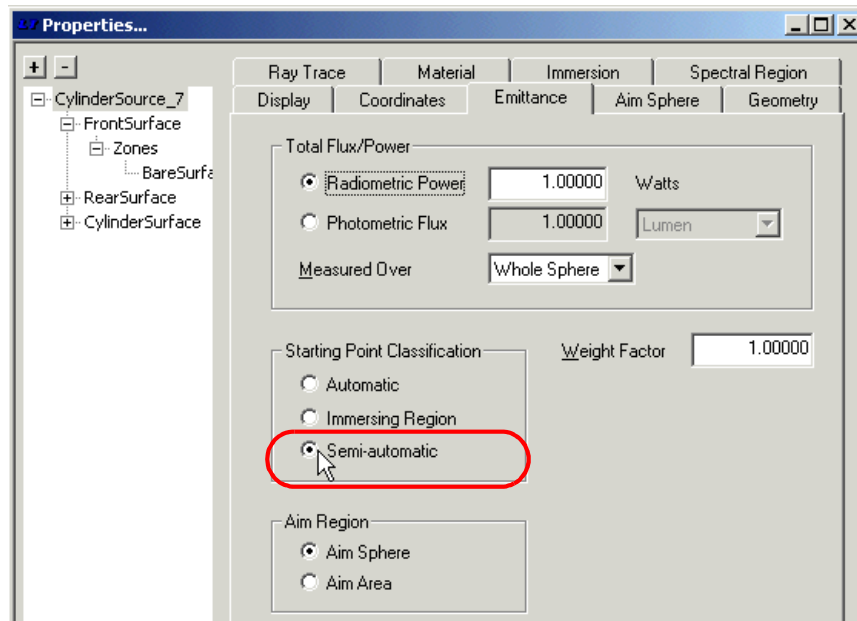
Note: If you do not want to use probabilistic ray splitting, you can turn it off. If you turn off the Probabilistic Ray Split option when the Ray Propagation Direction is set to Both, you override the default setting.

Starting Point Classification for Light Sources

A new option is available for light sources to classify the rays' starting points.

When you run a simulation, *LightTools* has to determine the medium in which the starting points of the rays reside. Starting Point Classification options let you specify the method *LightTools* uses to do this. When you choose the new option, Semi-automatic, *LightTools* does not have to classify the starting point of every light source ray; instead, *LightTools* starts a small number of rays (fewer than ten) from each source, and, if all of them start in the same region, this region becomes the default for starting point classification. Using fewer rays to determine the material can make the simulation faster, especially for models with imported geometry.

Although Semi-automatic mode is faster than Automatic mode, Semi-automatic mode cannot accurately classify the starting material in all situations. For example, if there is some overlap between the source and another element, you should use Automatic mode; however, if there is no overlap between the source and another element, Semi-automatic mode is the better choice.



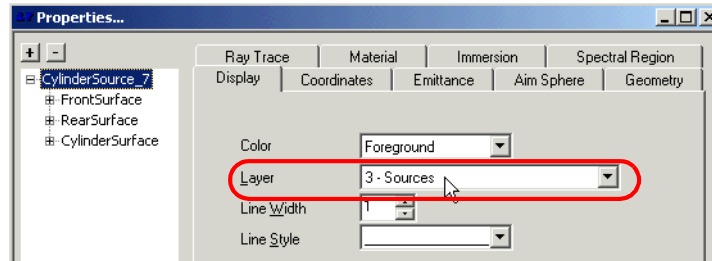
Note: Because light sources are fully contained in one medium (e.g., air, epoxy) in most models, the new default setting for starting point classification option is Semi-automatic. In previous releases, the default setting was Automatic. Also, the light sources included with *LightTools* (as Library elements and otherwise) have the starting point classification option set to Semi-automatic.

You can change the setting for the Starting Point Classification on the Properties dialog box, which controls properties for the selected source. You can also change the *default* setting for Starting Point Classification on the Preferences dialog box, which applies to all newly created sources. To change

the default setting for Starting Point Classification, right-click in the design view and select View Preferences on the shortcut menu; then, expand the Defaults heading and click Source item below the Defaults heading.

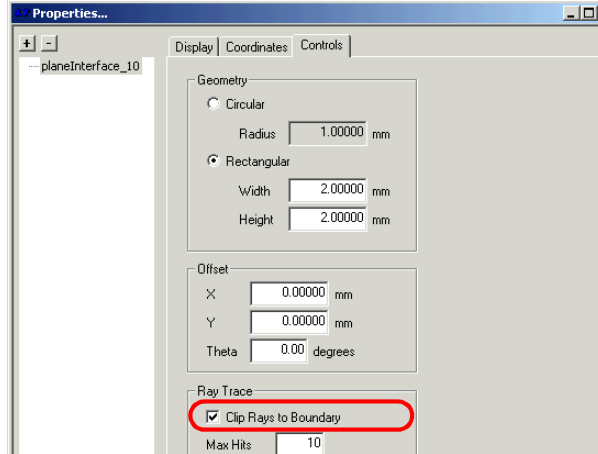
Layer Name Displayed on Properties Dialog Box

The name associated with a layer, previously displayed only on the Layers tab of the Preferences dialog box, is now also displayed on the Display tab of the Properties dialog box for a selected element, as shown in the following figure.



Default Setting Changed for Dummy Planes

For dummy planes, the default setting for Clip Rays to Boundary option is now *on* (enabled). If you would like to change the setting, select the dummy plane, right-click, and select Properties on the shortcut menu. Click on the Controls tab to see the Clip Rays to Boundary option, which is in the Ray Trace section at the bottom of the tab, shown in the following figure.



Changes to Glass Catalogs

Note: The *LightTools* glass database does not support glass names with special characters, such as hyphens. Glass names that include a hyphen in the manufacturer's catalog are written without the hyphen in *LightTools* (e.g., S-FTL10 is written **SFTL10**).

Corning France Glass Catalog

One new glass has been added: C0550. This glass is commonly used for the fabrication of molded glass aspheres. In addition, the availability codes for the other glasses in the database have been updated with the most current information.

Ohara Glass Catalog

Six new glasses have been added to the Ohara glass catalog (LAH80, PBH55, S-BSM21, S-NBM51, S-TIH20, and an i-line glass PBM18Y). Previously, all Ohara i-line glasses were defined using a Laurent's dispersion equation. In *LightTools* 4.0 SR1, these have been modified to use a more accurate Sellmeier dispersion equation. In addition, the price and availability information for all Ohara glasses has been updated in *LightTools* 4.0 SR1.

Ohara has recently modified the dispersion coefficients of seven current glasses, which resulted in small changes to their computed indices. The refractive index changes are very small within the visible region, but may be more significant if used in the UV or IR. The glasses impacted are: S-BSM18, S-BSM81, S-FPL51, S-LAH55, S-LAH79, S-LAL10, and S-TIH53. The dispersion coefficients for these glasses have been updated to the latest information in *LightTools* 4.0 SR1.

Schott Glass Catalog

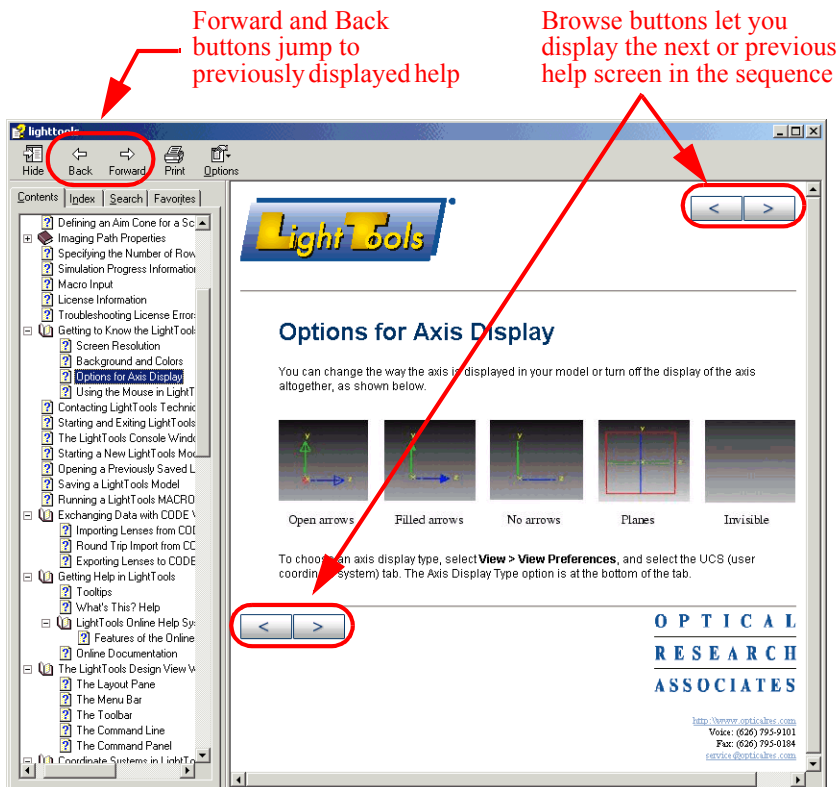
Twelve new glasses have been added to the Schott glass catalog (B-270, KZFS12, N-LAF35, N-LAF36, N-LAK33A, N-LAK34, N-LASF45, N-LASF46, N-PK52A, N-SF19, N-SF57, and N-SF57HHT). In addition, the price and availability information for all Schott glasses has been updated in *LightTools* 4.0 SR1.

Schott recently modified the dispersion coefficients for one glass, N-LASF45, which resulted in a very small change to its computed indices in the ultraviolet. The dispersion coefficient for this glass has been updated to the latest values in *LightTools* 4.0 SR1.

Online Help and Documentation Improvements

The following features have been added to the *LightTools* online help system:

- Browse buttons -- let you page through the help topics as though they were pages in a book. The left- and right-pointing browse button arrows are at the top and bottom of each help screen, as shown in the following figure.
- Forward button -- lets you jump to a previously displayed help screen (enabled only after you have used the Back button). Although the Back button was available in the previous release, the Forward button was inadvertently suppressed from display. As in previous releases, the options for moving forward and back in the sequence of previously displayed help screens is also available from the Options menu.



- The *LightTools API Reference Guide* and the *LightTools Macro User's Guide* are now included in both the online help system and the Electronic Documentation Library. In previous releases, these books were included only in the Electronic Documentation Library (Adobe Acrobat PDF files). You can now use the Search feature in either system to find information contained in these books.
 - To access the online help system, select the menu **Help > Contents and Index** or click the Help button on a dialog box.
 - To access the Electronic Documentation Library, select the menu **Help > Electronic Documentation Library** and select a book title.

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